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The social and environmental drivers of corporate credit ratings: international evidence

Gregor Dorfleitner¹  · Johannes Grebler¹ 

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Abstract We provide evidence of the exogenous impact of environmental and social performance components on credit ratings in North America, Europe, and Asia. In particular, the product innovation dimension is clearly identified as being the dominating driver of credit ratings within the environmental performance in every subsample region. In the social performance dimension, the extent of diversity is a main driver for firms in North America and Europe, but due to cultural reasons, not in Asia. Our results show that the risk mitigation view holds for all significant corporate social or environmental performance variables, but the magnitude of impact differs regionally.

Keywords Credit risk · Credit ratings · Asset4 · CSP · CSR · Sustainability

1 Introduction

We identify the single dimensions of corporate social and environmental performance which have an impact on credit ratings. Our analysis differs from earlier studies through the joint use of more sophisticated and transparent corporate social performance (CSP)¹ measures of Asset4, the identification of the affecting CSP components, the regional differentiation in an international dataset (North America, Europe, and Asia), and the use of an instrumental variables approach in

¹ The term 'corporate social performance' (CSP), as usually used in literature, includes both, the social and the environmental dimension (cf. Ioannou and Serafeim 2012). For that reason, we refer to CSP in case of the overall CSP performance throughout the paper while referring to either the social or environmental dimension which is denoted as social or environmental performance.

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conjunction with commonly employed credit risk models. It is our approach in particular that allows us to provide clearer indications of a causal relationship in terms of how CSP components impact credit ratings, as opposed to the common approaches revealing only correlational relationships.

Dorfleitner et al. (2020) find that out-of-sample prediction quality improves by more than 0.8% in their North America sample if environmental and social performance measures are integrated into an established credit risk model. However, a detailed analysis of the underlying drivers within the social and environmental performance is only available for the USA and suffers from a potential exposure to endogeneity (e.g., Oikonomou et al. 2014) or rather simplistic credit risk modeling (e.g., Attig et al. 2013). Endogeneity, in terms of the reverse causality problem, is crucial to the analysis of the relationship between CSP and credit ratings. On the one hand, CSP is commonly expected to have a positive impact on credit ratings. On the other hand, though, the opposite direction of impact is also conceivable, in the way that firms with better credit ratings save financing costs and are therefore able to increase their spending on CSP. Most studies on this topic use lagged independent variables to deal with the endogeneity problem, which is the first step, but nonetheless appears not to be insufficient. Some (e.g., Bauer et al. 2009; Jiraporn et al. 2014) estimate a two-stage least squares (2SLS) model, which is generally appropriate for reducing endogeneity, but this approach does not meet the standards of current literature on credit risk because credit ratings need to be considered as categorical, and the employed OLS estimation is unable to model this. As a consequence, an international analysis with an adequate credit risk model and a sufficient approach to identify relevant CSP aspects which have a causal impact on credit ratings is still lacking in the literature.

We fill this gap by applying the analysis to both CSP in general and its components in an international dataset including Asset4 CSP measures based on the two-stage predictor substitution (2SPS) with an established credit risk model in the second stage. Asset4 CSP measures are internationally available on a granular level, allowing us to drive our analysis consistently for North America, Europe, and Asia. The environmental performance comprises measures for emission reduction, product innovation, and resource reduction, while the social performance dimension spans the categories product responsibility, community, human rights, diversity, respectively, equal opportunities, employment quality, health, and training. Asset4 scores are, compared to other providers such as MSCI-KLD, methodologically superior and more transparent (Chatterji and Levine 2006). Concerning established credit risk models, endogeneity can be mitigated through the two-stage predictor substitution (2SPS), which is an implementation of the instrumental variable approach for nonlinear models. In the first stage, we regress the CSP scores on instruments such as the average CSP level of firms located in the same area (Jiraporn et al. 2014) and measures for so-called ‘national business systems’ (NBS) (Whitley 1999) in terms of the political, the labor, education, and the cultural system according to Ioannou and Serafeim (2012) as well as on further control variables. All instruments have an impact on CSP as shown in the above studies, but obviously have no direct impact on credit ratings. Hence, they qualify as instruments. Finally, in the second stage, credit ratings are regressed on the CSP estimate of the first

stage. We choose the ordered choice model as introduced by Kaplan and Urwitz (1979) and as applied in many studies (e.g., Dimitrov et al. 2015; Baghai et al. 2014; Alp 2013; Jiang et al. 2012; Becker and Milbourn 2011; Blume et al. 1998).

We show that within the environmental performance, the innovation dimension has the most significant impact on credit ratings. This is true for North America, Europe, and Asia. However, the magnitude of the effect differs between these regions. The impact of social performance in North America and Europe is mainly driven by diversity, while no social aspects are relevant for Asia. Our findings are important for real-world decision makers, as they enable the identification of those CSP dimensions that have an impact on credit ratings. As the positive link between selected CSP components and credit ratings indicates a lower default risk of firms with high CSP levels, practitioners may profit from this knowledge through a more precise evaluation of credit risk and the resulting incentives to act. Also, as better credit ratings are associated with lower financing costs, our results help to target investments efficiently, leading to cost savings. Particular investments in environmental product innovation are far more impactful than those for emission and resource reduction. Likewise, among the social dimensions, diversity and employment quality are to be prioritized in investment decisions.

The remainder of the paper is organized as follows. We review the related literature and consider theory in Sect. 2. Section 3 describes our international data set and Sect. 4 introduces the employed instrumental variable and ordered probit methodology. Sect. 5 presents the empirical results followed by Sect. 6 with robustness tests. Finally, Sect. 7 concludes the paper.

2 Theoretical considerations

A recent stream in literature analyzes the relationship between CSP and credit ratings. Dorfleitner et al. (2020), Stellner et al. (2015), Jiraporn et al. (2014), Oikonomou et al. (2014), Attig et al. (2013), Bauer and Hann (2010), Bauer et al. (2009) and Frooman et al. (2008) all contribute important insights to the prevailing positive link between CSP and credit ratings. However, the combination of a state of the art credit risk model and an econometrical framework to identify causal relationships rather than simple correlations has not yet been pursued.

In theory, there are two possible relationships between CSP and credit ratings. The overinvestment view regards CSP as being a waste of scarce resources, but there is little evidence of this perspective. In contrast, the risk mitigation view is based on the idea that sustainable companies face lower risks.

For US firms, Oikonomou et al. (2014), Attig et al. (2013), Bauer and Hann (2010), and Frooman et al. (2008) find a strong positive link between the KLD environment score and credit ratings. Dorfleitner et al. (2020) report an improved prediction quality in their North America sample if they consider environmental performance in their model. Environmental practices affect the solvency of borrowing firms by determining their exposure to potentially costly legal, reputational, and regulatory risks according to Bauer and Hann (2010). Following the correlation-based evidence of the above-mentioned previous studies, we also

conjecture a causal impact of (some of) the components of environmental performance on credit ratings. More concretely, we expect at least one of the environmental performance dimensions of emission reduction, resource reduction, and environmental innovation to have a positive impact on credit ratings.

Bauer et al. (2009) have already evidenced a positive relationship between the social pillar of CSP and credit ratings. Dorfleitner et al. (2020) report an improved prediction quality for North America, regarding a model that considers social performance. Through the breakdown into individual components, Attig et al. (2013) find that KLD social strengths and concerns correlate with credit ratings of US firms and that the individual components of CSP related to primary stakeholder management (i.e., community relations, diversity, and employee relations) matter most in explaining a firm's creditworthiness. Oikonomou et al. (2014) identify a similar relationship for community, employment, environment, and product safety. The positive link between CSP components and creditworthiness appears plausible especially for employee relations, as these are associated with greater productivity, higher profitability, higher firm value, and superior shareholder returns (e.g., Huselid 1995; Prennushi et al. 1997; Ichniowski and Shaw 1999; Edmans 2011). Bauer et al. (2009) argue that employee relations affect bondholders through their influence on firm risk. Thus, firms with sound and competitive employment practices can enhance their capacity to generate higher and more stable cash flows while simultaneously preempting or mitigating the harmful behavior of dissatisfied employees. In contrast, poor employee relations can limit firms' access to human capital, lead to the exit of valuable employees, increase both litigation and reputation risks, and raise transaction costs. Hence, we also expect a causal impact of (some of) the components of social performance on credit ratings. More narrowly, at least one of the social performance dimensions of product responsibility, community, human rights, diversity, employment quality, health, or training performance is expected to have a positive impact on credit ratings.

For the impact of CSP on some types of risk, it was already shown that this relationship varies regionally, e.g., Utz (2018) finds evidence for the risk mitigation view on the impact of CSP on idiosyncratic risk, while the overinvestment view seems to apply in Asia-Pacific. Some previous research on the relationship between CSP and credit ratings is provided for both North America and Europe. Jiraporn et al. (2014) find that the CSP policies of US firms are affected by CSP. Firms with high CSP have better credit ratings, i.e., by 4.5% for a one standard deviation change in the CSP level. In contrast, Stellner et al. (2015) find no relevance of Asset4's overall CSP rating for credit ratings regarding Europe. Dorfleitner et al. (2020) also confirm regional deviations between North America and Europe in the explanation and prediction quality of credit ratings through CSP. While social performance is a predictor for credit ratings in both North America and Europe, this is only the case for environmental performance in North America in their setting. Given there is an impact, we expect the effect of environmental and social performance categories on credit ratings to differ regionally.

3 Data

Our sample includes S&P credit ratings, Asset4 CSP measures, and some instrumental and control variables. After excluding financial firms based on the Thomson Reuters Business Classification (TRBC), the final data set encompasses 1212 firms with 7032 firm-year observations. Tables 1 and 2 present descriptive statistics of the credit rating variable, respectively, of the Asset4 scores, the instruments, and the control variables. The regional classification into North America, Europe, and Asia is described in Table 3.

The dependent variable of the second stage regression is the long-term borrower credit rating of S&P. These credit ratings reflect the creditworthiness of a borrower for a time horizon of at least 1 year. The referring rating grades comprise AAA, AA, A, BBB, BB, B, CCC, CC, and D. The default category D is assigned when obligors are overdue for their required payments. Vazza, and Kraemer (2017) provide further information on the rating methodology.

Asset4 publishes annual corporate social and environmental performance scores, which can be interpreted as being external measures for sustainable business models (Ioannou and Serafeim 2012; Chatterji et al. 2016; Humphrey et al. 2012). The scores include information from publicly available sources such as websites, SEC filings such as 10-K, DEF 14A, and 10-Q, sustainability reports, media sources, and NGO reports. The methodology is based on more than 700 questions about the fulfillment of a specific sustainable topic. Each question results in one data point. These pieces of information are aggregated to categories, which again are condensed to pillars. The approach of Asset4 allows us to overcome weaknesses

Table 1 This table reports on the total number of firms and observations per rating class including the partial quantity of rating upgrades and downgrades compared with the previous period for the entire sample

Rating	North America			Europe			Asia		
	Total	Upgr.	Downgr.	Total	Upgr.	Down.	Total	Upgr.	Downgr.
AAA	52	0	0	9	0	0	5	0	0
AA	131	4	6	70	1	2	158	2	1
A	841	30	9	375	17	11	277	11	9
BBB	1918	57	57	715	18	37	278	7	9
BB	1293	60	69	231	9	27	84	3	3
B	432	15	60	80	4	12	14	1	6
CCC	34	1	14	13	1	7	4	0	2
CC	2	0	2	3	0	3	0	0	0
D	6	0	6	4	0	4	3	0	3
Total	4709	167	223	1500	50	103	823	24	33

We use S&P long-term borrower credit ratings reflecting the obligor's creditworthiness over a long-term time horizon (greater than one year)

Table 2 This table reports the descriptive statistics for the asset scores, the instrumental variables, and control variables in our sample covering the period from 2002 until 2018

	North America				Europe				Asia						
	Mean	SD	25%	75%	Mean	SD	25%	75%	Mean	SD	25%	75%			
	<i>CSP variables</i>														
CSP score	54.04	28.74	25.45	54.67	82.84	81.63	17.21	76.10	89.46	93.56	70.08	26.45	57.69	81.67	90.11
Environm. score	53.02	31.59	19.28	53.09	86.14	80.77	19.34	75.59	90.30	93.66	74.47	27.35	65.64	89.01	93.43
Social score	55.03	29.05	26.78	58.10	82.88	82.51	17.55	77.02	90.22	94.71	65.71	28.87	45.89	77.76	89.08
Emission score	52.28	31.84	18.81	52.03	86.00	81.35	19.52	78.54	90.33	93.84	74.04	27.72	60.40	88.89	93.80
Env. inno. score	50.52	30.84	21.92	40.24	83.43	71.89	29.32	48.36	87.32	95.71	70.71	28.99	45.75	83.52	95.78
Resources score	53.58	32.18	19.63	57.58	87.23	79.31	17.95	73.12	87.50	91.95	70.84	26.79	58.34	82.86	90.88
Prod. resp. score	53.33	28.14	28.44	49.71	82.45	72.10	25.43	52.39	84.13	94.07	59.61	30.35	35.04	62.24	89.56
Comm. score	56.33	29.26	28.91	60.02	84.28	70.32	23.69	55.16	78.95	90.41	64.83	28.25	46.70	74.24	88.68
Hum. rights score	53.68	32.54	22.13	37.43	90.79	76.48	26.98	57.73	92.07	94.71	61.88	30.16	30.26	66.33	93.16
Diversity score	54.19	28.69	24.79	52.96	84.24	75.74	24.13	61.20	88.08	94.61	63.22	34.01	23.89	83.30	92.23
Employm. score	53.12	29.51	23.67	54.41	82.11	74.07	23.20	58.78	84.05	93.06	52.44	28.58	26.41	52.26	80.06
Health score	53.22	29.83	26.18	49.24	84.67	75.68	23.61	56.89	87.42	96.32	58.89	29.27	31.60	61.46	88.92
Training score	48.99	30.46	18.45	49.57	79.86	80.09	16.41	75.07	86.40	91.80	63.34	27.77	41.55	75.06	85.72
<i>Instruments</i>															
∅ CSP score ^a	54.01	4.96	52.15	55.82	56.99	81.12	8.40	76.41	82.46	86.91	70.03	15.50	62.60	70.17	83.37
∅ Environm. score ^a	53.01	5.11	50.34	54.54	56.69	80.30	9.21	74.18	81.80	86.83	74.39	17.16	70.55	77.65	88.13
∅ Social score ^a	55.01	4.99	53.99	57.13	57.32	81.94	8.67	77.30	83.27	87.59	65.66	14.91	59.04	65.03	78.94
∅ Emission score ^a	52.28	5.61	49.33	53.18	55.08	80.95	9.09	76.86	81.73	86.52	73.96	17.77	67.90	79.07	88.57
∅ Env. inno. score ^a	50.53	3.90	49.80	51.38	53.74	71.85	13.90	59.69	73.93	82.17	70.64	17.33	62.17	72.07	83.92
∅ Resources score ^a	53.57	5.66	50.18	55.80	57.29	78.81	8.60	74.69	79.52	84.26	70.83	15.32	67.39	71.92	82.54
∅ Prod. resp. score ^a	53.24	3.27	52.99	53.94	55.14	71.86	13.22	62.12	73.15	82.80	59.59	12.89	54.24	63.15	66.53

Table 2 continued

	North America				Europe				Asia						
	Mean	SD	25%	Med.	75%	Mean	SD	25%	Med.	75%	Mean	SD	25%	Med.	75%
	Ø Comm. score ^a	56.26	4.71	54.81	56.52	57.89	70.04	10.68	65.20	72.28	75.99	64.74	13.03	57.93	64.44
Ø Hum. rights score ^a	53.71	6.33	47.17	57.76	58.96	76.33	12.36	70.03	77.64	85.09	61.81	17.16	51.22	59.94	80.14
Ø Diversity score ^a	54.15	4.17	54.13	54.71	56.73	75.44	12.23	69.82	76.57	84.17	63.24	20.52	46.29	62.77	85.62
Ø Employm. score ^a	53.07	7.01	53.55	55.44	56.38	73.71	10.70	69.24	75.15	80.04	52.41	14.61	37.80	49.63	66.75
Ø Health score ^a	53.19	4.43	52.72	54.00	54.14	75.36	9.70	71.35	74.84	80.89	58.84	11.92	50.07	57.65	65.71
Ø Training score ^a	49.04	5.01	46.75	51.30	52.29	79.36	9.36	74.42	82.45	85.38	63.36	11.00	55.29	63.15	70.86
Regulatory framew.	17.33	1.10	17.00	17.00	17.00	16.52	10.12	12.00	14.00	20.00	29.97	13.36	24.00	37.00	37.00
Anti-self-dealing	0.65	0.00	0.65	0.65	0.65	0.50	0.27	0.28	0.38	0.95	0.62	0.20	0.50	0.50	0.58
Corruption	0.67	0.05	0.68	0.68	0.68	0.84	0.86	0.54	0.54	0.73	0.78	0.86	0.72	0.72	0.72
Political orientation	94.73	28.10	103.13	103.13	103.13	26.05	43.48	0.31	0.34	99.76	19.81	39.97	0.01	0.01	0.01
Union density	13.46	4.88	12.00	12.00	12.00	27.01	17.68	19.50	22.20	28.80	20.66	5.39	19.20	19.20	20.10
Skilled labor	6.12	0.10	6.09	6.09	6.09	6.26	0.48	5.78	6.30	6.46	5.13	0.95	4.50	4.50	6.06
Power distance	39.92	0.27	40.00	40.00	40.00	44.12	14.07	35.00	35.00	57.00	59.42	10.59	54.00	54.00	68.00
Individualism	90.10	3.02	91.00	91.00	91.00	73.85	11.82	68.00	71.00	89.00	39.42	10.44	25.00	46.00	46.00
<i>Control variables</i>															
Interest coverage	11.97	19.52	2.48	5.57	12.20	9.04	14.19	2.85	5.27	9.54	23.35	29.16	4.87	11.32	26.89
Operating margin	13.61	8.64	7.04	12.32	18.99	12.41	9.04	5.64	10.23	16.66	10.83	8.65	4.66	7.76	14.43
Total debt	45.52	20.72	30.55	42.99	58.18	46.64	16.85	33.48	45.91	58.34	37.58	19.20	23.02	37.01	51.94
US\$ billions	20.34	46.62	2.83	6.57	17.49	25.90	35.81	4.94	11.46	31.72	20.50	29.67	6.13	11.69	24.38
Beta	0.56	0.49	0.15	0.45	0.89	0.55	0.48	0.16	0.44	0.91	0.59	0.48	0.16	0.49	1.00
Idiosyncratic risk	2.03	1.15	1.28	1.81	2.66	1.96	1.15	1.21	1.70	2.47	1.92	0.93	1.24	1.67	2.37
Dividend payer	0.71	0.45	0.00	1.00	1.00	0.88	0.33	1.00	1.00	1.00	0.96	0.19	1.00	1.00	1.00
Market/Book	3.00	2.22	1.48	2.32	3.74	2.61	2.04	1.25	2.02	3.18	1.68	0.78	1.08	1.48	2.02

Table 2 continued

	North America				Europe				Asia			
	Mean	SD	25%	75%	Mean	SD	25%	75%	Mean	SD	25%	75%
Retained earnings	0.25	0.30	0.06	0.44	0.19	0.19	0.06	0.18	0.29	0.16	0.17	0.39
Capital expenditure	4.86	3.03	2.26	7.21	4.45	2.69	2.26	3.84	5.40	2.83	3.10	7.50
Cash holdings	0.11	0.11	0.03	0.15	0.10	0.08	0.05	0.08	0.13	0.10	0.06	0.17
Tangibility	0.34	0.26	0.11	0.26	0.31	0.20	0.13	0.28	0.35	0.19	0.19	0.48
R&D	0.02	0.04	0.00	0.02	0.02	0.03	0.00	0.00	0.02	0.03	0.00	0.03
GDP growth	0.02	0.01	0.02	0.03	0.01	0.02	0.01	0.02	0.02	0.02	0.01	0.02
N	4709				1500				823			

^aCountry average

Table 3 This table reports the breakdown of our data panel on regions and countries which are the base for our panel selection when analyzing regional differences

Continent	Countries	Observations	Firms
North America	Canada, USA	4709	813
Europe	Belgium, Switzerland, Germany, Denmark, Spain, Finland, France, Great Britain, Greece, Italy, Netherlands, Norway, Portugal, Sweden	1500	224
Asia	Hong Kong, India, Japan, Malaysia, Singapore, Taiwan	823	175
Total		7032	1212

of the KLD, FTSE4Good, and Dow Jones-rating approaches such as lack of transparency (Chatterji and Levine 2006) as far as possible. Following El Ghoul et al. (2017), we also derive the overall CSP performance from aggregating the environmental and social pillars. The final scores range from zero to 100% with high levels reflecting high CSP. The distribution of Asset4 scores may be skewed as the required information to assign a rating is easier to obtain from larger and high-CSP companies as badly performing firms are unlikely to provide the necessary information. As a consequence, we include size and a large set of further control variables in our models. The data is free from survivorship bias as post-bankruptcies, mergers, and other causes of de-listings are accounted for and the corresponding stocks are retained in the sample. A detailed description of the CSP scores is displayed in Table 4.

Our first instrument for CSP is selected based on the study by Jiraporn et al. (2014), who ascertain that the CSP policy of surrounding firms to have an impact on firm CSP performance. Thus we apply the average CSP score of all (available) surrounding firms within the same country. Second, a further set on instruments is included, namely the drivers for CSP in terms of "national business systems" (NBS) according to Whitley (1999), such as the political, labor, education, and the cultural systems. The theoretical NBS category political system is measured with the aid of a regulations index, an anti-self-dealing index, an absence-of-corruption index, and an index for left/center political orientation. The education and labor system is modeled by union density and a skilled labor index while the cultural system involves indices for power distance and individualism. A detailed description of the variables of each NBS category is presented in Table 5.

We add further control variables based on previous research. Following Standard&Poor's (2013) and Merton (1974), we include the three-year averages of the operating margin, the total debt, and the interest coverage ratios. The interest coverage ratio is transformed as suggested by Blume et al. (1998). We set negative values to zero because these could be due to low interest payments or high negative earnings, while both explanations have a contradictory impact on credit ratings. By assuming decreasing marginal effects for high levels of interest coverage, we cap the three-year average at 100. To model a non-linear shape, we transform the

Table 4 This table presents the description of our selection on Asset4 CSP measures. Source: Asset4

Variable	Definition
Emission	The emission reduction category measures a company's management commitment and effectiveness toward reducing environmental emission in the production and operational processes. It reflects a company's capacity to reduce air emissions (greenhouse gases, F-gases, ozone-depleting substances, NOx and SOx, etc.), waste, hazardous waste, water discharges, spills, or its impacts on biodiversity and to partner environmental organisations to reduce the environmental impact of the company in the local or broader community. Source: Thomson Reuters Datastream; Mnemonic ENER
Env. inno.	The product innovation category measures a company's management commitment and effectiveness toward supporting the research and development of eco-efficient products or services. It reflects a company's capacity to reduce the environmental costs and burdens for its customers, thereby creating new market opportunities through new environmental technologies and processes or eco-designed, dematerialized products with extended durability. Source: Thomson Reuters Datastream; Mnemonic ENPI
Resources	The resource reduction category measures a company's management commitment and effectiveness toward achieving an efficient use of natural resources in the production process. It reflects a company's capacity to reduce the use of materials, energy or water, and to find more eco-efficient solutions by improving supply chain management. Source: Thomson Reuters Datastream; Mnemonic ENRR
Prod. resp.	The customer/product responsibility category measures a company's management commitment and effectiveness toward creating value-added products and services upholding the customer's security. It reflects a company's capacity to maintain its license to operate by producing quality goods and services integrating the customer's health and safety, and preserving its integrity and privacy, also through accurate product information and labelling. Source: Thomson Reuters Datastream; Mnemonic SOPR
Comm.	The community category measures a company's management commitment and effectiveness toward maintaining the company's reputation within the general community (local, national, and global). It reflects a company's capacity to maintain its license to operate by being a good citizen (donations of cash, goods or staff time, etc.), protecting public health (avoidance of industrial accidents, etc.), and respecting business ethics (avoiding bribery and corruption, etc.). Source: Thomson Reuters Datastream; Mnemonic SOCO
Hum. rights	The human rights category measures a company's management commitment and effectiveness towards respecting the fundamental human rights conventions. It reflects a company's capacity to maintain its license to operate by guaranteeing the freedom of association and excluding child, forced or compulsory labor. Source: Thomson Reuters Datastream; Mnemonic SOHR
Diversity	The diversity and opportunity category measures a company's management commitment and effectiveness towards maintaining diversity and equal opportunities in its workforce. It reflects a company's capacity to increase its workforce loyalty and productivity by promoting an effective life-work balance, a family friendly environment and equal opportunities regardless of gender, age, ethnicity, religion or sexual orientation. Source: Thomson Reuters Datastream; Mnemonic SODO
Employm.	The employment quality category measures a company's management commitment and effectiveness towards providing high-quality employment benefits and job conditions. It reflects a company's capacity to increase its workforce loyalty and productivity by distributing rewarding and fair employment benefits, and by focusing on long-term employment growth and stability by promoting from within, avoiding lay-offs, and maintaining relations with trade unions. Source: Thomson Reuters Datastream; Mnemonic SOEQ

Table 4 continued

Variable	Definition
Health	The health & safety category measures a company's management commitment and effectiveness towards providing a healthy and safe workplace. It reflects a company's capacity to increase its workforce loyalty and productivity by integrating into its day-to-day operations a concern for the physical and mental health, well-being, and stress level of all employees. Source: Thomson Reuters Datastream; Mnemonic SOHS
Training	The training and development category measures a company's management commitment and effectiveness towards providing training and development (education) for its workforce. It reflects a company's capacity to increase its intellectual capital, workforce loyalty, and productivity by developing the workforce's skills, competences, employability, and careers in an entrepreneurial environment. Source: Thomson Reuters Datastream; Mnemonic SOTD

Table 5 This table provides an overview of the NBS categories (Whitley 1999) and their variables, which we select as instruments for use during the first stage of our 2SPS regressions based on the work of Ioannou and Serafeim (2012)

NBS category	Variable	Definition
Political system	Regulatory framework	Strengths of laws that encourage competition in the country (measured as of 2017). Source: IMD World Competitiveness Report 2017
	Anti-self-dealing index	The extent to which laws restrict insider trading (measured as of 2001). Source: La Porta et al. (2006)
	Corruption	Inverse corruption score (measured as average of 1996-2017). Source: World Bank
	Political orientation	The extent to which both the Chief Executive and the largest party in Congress are politically left respectively central (measured as proportion of the time period 1928-1995). Source: Botero et al. (2004)
Education and labor system	Union density	The proportion of union members of all employees based on administrative and survey data (measured as average as of 2002–2017). Source: OECD and J.Visser, ICTWSS database (Institutional Characteristics of Trade Unions, Wage Setting, State Intervention and Social Pacts)
	Skilled labor	The extent to which skilled labor is available in a country (measured as of 2017). Source: IMD World Competitiveness Report 2017
Cultural system	Power distance	The degree of acceptance for inequality in the distribution of power inside organisations and institutions (measured as of 1973). Source: Hofstede et al. (2010) and Hofstede (2001)
	Individualism	The extent of including individuals into groups (measured as of 1973). Source: Hofstede et al. (2010) and Hofstede (2001)

interest coverage C_{it} of a company i in year t into four subvariables c_{it}^A , c_{it}^B , c_{it}^C , c_{it}^D according to:

	c_{it}^A	c_{it}^B	c_{it}^C	c_{it}^D
if $C_{it} \in [0, 5)$	C_{it}	0	0	0
if $C_{it} \in [5, 10)$	5	$C_{it} - 5$	0	0
if $C_{it} \in [10, 20)$	5	5	$C_{it} - 10$	0
if $C_{it} \in [20, 100)$	5	5	10	$C_{it} - 20$

We control for firm size for two reasons. On the one hand, larger companies are less likely to default (Altman et al. 1977). On the other hand, the CSP scores are likely to be skewed with respect to firm size. Referring to Blume et al. (1998), we also control for systematic risk (market model beta) as well as idiosyncratic risk. The firms' willingness to pay dividends can also be an indicator of credit risk (Hoberg and Prabhala 2009). Furthermore, firms with a high market-to-book ratio may be less likely to default (Pástor and Pietro 2003). Retained earnings are used to proxy a company's life cycle phase (DeAngelo et al. 2006), whereas established companies tend to have better ratings (Fons 1994). Additionally, capital expenditure has been evidenced to influence credit risk (Tang 2009). We include cash among the controls because firms in distress tend to hold precautionary savings (Acharya et al. 2012). Furthermore, tangibility may have an impact on credit risk (Rampini and Viswanathan 2013). As S&P credit ratings appear to change at least to some extent pro-cyclically, the gross domestic product (GDP) growth rate is employed to model the business cycle. A detailed description of the above control variables is presented in Table 6. Time fixed effects are intended to catch all remaining systematic effects (Elton et al. 2001). Finally, we also control for industry-fixed effects. An overview of industries is delineated in Table 7.

In order to control for multicollinearity, we calculate variance inflation factors (VIF) for overall CSP scores, instruments, and control variables. If necessary, input variables are discarded in a selection process in order to maintain only VIFs below 10 indicating sufficient low exposure to multicollinearity. The variable 'individualism' is discarded in that process for the combined dataset of all three regions. An estimation based on the full set of instruments is presented in the robustness checks.

4 Methodology

As CSP and credit ratings are likely to be highly endogenous, our analysis is based on the instrumental variable approach to mitigate the bias due to the endogeneity of the input variables. Thus in the first stage, we regress the respective CSP factor on selected instruments and controls. All factors that can explain variation in CSP but do not affect credit ratings qualify as instruments.

Table 6 This table describes used control variables that are firm specific except for GDP growth. All of them are delivered by Worldscope and Thomson Reuters Datastream

Variable	Definition
Interest coverage	Earnings before interest and taxes divided by interest expense on debt (3-year averages; floored at 0; capped at 100). To model the nonlinear shape of the interest coverage ratio, the interval of (0–5) is assigned to sub-variable A, (5–10) to sub-variable B, (10–20) to sub-variable C, and (20–100) to sub-variable D. Source: Thomson Reuters Datastream; Mnemonic WC08291
Operating margin	The ratio of operating income and net sales or revenues (3-year averages). Source: Thomson Reuters Datastream; Mnemonics WC08316
Total debt	The ratio of long-term plus short-term debt and total capital plus short-term debt (3-year averages). Source: Thomson Reuters Datastream; Mnemonic WC08221
Size	The percentile of the market capitalization among those of companies listed at the New York Stock Exchange (NYSE). Source: Thomson Reuters Datastream; Mnemonic WC07210
Idiosyncratic risk	The root mean squared error of a market model estimation based on daily stock and local market index returns within the time horizon of one year if at least 50 observations are available. Source: Thomson Reuters Datastream; Mnemonics X(LI), X(RI)
Beta	The systematic risk beta of the market model as described for the calculation of idiosyncratic risk. Source: Thomson Reuters Datastream; Mnemonics X(LI), X(RI)
Dividend payer	Positive dividends per share indicated by a dummy variable. Source: Thomson Reuters Datastream; Mnemonic WC05101
Market/Book	The ratio of common equity and its balance sheet value. Source: Thomson Reuters Datastream; Mnemonic MTBV
R&D	All costs related to the development of new processes, techniques, applications, and products that are intended for commercial exploitation. Missing values are replaced by zero. Source: Thomson Reuters Datastream; Mnemonics WC01201, WC02999
Retained earnings	The ratio of accumulated earnings after tax that have not been paid as dividends or allocated to allowances and total assets. Source: Thomson Reuters Datastream; Mnemonics WC03495, WC02999
Capital expenditures	The ratio of capital expenditures and total assets. Source: Thomson Reuters Datastream; Mnemonics WC08416, WC02999
Cash holdings	The ratio of cash plus short-term investments and total assets. Source: Thomson Reuters Datastream; Mnemonics WC02001, WC02999
Tangibility	The ratio of net property, plant, and equipment and total assets. Source: Thomson Reuters Datastream; Mnemonics WC02501, WC02999
GDP growth	The growth rate of the gross domestic product (GDP) per year. Source: Thomson Reuters Datastream; Mnemonic GDP.D (in combination with the two letter country code)

The first stage regression includes the CSP measure $x_{i,t-1}$ as a dependent variable, and instrument variables $z_{i,t-1}$ and controls $c_{i,t-1}$ as explanatory (vectorial) variables with referring coefficients vectors β_z and β_c as described by:

$$x_{i,t-1} = z'_{i,t-1}\beta_z + c'_{i,t-1}\beta_c + \epsilon_{1,i,t}. \quad (1)$$

This estimation is based on OLS. To account for the panel structure of our data, we

Table 7 This table reports on industry classes according to the economic sector level of Thomson Reuters Business Classification (TRBC). Financial firms are excluded

Industry Class	Observations	Industry Class	Observations
Basic materials	624	Oil and Gas	569
Consumer goods	1050	Technology	527
Consumer services	1169	Telecommunications	213
Healthcare	539	Utilities	677
Industry	1664	Total	7032

include time-fixed effects among the controls and clustering of standard errors at the firm level.

The second stage regression is based on a model that was initially introduced by Kaplan and Urwitz (1979) and further developed by (e.g. Blume et al. (1998)). This model is applied in many studies (e.g., Dimitrov et al. 2015; Baghai et al. 2014; Alp 2013; Jiang et al. 2012; Becker and Milbourn 2011). Our threshold model is based on an unobserved linking variable y_{it}^* , which represents the creditworthiness of a firm i and year t and calculates

$$y_{it}^* = \hat{x}_{i,t-1}\beta_{\hat{x}} + \mathbf{c}'_{i,t-1}\beta_c + \epsilon_{2,i,t}, \tag{2}$$

where $\hat{x}_{i,t-1}$ is the CSP estimate of the first stage and $\mathbf{c}_{i,t-1}$ represents the vector of observed explanatory variables of firm i in the year $t - 1$. Accordingly, $\beta_{\hat{x}}$ is the CSP coefficient while β_c is a vector of coefficients for control variables. The linking variable y_{it}^* is continuous and its range comprises the set of real numbers. In our study, we consider nine different levels of credit ratings (i.e., AAA, AA, A, BBB, BB, B, CCC, C, and D). The variable R_{it} defines the rating category of firm i and year t . It takes the value 9 if firm i has a rating of AAA, 8 if AA, 7 if A, 6 if BBB, 5 if BB, 4 if B, 3 if CCC, 2 if CC and 1 if D in year t . Thus the first stage of our estimation maps the credit ratings into a partition of the unobserved linking variable y_{it}^* as follows:

$$R_{it} = \begin{cases} 9 & \text{if } y_{it}^* \in [\mu_8, \mu_9) & (AAA) \\ 8 & \text{if } y_{it}^* \in [\mu_7, \mu_8) & (AA) \\ 7 & \text{if } y_{it}^* \in [\mu_6, \mu_7) & (A) \\ 6 & \text{if } y_{it}^* \in [\mu_5, \mu_6) & (BBB) \\ 5 & \text{if } y_{it}^* \in [\mu_4, \mu_5) & (BB) \\ 4 & \text{if } y_{it}^* \in [\mu_3, \mu_4) & (B) \\ 3 & \text{if } y_{it}^* \in [\mu_2, \mu_3) & (CCC) \\ 2 & \text{if } y_{it}^* \in [\mu_1, \mu_2) & (CC) \\ 1 & \text{if } y_{it}^* \in (\mu_0, \mu_1) & (D), \end{cases} \tag{3}$$

where μ_1, \dots, μ_8 are partition points independent of time t while $\mu_0 = -\infty$ and $\mu_9 = \infty$. Thresholds are not given ex-ante but instead determined in the statistical estimation procedure. The assumption that ϵ_{it} is normally and independently

distributed with a mean of 0 and a variance of 1 is ensured in the estimation. We obtain a certain rating (i.e., a realization of R_{it}) and a realization of the input variables for each company and each year during the observation period.² The explanatory variables are lagged by one period to model the status of information at the time of prediction. Table 8 provides an overview of the input factors, boundaries, and outputs of the estimated models.

Following the assumption that $\epsilon_{2,it}$ is normally and independently distributed with a mean of 0 and a variance of 1 and given $\hat{x}_{i,t-1}$ and $\mathbf{c}_{i,t-1}$, the probability of assignment to a specific rating class can be calculated according to:

$$P(R_{it} = j | \hat{x}_{i,t-1}, \mathbf{c}_{i,t-1}) = \Phi(\mu_j - \hat{x}_{i,t-1}\beta_{\hat{x}} + \mathbf{c}_{i,t-1}\beta_{\mathbf{c}}) - \Phi(\mu_{j-1} - \hat{x}_{i,t-1}\beta_{\hat{x}} + \mathbf{c}_{i,t-1}\beta_{\mathbf{c}}) \quad (4)$$

with $j = 1, \dots, 9$, $\mu_0 = -\infty$ and $\mu_9 = \infty$.

5 Empirical tests

To test our hypotheses, we estimate a total of 13 different model specifications. Starting with a model of overall CSP, two further models include the environmental or the social pillar respectively. Further models focus on each of the components contained in the pillars, respectively. Concerning environmental performance, we estimate models for *emission*, *environmental innovation*, and *resources*. Referring to social performance, additional models include *product responsibility*, *community*, *human rights*, *diversity*, *employment quality*, *health*, and *training*. All of these models are estimated on the pooled dataset of North America, Europe, and Asia in two stages based on the 2SPS approach. Each model considers one CSP score as a dependent variable in the first stage regressed on instrumental and control variables. The corresponding second step includes the credit rating as the dependent variable with both the CSP estimate and the same controls from the first stage as independent variables. The regression results for both stages of all models are presented in Table 9. Moreover, we test for weak instruments in the first stage and report adjusted R^2 values as goodness-of-fit measures for both stages of every model.

5.1 The impact of CSP and its components

The first stage regression results for the overall CSP, the environment, and the social model in our pooled sample of North America, Europe, and Asia show that some of our instruments are significant and hence add an important explanation to the CSP scores. The test on weak instruments delivers p values close to zero, implying that

² The main purpose of lagging the variables is to enable a prediction of credit ratings through a function of explaining variables at the end of year $t - 1$. The specification of a lag of 1 year is frequently used in studies on CSP (e.g., Oikonomou et al. 2014; Attig et al. 2013), while we cannot find any references for benefits of lags of higher order in the literature (cf., Baghai et al. 2014). In the case of our data, which are characterized by short time series in a large cross section, lags of higher order would lower the estimation quality as we would lose a large number of observations. For these reasons, we choose the standard specification of only including a lag of one period.

Table 8 This table gives an overview of both stages of our estimated models. The first stage includes instruments and control variables to estimate CSP scores as dependent variables. The second stage includes the estimate of the referring CSP score and the same control variables from the first stage with credit ratings as the dependent variable. The estimation results contain also boundaries needed to assign rating classes based on the linear predictor

Dependent variable		Stage 1 CSP score	Stage 2 Credit rating
CSP variables	CSP score estimate		\hat{x}_0
Instruments	Country average of CSP score	x_1	
	Regulatory framework	x_2	
	Anti-self-dealing	x_3	
	Corruption	x_4	
	Political orientation	x_5	
	Union density	x_6	
	Skilled labor	x_7	
	Power distance	x_8	
	Individualism	x_9	
Control variables	Interest coverage A	x_{10}	x_1
	Interest coverage B	x_{11}	x_2
	Interest coverage C	x_{12}	x_3
	Interest coverage D	x_{13}	x_4
	Operating margin	x_{14}	x_5
	Total debt	x_{15}	x_6
	Size	x_{16}	x_7
	Beta	x_{17}	x_8
	Idiosyncratic risk	x_{18}	x_9
	Dividend payer dummy	x_{19}	x_{10}
	Market/Book	x_{20}	x_{11}
	Retained earnings	x_{21}	x_{12}
	Capital expenditure	x_{22}	x_{13}
	Cash holdings	x_{23}	x_{14}
	Tangibility	x_{24}	x_{15}
	R&D	x_{25}	x_{16}
	GDP growth	x_{26}	x_{17}
	Dummy for North America	x_{27}	x_{18}
	Dummy for Asia	x_{28}	x_{19}
Dummy for year 1 (following years analogue)	x_{29}	x_{20}	
Boundaries	Lower Boundary for rating AAA		μ_8
	Lower boundary for rating AA		μ_7
	Lower boundary for rating A		μ_6
	Lower boundary for rating BBB		μ_5
	Lower boundary for rating BB		μ_4
	Lower boundary for rating B		μ_3
	Lower boundary for rating CCC		μ_2
	Lower boundary for rating CC		μ_1

Table 8 continued

Dependent variable		Stage 1 CSP score	Stage 2 Credit rating
Output	CSP score estimate (becomes input for stage 2)	\hat{x}_0	
	Linear predictor		y^*
	Rating class		R

the null hypothesis of weak instruments can be rejected. In the second stage, we find coefficients of overall CSP in all three regions to be positive and significant on a 1% level. The sign indicates that strong CSP performance tends to be linked to better credit ratings. Thus increases of firm CSP also tend to go along with credit rating improvements. Hence, these results confirm the risk mitigation view. By implementing the argument of Galema et al. (2008) that aggregating multiple categories of CSP may hide confounding effects among the single components of corporate social and environmental performance, we focus on CSP components in the following.

When targeting the environmental category level of Asset4 CSP scores, we find that all environmental categories (*emission*, *environmental innovation*, and *resources*) are relevant. A consideration of the most distinct result regarding environmental innovation raises the question of why conventional control variables such as R&D expenses cannot catch the effect. First, we argue that CSP aims to measure future long-term development while the accounting ratios included in controls represent solely the status quo. Second, CSP also catches intangible assets which are likely not (fully) reflected in accounting ratios. Previous research reveals some reasons for the potential relationship between environmental innovation and firm performance. Environmental innovation may increase efficiency and hence decrease total material cost (Porter and Van der Linde 1995). Additionally, businesses can gain competitive advantages through green product and green process innovation (Chen et al. 2006). Moreover, Kammerer (2009) argues that product innovation also increases the customer benefits and thereby also the demand. Furthermore, a positive impact on the market performance is confirmed by Pujari (2006), including reputation among the potential drivers of this (Eiadat et al. 2008).

Next, we analyze which single categories of the social performance dimension drive the impact on credit ratings. Our findings show a significant positive impact of *health* and *diversity*, while the latter is more important in terms of significance. A considerable number of empirical studies identifies a positive relationship between gender diversity in the boardroom and firm performance for North America (Carter et al. 2003; Erhardt et al. 2003; Miller and del Carmen Triana 2009) and European countries (Campbell and Mínguez-Vera 2008; Reguera-Alvarado et al. 2017; Lückerath-Rovers 2013). A similarly positive relationship can be formulated between gender diversity in management and firm performance if moderated by a firm's strategic orientation and the organizational culture (Dwyer et al. 2003).

Table 9 Pooled estimation

Stage	Ov. CSP		Environm.		Social	
	Stage 1 Ov. CSP	Stage 2 Cr. rat.	Stage 1 Environm.	Stage 2 Cr. rat.	Stage 1 Social	Stage 2 Cr. rat.
<i>Coefficients</i>						
<i>CSP</i>						
Intercept	- 31.250**	0.040***	- 17.871	0.044***	- 37.630***	0.032**
Dummy North Am.	- 11.405***	0.522	- 11.419***	0.574*	- 12.635***	0.354
Dummy Asia	- 20.021***	1.310***	- 16.589***	1.187***	- 24.717***	1.309***
CSP cou. av.	0.175***		0.135*		0.162**	
Regulatory framework	0.222**		0.184*		0.268***	
Anti self-dealing	19.017***		16.106**		21.584***	
Corruption	- 1.814**		- 2.048**		- 1.735**	
Political orientation	- 0.101***		- 0.115***		- 0.092***	
Union density	0.038		0.033		0.041	
Skilled labor	0.018		- 0.962		0.542	
Power distance	0.078		0.028		0.127	
Individualism	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
Interest coverage A	- 0.707*	0.379***	- 0.898**	0.389***	- 0.501	0.367***
Interest coverage B	0.383	0.029	0.535	0.019	0.236	0.039
Interest coverage C	- 0.126	0.055***	- 0.040	0.051***	- 0.214	0.058***
Interest coverage D	0.056*	0.000	0.032	0.001	0.082**	0.000
Operating margin	- 0.456***	0.024**	- 0.491***	0.028***	- 0.427***	0.018*
Total debt	0.128***	- 0.023***	0.159***	- 0.025***	0.098***	- 0.021***
Size	0.915***	0.059***	0.905***	0.056***	0.931***	0.066***
Beta	0.624	- 0.004	0.995	- 0.026	0.284	0.017
Idiosyncratic risk	0.371	- 0.032	0.271	- 0.028	0.471	- 0.033
Dividend payer	7.836***	1.213***	9.302***	1.118***	6.311***	1.341***
Market/Book	- 0.166	0.079***	- 0.148	0.081***	- 0.201	0.076***
Retained earnings	9.258***	1.529***	7.910**	1.583***	10.841***	1.528***
Capital expenditure	- 0.375	- 0.044*	- 0.366	- 0.043*	- 0.405*	- 0.046*
Cash holdings	9.519*	- 1.415**	14.188**	- 1.608**	5.020	- 1.227*
Tangibility	15.816***	0.434	20.065***	0.168	11.827***	0.738

Table 9 continued

Stage	Ov. CSP		Environm.		Social	
	Stage 1 Ov. CSP	Stage 2 Cr. rat.	Stage 1 Environm.	Stage 2 Cr. rat.	Stage 1 Social	Stage 2 Cr. rat.
R&D	97.620***	- 0.706	123.231***	- 2.291	72.413***	1.079
GDP growth	- 173.837***	0.774***	- 193.196***	3.549***	- 157.392***	- 3.022***
Time dummies	Y	Y	Y	Y	Y	Y
Industry dummies	Y	Y	Y	Y	Y	Y
<i>Lower boundaries</i>						
AAAIAA		17.025		17.023		17.015
AAIA		14.755		14.750		14.748
AIBBB		12.088		12.081		12.085
BBBIBB		8.489		8.476		8.490
BBIB		4.793		4.779		4.796
BjCCC		1.075		1.055		1.085
CCCjCC		- 0.470		- 0.492		- 0.458
CCID		- 0.816		- 0.839		- 0.805
Weak Instruments	0.000		0.000		0.000	
R ²	0.505	0.364	0.478	0.365	0.457	0.364
N	7032		7032		7032	
Stage	Emission		Env. inno.		Resources	
Dependent variable	Stage 1 Emission	Stage 2 Cr. rat.	Stage 1 Env. inno.	Stage 2 Cr. rat.	Stage 1 Resources	Stage 2 Cr. rat.
<i>Coefficients</i>						
\widehat{CSP}		0.038***		0.069***		0.038***
Intercept	- 8.656		2.384		- 8.752	
Dummy North Am.	- 11.450***	0.541*	- 9.530***	0.722***	- 12.229***	0.415
Dummy Asia	- 18.419***	1.135***	- 9.784**	1.289***	- 18.822***	1.128***
CSP cou. av.	0.164**		0.094		0.061	
Regulatory framework	0.102		0.076		0.264***	

Table 9 continued

Stage	Emission		Env. immo.		Resources	
	Stage 1	Stage 2	Stage 1	Stage 2	Stage 1	Stage 2
	Emission	Cr. rat.	Env. immo.	Cr. rat.	Resources	Cr. rat.
Anti self-dealing	21.752***		- 1.174		15.588**	
Corruption	- 2.215**		- 1.262		- 1.536	
Political orientation	- 0.156***		- 0.048		- 0.108***	
Union density	0.008		0.028		0.074	
Skilled labor	- 3.287*		- 0.267		- 1.383	
Power distance	- 0.013		0.029		0.063	
Individualism	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
Interest coverage A	- 1.057**	0.390***	- 0.116	0.355***	- 1.097**	0.390***
Interest coverage B	0.293	0.030	0.876*	- 0.020	0.137	0.038
Interest coverage C	- 0.063	0.051***	0.283	0.030	- 0.072	0.052***
Interest coverage D	0.031	0.001	0.021	0.001	0.024	0.001
Operating margin	- 0.352***	0.020**	- 0.651***	0.054***	- 0.370***	0.020**
Total debt	0.149***	- 0.024***	0.184***	- 0.031***	0.110***	- 0.023***
Size	0.918***	0.061***	0.676***	0.048***	0.877***	0.063***
Beta	1.291	- 0.029	1.010	- 0.066	0.523	0.000
Idiosyncratic risk	0.171	- 0.022	0.350	- 0.041	0.188	- 0.024
Dividend payer	8.083***	1.209***	7.535***	1.022***	8.870***	1.196***
Market/Book	0.018	0.074***	- 0.582*	0.120***	- 0.026	0.074***
Retained earnings	8.572***	1.627***	6.259*	1.451***	7.445**	1.624***
Capital expenditure	- 0.371	- 0.044*	- 0.098	- 0.053**	- 0.348	- 0.045*
Cash holdings	17.673***	- 1.626**	7.906	- 1.530**	11.881*	- 1.463**
Tangibility	26.417***	0.014	4.645	0.787**	18.477***	0.364
R&D	92.413***	- 0.504	178.260***	- 9.441***	90.222***	- 0.260
GDP growth	- 148.760***	1.134***	- 189.804***	9.472***	- 134.427***	- 0.769***
Time dummies	Y	Y	Y	Y	Y	Y
Industry dummies	Y	Y	Y	Y	Y	Y
<i>Lower boundaries</i>						
AAA/AA		16.876		17.723		17.217
AA/A		14.601		15.447		14.947

Table 9 continued

Stage	Emission		Env. inno.		Resources	
	Stage 1 Emission	Stage 2 Cr. rat.	Stage 1 Env. inno.	Stage 2 Cr. rat.	Stage 1 Resources	Stage 2 Cr. rat.
AIBBB		11.927		12.776		12.280
BBBIBB		8.320		9.173		8.680
BBIB		4.618		5.474		4.984
BICCC		0.893		1.748		1.266
CCCIC		- 0.656		0.199		- 0.281
CCID		- 1.003		- 0.147		- 0.627
Weak Instruments	0.000		0.100		0.000	
R ²	0.476		0.386		0.401	
N	7032		7032		7032	

Stage	Prod. resp.		Comm.		Hum. rights		Diversity	
	Stage 1 Prod. resp.	Stage 2 Cr. rat.	Stage 1 Comm.	Stage 2 Cr. rat.	Stage 1 Hum. rights	Stage 2 Cr. rat.	Stage 1 Diversity	Stage 2 Cr. rat.
<i>Coefficients</i>								
<i>CSP</i>		0.015		0.020		0.016		0.046***
Intercept	28.154*		- 30.982**		- 10.844		13.486	
Dummy North Am.	- 14.028***	- 0.067	- 3.537*	- 0.143	- 12.531***	- 0.013	- 10.763***	0.380
Dummy Asia	- 28.248***	0.910***	- 14.870***	0.852***	- 23.288***	0.996**	- 24.244***	1.369***
CSP cou. av.	- 0.083		0.099		0.151**		0.114*	
Regulatory framework	0.524***		0.262***		0.502***		0.194	
Anti self- dealing	- 6.102		38.338***		3.995		13.312**	
Corruption	- 2.591**		- 1.053		- 2.573*		- 0.647	
Political orientation	0.000		- 0.153***		- 0.003		- 0.093**	
Union density	0.124		- 0.097		0.207**		- 0.064	
Skilled labor	- 0.457		0.604		0.772		- 5.429**	
Power distance	0.464***		- 0.097		0.113		0.016	

Table 9 continued

Stage	Prod. resp.		Comm.		Hum. rights		Diversity	
	Stage 1 Prod. resp.	Stage 2 Cr. rat.	Stage 1 Comm.	Stage 2 Cr. rat.	Stage 1 Hum. rights	Stage 2 Cr. rat.	Stage 1 Diversity	Stage 2 Cr. rat.
Individualism	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
Interest coverage A	0.241	0.347***	- 0.323	0.359***	- 0.504	0.358***	- 0.826**	0.386***
Interest coverage B	0.219	0.043	0.260	0.042	0.687	0.034	0.700*	0.008
Interest coverage C	- 0.061	0.052***	- 0.321	0.057***	- 0.271	0.054***	- 0.372*	0.064***
Interest coverage D	0.007	0.002	0.058*	0.001	0.043	0.002	0.099***	- 0.002
Operating margin	- 0.407***	0.012	- 0.340***	0.011	- 0.497***	0.014	- 0.276***	0.021**
Total debt	- 0.015	- 0.018***	0.057	- 0.019***	0.098**	- 0.020***	0.111***	- 0.025***
Size	0.352***	0.090***	0.777***	0.080***	0.666***	0.084***	0.877***	0.055***
Beta	0.106	0.022	0.528	0.021	- 1.036	0.043	0.744	- 0.009
Idiosyncratic risk	- 0.110	- 0.019	0.170	- 0.023	0.585	- 0.029	0.317	- 0.028
Dividend payer	2.765*	1.522***	7.476***	1.387***	7.618***	1.438***	4.378***	1.335***
Market/Book	0.518*	0.064**	0.093	0.066**	- 0.507	0.078***	- 0.126	0.085***
Retained earnings	7.716**	1.699***	9.854***	1.656***	15.001***	1.570***	7.068**	1.580***
Capital expenditure	- 0.127	- 0.059**	- 0.330	- 0.051**	- 0.106	- 0.057**	- 0.794***	- 0.024
Cash holdings	- 6.625	- 0.981	6.190	- 1.196*	8.323	- 1.171*	6.941	- 1.248**
Tangibility	- 1.240	1.210***	10.940**	0.877**	- 4.934	1.231***	11.267**	0.564
R&D	65.165**	2.379	26.905	2.809	86.311***	1.780	72.942***	- 0.422
GDP growth	- 56.132	- 7.453***	- 149.072***	- 6.073***	- 35.191	- 7.954***	- 167.035***	7.052***
Time dummies	Y	Y	Y	Y	Y	Y	Y	Y
Industry dummies	Y	Y	Y	Y	Y	Y	Y	Y
<i>Lower boundaries</i>								
AAA/AA		17.776		16.923		17.496		16.948
AA/A		15.511		14.656		15.231		14.673
A/BBB		12.850		11.991		12.569		11.998
BB/BBB		9.260		8.401		8.982		8.393
BB/B		5.565		4.708		5.288		4.683
B/C/C		1.859		1.000		1.582		0.953
CCC/C		0.314		- 0.542		0.037		- 0.604
CCID		- 0.032		- 0.888		- 0.310		- 0.952

Table 9 continued

Stage	Prod. resp.		Comm.		Hum. rights		Diversity	
	Stage 1 Prod. resp.	Stage 2 Cr. rat.	Stage 1 Comm.	Stage 2 Cr. rat.	Stage 1 Hum. rights	Stage 2 Cr. rat.	Stage 1 Diversity	Stage 2 Cr. rat.
Weak Instruments	0.000		0.000		0.000		0.000	
R ²	0.238	0.363	0.285		0.324	0.363	0.370	0.365
N	7032		7032		7032		7032	
Stage	Employ.		Health		Training			
	Stage 1 Employ.	Stage 2 Cr. rat.	Stage 1 Health	Stage 2 Cr. rat.	Stage 1 Training	Stage 2 Cr. rat.		
<i>Coefficients</i>								
CSP		- 0.017		0.033*		0.011		
Intercept	- 76.749***		- 2.778		- 17.999		- 23.028***	- 0.001
Dummy North Am.	- 9.913***	- 0.581*	- 12.081***	0.316	- 23.028***		- 23.953***	0.903***
Dummy Asia	- 18.272***	0.326	- 23.882***	1.323***	- 23.953***			
CSP cou. av.	0.184***		0.062		- 0.020			
Regulatory framework	0.164		- 0.124		0.192**			
Anti self-dealing	21.630***		20.287***		13.702*			
Corruption	- 0.995		- 0.140		- 1.126			
Political orientation	- 0.065*		- 0.102***		- 0.063*			
Union density	0.024		0.020		0.029			
Skilled labor	6.132***		- 1.235		2.033			
Power distance	0.085		0.187		0.196**			
Individualism	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
Interest coverage A	- 0.293	0.347***	- 0.271	0.363***	- 1.085**			0.365***
Interest coverage B	- 0.528	0.034	- 0.282		0.367			0.043
Interest coverage C	- 0.127	0.047**	0.038	0.051***	0.052			0.050***
Interest coverage D	0.089**	0.004	0.082*	0.000	0.046			0.002
Operating margin	- 0.128*	0.005	- 0.251***	0.012	- 0.386***			0.009

Table 9 continued

Stage	Employm.		Health		Training	
	Stage 1 Employm.	Stage 2 Cr. rat.	Stage 1 Health	Stage 2 Cr. rat.	Stage 1 Training	Stage 2 Cr. rat.
Total debt	0.040	- 0.018***	0.117***	- 0.022***	0.104***	- 0.019***
Size	0.756***	0.107***	0.676***	0.073***	0.823***	0.086***
Beta	2.051*	0.063	0.967	- 0.005	- 0.126	0.028
Idiosyncratic risk	3.084**	- 0.025	0.598	- 0.040	0.482	- 0.027
Dividend payer	3.084**	1.626***	6.305***	1.337***	1.996	1.538***
Market/Book	- 0.170	0.068**	- 0.342	0.079***	- 0.334	0.073***
Retained earnings	11.719***	1.974***	3.074	1.773***	10.796***	1.689***
Capital expenditure	- 0.215	- 0.063**	- 0.290	- 0.049**	- 0.306	- 0.056**
Cash holdings	- 0.365	- 1.032	7.966	- 1.385**	5.798	- 1.163*
Tangibility	11.018***	1.383***	17.985***	0.545	11.297**	1.044**
R&D	26.741	3.517	80.501***	0.918	28.129	3.074
GDP growth	- 187.798**	- 11.729***	- 98.888**	- 7.766***	- 72.218*	- 9.344***
Time dummies	Y	Y	Y	Y	Y	Y
Industry dummies	Y	Y	Y	Y	Y	Y
<i>Lower boundaries</i>						
AAA/AAA		17.285		17.352		17.172
AA/A		15.018		15.087		14.907
A/BBB		12.353		12.424		12.245
BB/BBB		8.768		8.830		8.659
BB/B		5.067		5.137		4.966
B/C		1.363		1.432		1.264
CCC/C		- 0.184		- 0.107		- 0.278
CC/D		- 0.532		- 0.454		- 0.624
Weak Instruments	0.000		0.002		0.001	
R ²	0.309	0.363	0.329	0.363	0.359	0.363
N	7032	7032	7032	7032	7032	7032

This table displays the estimation results of both stages of the instrumental variable approach for each CSP impact score. Coefficients of all variables are displayed including the significance level marked by asterisks. They are considered significant on the level of 1% (***) or 5% (**) or 10% (*) when the *p* value is below these levels. The lower boundaries of the rating categories according to Sect. 4 are also displayed

Contrasting views (e.g., Adams and Ferreira 2009; Marinova et al. 2016) exist, but are less widespread. Possible explanations include the conjecture that diversity may help in decision processes by introducing other perspectives and information and additionally a different assessment of risk (Gul et al. 2011). Moreover, a diverse mindset within firms helps to catch up with business and society trends of the customer base and attract talented personnel (Li and Chen 2018).

5.2 The region matters

Tables 10, 11 and 12 show the second stage results for separate estimations on the panels of North America, Europe, and Asia.³ When focusing on North America, we find all dimensions (*emission, environmental innovation, resources, product responsibility, community, human rights, diversity, employment quality, health, and training*) to be positively significant. Concerning Europe, we find the dimensions *environmental innovation* and *diversity* to be significantly positively related to credit ratings. The measures *community* and *training* are weakly significant on a 10% level and the first reveals a negative sign. Coefficients in the Asia subsample are significant in the dimensions of *emission, environmental innovation, and resources*. Among the social categories, no dimension is significant. Except for the *community* category in Europe, all significant CSP coefficients show positive signs indicating the positive link between the referring CSP scores and credit ratings. Our results once more generally support the risk mitigation view.

As the link function in our model limits the interpretability of the CSP impact, marginal effects (at means of the controls) according to Greene (2011) are calculated. In the Tables 18, 19 20, one can observe the practical implications of our results. Predominantly, we see increases of the probability to obtain a better rating class if the CSP score is significant and is increased by 1% point (*ceteris paribus*). At the same time, the probability to obtain a worse rating class decreases. For example, the probability of an actual BBB rated North American counterparty to upgrade to an A rating increases by 0.43% points if the overall CSP score increases by 1% point under otherwise identical circumstances, while the probability of a downgrade to BBB decreases by 0.48%.

In general, we support the argumentation of Attig et al. (2013) that CSP helps to generate intangible assets such as reputation and relationships with stakeholders, which again improve a firm's competitiveness (Orlitzky et al. 2003). This may explain the relevance of all CSP scores in North America. The same argumentation may apply also for Europe. However, besides *environmental innovation* and *diversity* no further CSP component is significant on the 1% level, which is likely caused by the comparably high mean levels and low variation of CSP of European firms. For example, *emission* exhibits a higher mean of 81.3% and a lower standard deviation of 19.5% when compared to the mean (52.3%) and standard deviation (31.8%) of North American companies. As a result, European firms can differentiate less from each other through *emission* reduction. In contrast, *environmental innovation* shows a higher standard deviation (29.3%) and turns out to be

³ Referring first stage estimation results are presented in Tables 13, 14 and 15.

Table 10 Panel North America

	Ov. CSP	Environm.	Social	Emission	Env. inno.	Resources	Prod. resp.
<i>Coefficients</i>							
<i>CSP</i>	0.039**	0.036**	0.042**	0.030**	0.079***	0.037**	0.076**
CSR country average	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
Interest coverage A	0.362***	0.364***	0.359***	0.357***	0.327***	0.378***	0.308***
Interest coverage B	- 0.002	- 0.007	0.004	0.003	- 0.039	0.006	- 0.040
Interest coverage C	0.070***	0.062***	0.078***	0.066***	0.024	0.065***	0.086***
Interest coverage D	- 0.002	- 0.001	- 0.004	- 0.002	0.000	- 0.001	- 0.001
Operating margin	0.030**	0.029**	0.030**	0.023**	0.057***	0.026**	0.043**
Total debt	- 0.024***	- 0.025***	- 0.023***	- 0.024***	- 0.035***	- 0.023***	- 0.022***
Size	0.054***	0.057***	0.051**	0.062***	0.043***	0.056***	0.061***
Beta	0.023	0.005	0.042	0.007	- 0.047	0.014	0.111
Idiosyncratic risk	0.055	0.065	0.045	0.070	0.054	0.061	0.086
Dividend payer	1.259***	1.228***	1.300***	1.317***	0.929***	1.247***	1.349***
Market/Book	0.075**	0.074**	0.078**	0.068**	0.098***	0.073**	0.074**
Retained earnings	1.627***	1.726***	1.511***	1.788***	1.493***	1.710***	1.458***
Capital expenditure	- 0.043	- 0.044	- 0.042	- 0.044	- 0.056*	- 0.044	- 0.064**
Cash holdings	- 1.446*	- 1.586**	- 1.292*	- 1.744**	- 1.682**	- 1.485*	- 0.557
Tangibility	- 0.012	- 0.148	0.151	- 0.238	0.315	- 0.125	1.218**
R&D	- 2.842	- 3.321	- 2.263	- 1.612	- 10.330***	- 2.658	- 4.475
Time dummies	Y	Y	Y	Y	Y	Y	Y
Industry dummies	Y	Y	Y	Y	Y	Y	Y
<i>Lower boundaries</i>							
AAAI	15.346	15.386	15.301	15.306	15.762	15.713	18.829
AAIA	13.815	13.855	13.770	13.774	14.231	14.182	17.298
AIBBB	11.060	11.100	11.015	11.020	11.476	11.428	14.544
BBBIBB	7.499	7.539	7.454	7.458	7.915	7.866	10.982
BBIB	3.682	3.721	3.637	3.641	4.097	4.049	7.165
BICCC	- 0.465	- 0.426	- 0.510	- 0.506	- 0.050	- 0.098	3.018
CCCCC	- 2.333	- 2.293	- 2.378	- 2.374	- 1.918	- 1.966	1.150
CCID	- 2.636	- 2.596	- 2.681	- 2.678	- 2.221	- 2.269	0.847
Weak instruments	0.000	0.000	0.000	0.000	0.060	0.000	0.003

Table 10 continued

	Ov. CSP	Environm.	Social	Emission	Env. inno.	Resources	Prod. resp.
	0.370 4709	0.370 4709	0.370 4709	0.370 4709	0.370 4709	0.370 4709	0.370 4709
	Comm.	Hum. rights	Diversity	Employ.	Health	Training	
<i>Coefficients</i>							
CSP	0.034**	0.088***	0.067**	0.044**	0.050**	0.063**	
CSR country average	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
Interest coverage A	0.337***	0.359***	0.404***	0.351***	0.342***	0.418***	0.418***
Interest coverage B	0.006	-0.031	-0.027	0.037	0.060	-0.011	-0.011
Interest coverage C	0.076***	0.073***	0.102***	0.075***	0.050**	0.068***	0.068***
Interest coverage D	-0.002	-0.002	-0.008	-0.004	-0.002	-0.004	-0.004
Operating margin	0.024**	0.053***	0.026**	0.017*	0.026**	0.041**	0.041**
Total debt	-0.021***	-0.029***	-0.027***	-0.020***	-0.024***	-0.025***	-0.025***
Size	0.064***	0.034**	0.034	0.057***	0.056***	0.036	0.036
Beta	0.031	0.097	-0.010	-0.019	0.005	0.047	0.047
Idiosyncratic risk	0.066	0.038	0.026	0.070	0.021	0.036	0.036
Dividend payer	1.333***	0.825***	1.211***	1.473***	1.224***	1.474***	1.474***
Market/Book	0.065**	0.132***	0.059*	0.073**	0.081***	0.082***	0.082***
Retained earnings	1.639***	0.820**	1.446***	1.407***	1.848***	1.185**	1.185**
Capital expenditure	-0.046	-0.079**	0.000	-0.056*	-0.044	-0.019	-0.019
Cash holdings	-1.196	-1.845**	-1.670**	-1.224*	-1.600**	-1.433*	-1.433*
Tangibility	0.195	1.089**	-0.017	0.258	-0.243	-0.440	-0.440
R&D	-0.286	-7.665***	-3.477	-0.662	-2.584	-1.125	-1.125
Time dummies	Y	Y	Y	Y	Y	Y	Y
Industry dummies	Y	Y	Y	Y	Y	Y	Y
<i>Lower boundaries</i>							
AAA/AA	15.767	17.252	14.784	14.927	15.961	15.390	15.390
AA/A	14.236	15.721	13.253	13.396	14.430	13.858	13.858
A/BBB	11.481	12.966	10.498	10.642	11.675	11.104	11.104
BB/BBB	7.920	9.405	6.937	7.080	8.114	7.542	7.542
BB/B	4.103	5.588	3.119	3.263	4.296	3.725	3.725

Table 10 continued

	Comm.	Hum. rights	Diversity	Employm.	Health	Training
BiCCC	− 0.044	1.440	− 1.028	− 0.884	0.149	− 0.422
CCCICC	− 1.912	− 0.427	− 2.896	− 2.752	− 1.719	− 2.290
CCID	− 2.215	− 0.730	− 3.199	− 3.055	− 2.022	− 2.593
Weak instruments	0.000	0.115	0.008	0.000	0.000	0.021
R ²	0.370	0.370	0.370	0.370	0.370	0.370
N	4709	4709	4709	4709	4709	4709

This table displays the estimation results of the second stage of the instrumental variable approach for each CSP impact score in the North America sample. Coefficients of all variables are displayed including the significance level marked by asterisks. They are regarded as being significant on the level of 1% (***) or 5% (**) or 10% (*) when the *p* value is below these levels. The lower boundaries of the rating categories according to Sect. 4 are also displayed

Table 11 Panel Europe

	Ov. CSP	Environm.	Social	Emission	Env. inno.	Resources	Prod. resp.
<i>Coefficients</i>							
CSP	0.059	0.078**	0.017	0.042	0.061***	0.020	0.016
Interest coverage A	0.422***	0.424***	0.423***	0.446***	0.417***	0.419***	0.412***
Interest coverage B	0.152**	0.123	0.163**	0.145*	0.098	0.164**	0.186**
Interest coverage C	0.048	0.042	0.054	0.051	0.032	0.049	0.051
Interest coverage D	0.000	0.000	0.000	0.000	0.000	0.001	0.000
Operating margin	0.027	0.046**	0.009	0.020	0.058***	0.011	0.011
Total debt	− 0.014*	− 0.013*	− 0.016**	− 0.015*	− 0.016**	− 0.016**	− 0.015**
Size	0.071**	0.060**	0.096***	0.082***	0.059***	0.096***	0.099***
Beta	− 0.117	− 0.165	− 0.078	− 0.129	− 0.194	− 0.076	− 0.082
Idiosyncratic risk	− 0.241**	− 0.269**	− 0.235**	− 0.252**	− 0.274***	− 0.239**	− 0.237**
Dividend payer	1.210***	1.166***	1.257***	1.262***	1.307***	1.248***	1.311***
Market/Book	0.134***	0.139***	0.142***	0.130**	0.189***	0.144***	0.123**

Table 11 continued

	Ov. CSP	Enviromm.	Social	Emission	Env. inno.	Resources	Prod. resp.
Retained earnings	0.861	0.928	0.779	0.633	1.023	0.836	0.813
Capital expenditure	0.017	0.022	0.009	0.006	0.053	0.003	0.006
Cash holdings	0.368	- 0.128	1.148	0.954	0.164	1.020	1.389
Tangibility	- 0.515	- 0.992	- 0.078	- 0.602	- 0.638	- 0.045	0.068
R&D	7.146	2.931	10.006	7.294	- 6.141***	9.821	10.557
GDP growth	10.269***	15.221***	3.043***	5.682***	12.380***	4.282***	3.332***
Time dummies	Y	Y	Y	Y	Y	Y	Y
Industry dummies	Y	Y	Y	Y	Y	Y	Y
<i>Lower boundaries</i>							
AAAAIAA	22.226	22.892	20.788	21.769	21.081	21.030	21.069
AAIA	19.367	20.027	17.943	18.922	18.212	18.189	18.220
AIBBB	16.131	16.789	14.708	15.693	14.951	14.955	14.980
BBBIBB	11.793	12.432	10.383	11.356	10.559	10.630	10.649
BBIB	8.289	8.912	6.884	7.849	7.017	7.125	7.141
BICCC	4.876	5.474	3.488	4.448	3.535	3.727	3.736
CCICCC	3.585	4.186	2.192	3.159	2.234	2.433	2.436
CCID	2.982	3.587	1.585	2.554	1.636	1.827	1.832
Weak instruments	0.160	0.310	0.112	0.360	0.009	0.140	0.000
R ²	0.392	0.394	0.392	0.392	0.398	0.392	0.392
N	1500	1500	1500	1500	1500	1500	1500
<i>Coefficients</i>							
CSP	- 0.040*	- 0.041	- 0.041	0.078***	- 0.001	0.004	0.067*
Interest coverage A	0.426***	0.398***	0.398***	0.424***	0.424***	0.423***	0.453***
Interest coverage B	0.157**	0.160**	0.160**	0.116	0.160**	0.160**	0.147*
Interest coverage C	0.043	0.059	0.059	0.059	0.055	0.054	0.027
Interest coverage D	0.001	0.004	0.004	0.004	0.001	0.001	0.003
Operating margin	- 0.002	- 0.012	- 0.012	0.029*	0.004	0.004	0.012
Total debt	- 0.021***	- 0.024***	- 0.024***	- 0.018**	- 0.017**	- 0.017**	- 0.014*
Size	0.121***	0.130***	0.130***	0.051**	0.105***	0.103***	0.078***
<i>Comm.</i>							
		Hum. rights	Diversity	Health	Employm.	Training	

Table 11 continued

	Comm.	Hum. rights	Diversity	Emplm.	Health	Training
Beta	- 0.087	- 0.151	- 0.110	- 0.067	- 0.068	- 0.124
Idiosyncratic risk	- 0.254**	- 0.202*	- 0.169	- 0.242**	- 0.238**	- 0.257**
Dividend payer	1.550***	1.351***	1.142***	1.282***	1.289***	1.285***
Market/Book	0.188***	0.170***	0.162***	0.148***	0.150***	0.182***
Retained earnings	0.731	1.165	1.064	0.758	0.772	0.894
Capital expenditure	- 0.013	- 0.026	0.062	0.004	0.004	- 0.007
Cash holdings	2.821*	2.460	0.669	1.432	1.385	0.398
Tangibility	0.175	- 0.095	- 1.092	0.055	0.025	0.421
R&D	8.425	11.190	5.074	10.183	9.764	10.710
GDP growth	- 1.434***	- 1.934***	17.233***	0.780	1.244*	9.929***
Time dummies	Y	Y	Y	Y	Y	Y
Industry dummies	Y	Y	Y	Y	Y	Y
<i>Lower boundaries</i>						
AAA/AA	19.281	18.458	21.235	20.210	20.329	23.701
AA/A	16.442	15.624	18.378	17.373	17.490	20.843
A/BBB	13.203	12.375	15.102	14.138	14.256	17.596
BBB/BB	8.852	8.041	10.714	9.813	9.930	13.247
BB/B	5.315	4.537	7.213	6.311	6.428	9.747
B/CCC	1.889	1.123	3.740	2.916	3.035	6.279
CCC/CC	0.591	- 0.193	2.389	1.619	1.740	4.960
CC/ID	- 0.011	- 0.804	1.772	1.012	1.133	4.355
Weak instruments	0.002	0.090	0.037	0.422	0.004	0.000
R ²	0.394	0.393	0.397	0.391	0.391	0.394
N	1500	1500	1500	1500	1500	1500

This table displays the estimation results of the second stage of the instrumental variable approach for each CSP impact score in the Europe sample. Coefficients of all variables are displayed including the significance level marked by asterisks. They are regarded as being significant on the level of 1% (***) or 5% (**) or 10% (*) when the *p* value is below these levels. The lower boundaries of the rating categories according to Sect. 4 are also displayed

Table 12 Panel Asia

	Ov. CSP	Environm.	Social	Emission	Env. inno.	Resources	Prod. resp.
<i>Coefficients</i>							
\widehat{CSP}	0.028	0.024*	0.025	0.017	0.065***	0.019	0.020
<i>CSR country average</i>							
Interest coverage A	0.369**	0.385***	0.361**	0.386***	0.312**	0.406***	0.374**
Interest coverage B	- 0.032	- 0.026	- 0.026	0.000	- 0.086	- 0.016	- 0.012
Interest coverage C	0.049	0.053	0.043	0.045	0.078**	0.047	0.041
Interest coverage D	- 0.004	- 0.003	- 0.004	- 0.002	- 0.004	- 0.003	0.000
Operating margin	0.004	0.002	0.005	0.000	0.024	0.001	0.007
Total debt	- 0.056***	- 0.057***	- 0.054***	- 0.054***	- 0.061***	- 0.056***	- 0.046***
Size	0.117***	0.121***	0.117***	0.129***	0.090***	0.125***	0.140***
Beta	0.029	0.021	0.046	0.032	- 0.025	0.052	- 0.026
Idiosyncratic risk	- 0.135	- 0.117	- 0.148	- 0.109	- 0.185	- 0.104	- 0.122
Dividend payer	2.500*	2.502*	2.503*	2.611*	2.404	2.465*	2.648*
Market/Book	- 0.677***	- 0.671***	- 0.702***	- 0.679***	- 0.533***	- 0.724***	- 0.781***
Retained earnings	3.312**	3.182**	3.370**	2.948**	4.203***	3.144**	3.194**
Capital expenditure	- 0.160***	- 0.159***	- 0.159***	- 0.157***	- 0.198***	- 0.152***	- 0.155***
Cash holdings	- 2.717	- 2.991	- 2.385	- 2.727	- 3.492*	- 2.799	- 2.087
Tangibility	4.848***	4.801***	4.895***	4.718***	5.445***	4.776***	4.526***
R&D	- 1.791***	- 2.175***	- 0.146	0.433***	- 17.725***	- 0.204	- 0.292
GDP growth	- 30.499***	- 26.679***	- 35.914***	- 29.986***	- 2.610***	- 32.930***	- 35.913***
Time dummies	Y	Y	Y	Y	Y	Y	Y
Industry dummies	Y	Y	Y	Y	Y	Y	Y
<i>Lower boundaries</i>							
AAAAAA	19.942	20.435	19.579	20.682	20.521	20.317	21.392
AAIAA	15.078	15.573	14.714	15.821	15.628	15.460	16.514
AIBBB	11.904	12.401	11.537	12.649	12.425	12.290	13.331
BBBIBB	7.955	8.455	7.591	8.702	8.486	8.347	9.382
BBIB	4.280	4.784	3.926	5.029	4.831	4.685	5.725
BICCC	1.218	1.709	0.894	1.960	1.779	1.607	2.767
CCCICC	- 0.861	- 0.380	- 1.166	- 0.125	- 0.264	- 0.481	0.698
CCCID	- 0.862	- 0.380	- 1.166	- 0.126	- 0.264	- 0.481	0.698

Table 12 continued

	Ov. CSP	Environm.	Social	Emission	Env. inno.	Resources	Prod. resp.
Weak instruments	0.001	0.002	0.006	0.000	0.124	0.006	0.000
R ²	0.407	0.407	0.407	0.407	0.409	0.407	0.408
N	823	823	823	823	823	823	823
	Comm.	Hum. rights	Diversity	Employm.	Health	Training	
<i>Coefficients</i>							
CSP	0.014	0.016	0.024	0.018	0.018	0.018	0.010
CSR country average	0.398***	0.423***	0.376**	0.411***	0.379**	0.427***	0.427***
Interest coverage A	-0.003	-0.021	-0.011	0.034	-0.010	0.042	0.042
Interest coverage B	0.044	0.050	0.038	0.042	0.058	0.038	0.038
Interest coverage C	-0.002	-0.004	-0.007	-0.001	-0.006	0.000	0.000
Interest coverage D	0.000	0.007	0.011	0.003	0.004	0.001	0.001
Operating margin	-0.051***	-0.053***	-0.057***	-0.051***	-0.050***	-0.046***	-0.046***
Total debt	0.130***	0.130***	0.115***	0.149***	0.130***	0.150***	0.150***
Size	0.056	0.106	0.068	0.137	0.051	0.049	0.049
Beta	-0.128	-0.115	-0.098	-0.090	-0.126	-0.080	-0.080
Idiosyncratic risk	2.511*	2.303	2.679*	2.542*	2.337	2.507*	2.507*
Dividend payer	-0.711***	-0.740***	-0.662***	-0.773***	-0.762***	-0.785***	-0.785***
Market/Book	3.151**	3.101**	3.186**	2.688	3.146**	2.836**	2.836**
Retained earnings	-0.159***	-0.145**	-0.151***	-0.156**	-0.150**	-0.140**	-0.140**
Capital expenditure	-2.672	-2.200	-2.284	-2.764	-2.636	-2.469	-2.469
Cash holdings	4.944***	5.002***	4.712***	4.682***	4.276***	4.751***	4.751***
Tangibility	3.302	1.262	-0.888	4.612	2.896	5.215	5.215
R&D	-37.023***	-33.464***	-31.486***	-36.219***	-37.608***	-36.836***	-36.836***
GDP growth	Y	Y	Y	Y	Y	Y	Y
Time dummies	Y	Y	Y	Y	Y	Y	Y
Industry dummies	Y	Y	Y	Y	Y	Y	Y
Lower boundaries							

Table 12 continued

	Comm.	Hum. rights	Diversity	Empl.ym.	Health	Training
AAAIAA	20.343	20.405	19.543	20.773	20.070	21.061
AAIA	15.485	15.541	14.681	15.919	15.211	16.202
AIBBB	12.312	12.366	11.509	12.747	12.032	13.025
BBBBBB	8.369	8.427	7.529	8.810	8.099	9.098
BBIB	4.713	4.768	3.816	5.169	4.463	5.466
BiCCC	1.668	1.690	0.721	2.087	1.444	2.389
CCCICC	-0.394	-0.397	-1.387	0.012	-0.594	0.326
CCID	-0.396	-0.398	-1.387	0.012	-0.596	0.326
Weak instruments	0.000	0.000	0.000	0.130	0.006	0.080
R ²	0.407	0.407	0.409	0.406	0.406	0.406
N	823	823	823	823	823	823

This table displays the estimation results of the second stage of the instrumental variable approach for each CSP impact score in the Asia sample. Coefficients of all variables are displayed including the significance level marked by asterisks. They are regarded as being significant on the level of 1% (***) or 5% (**) or 10% (*) when the *p* value is below these levels. The lower boundaries of the rating categories according to Sect. 4 are also displayed

Table 13 First stage panel North America

	Ov. CSP	Environm.	Social	Emission	Env. immo.	Resources	Prod. resp.
<i>Coefficients</i>							
Intercept	- 23.276***	- 23.946***	- 22.884***	- 31.443***	- 6.299	- 14.551**	33.676***
Political orientation	- 0.149***	- 0.160***	- 0.139***	- 0.192***	- 0.074*	- 0.156***	- 0.076***
Interest coverage A	- 0.939**	- 1.060*	- 0.804*	- 1.032*	- 0.015	- 1.410**	0.226
Interest coverage B	0.147	0.297	- 0.009	0.032	0.550	- 0.051	0.567
Interest coverage C	- 0.104	0.096	- 0.298	- 0.011	0.524*	0.011	- 0.274
Interest coverage D	0.041	0.007	0.074*	0.024	- 0.010	0.001	0.005
Operating margin	- 0.504***	- 0.535***	- 0.482***	- 0.429***	- 0.600***	- 0.436***	- 0.435***
Total debt	0.152***	0.187***	0.118***	0.189***	0.217***	0.126***	0.053
Size	1.028***	1.016***	1.046***	1.056***	0.648***	1.014***	0.435***
Beta	0.379	0.891	- 0.107	1.031	1.080	0.645	- 0.959
Idiosyncratic risk	0.515	0.299	0.730	0.170	0.274	0.401	- 0.140
Dividend payer	8.395***	9.890***	6.879***	8.944***	8.380***	9.117***	3.119*
Market/Book	- 0.213	- 0.182	- 0.261	- 0.014	- 0.390	- 0.167	- 0.084
Retained earnings	10.940***	9.047**	13.040***	8.833**	7.150*	9.240***	7.817**
Capital expenditure	- 0.616**	- 0.638*	- 0.608**	- 0.758**	- 0.136	- 0.622*	- 0.043
Cash holdings	7.950	12.379	3.756	20.125**	6.950	9.362	- 7.573
Tangibility	19.869***	25.111***	14.714***	33.177***	5.731	23.839***	- 5.916
R&D	98.526***	119.169***	78.435**	86.700**	144.280***	98.253***	71.776**
GDP growth	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
Time dummies	Y	Y	Y	Y	Y	Y	Y
Industry dummies	Y	Y	Y	Y	Y	Y	Y
Weak instruments	0.000	0.000	0.000	0.000	0.060	0.000	0.003
R ²	0.448	0.413	0.410	0.418	0.314	0.352	0.214
N	4709	4709	4709	4709	4709	4709	4709
<i>Comm.</i>							
Hum. rights		11.335					
Diversity			- 21.880***				
Emplm.					- 30.079***		
Health						- 5.951	
Training							- 13.753**

Table 13 continued

	Comm.	Hum. rights	Diversity	Employm.	Health	Training
Political orientation	- 0.170***	- 0.066	- 0.086***	- 0.132***	- 0.117***	- 0.092**
Interest coverage A	- 0.333	- 0.382	- 1.163**	- 0.574	- 0.332	- 1.467***
Interest coverage B	- 0.067	0.397	0.458	- 0.741	- 1.118**	0.239
Interest coverage C	- 0.299	- 0.080	- 0.543*	- 0.205	0.304	- 0.038
Interest coverage D	0.045	0.019	0.105**	0.074	0.030	0.055
Operating margin	- 0.403***	- 0.497***	- 0.244**	- 0.167*	- 0.317***	- 0.501***
Total debt	0.093**	0.123**	0.129***	0.052	0.132***	0.106**
Size	0.894***	0.684***	0.901***	0.842***	0.759***	0.930***
Beta	0.208	- 0.671	0.715	1.284	0.667	- 0.148
Idiosyncratic risk	0.269	0.427	0.742	0.131	1.096*	0.618
Dividend payer	7.424***	8.681***	5.589***	2.592	7.303***	1.794
Market/Book	0.053	- 0.743**	0.114	- 0.136	- 0.289	- 0.245
Retained earnings	12.166***	14.068***	9.052***	14.667***	4.165	13.804***
Capital expenditure	- 0.608**	0.135	- 0.990***	- 0.258	- 0.462	- 0.760**
Cash holdings	1.762	8.084	7.941	2.007	9.341	4.713
Tangibility	16.676***	- 3.682	11.623**	11.499**	20.277***	19.110***
R&D	37.902	98.805***	66.691**	37.881	72.300**	33.874
GDP growth	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
Time dummies	Y	Y	Y	Y	Y	
Industry dummies	Y	Y	Y	Y	Y	
Weak instruments	0.000	0.115	0.008	0.000	0.000	0.021
R ²	0.310	0.280	0.308	0.274	0.322	0.262
N	4709	4709	4709	4709	4709	4709

This table displays the estimation results of the first stage of the instrumental variable approach for each CSP impact score in the North America panel. The second stage is reported in Sect. 5.2. Coefficients of all variables are displayed including the significance level marked by asterisks. They are regarded as being significant on the level of 1% (***), 5% (***) or 10% (*) when the *p* value is below these levels. The lower boundaries of the rating categories according to Sect. 4 are also displayed

Table 14 First stage panel Europe

	Ov. CSP	Environm.	Social	Emission	Env. inno.	Resources	Prod. resp.
<i>Coefficients</i>							
Intercept	19.575	12.715	31.175	42.046*	- 53.920	42.661**	120.410***
CSR country average	- 0.053	- 0.117	- 0.031	- 0.143*	- 0.166*	- 0.132	- 0.187**
Regulatory framework	0.057	0.117	0.004	- 0.069	0.517	0.002	- 0.197
Anti self-dealing	1.752	- 3.001	5.821	2.961	- 21.102**	- 0.344	- 12.878*
Corruption	- 0.149	- 1.054	0.548	- 0.067	- 4.914	1.128	4.521**
Union density	0.048	0.094	- 0.004	0.046	0.238*	0.074	0.018
Skilled labor	1.444	2.262	0.561	1.097	3.611	0.595	- 5.470*
Power distance	0.176**	0.202**	0.151*	0.144*	0.342**	0.145*	0.354***
Individualism	- 0.037	0.040	- 0.112	- 0.112	0.466***	- 0.089	- 0.424***
Interest coverage A	- 0.062	- 0.143	0.026	- 0.527	- 0.163	0.027	0.147
Interest coverage B	0.194	0.559	- 0.085	0.406	1.163	- 0.112	- 1.585**
Interest coverage C	0.184	0.236	0.106	0.137	0.499	0.353	0.366
Interest coverage D	0.009	0.005	0.015	0.023	- 0.008	- 0.034	0.014
Operating margin	- 0.401***	- 0.540***	- 0.280***	- 0.402***	- 0.840***	- 0.307***	- 0.335**
Total debt	- 0.051	- 0.026	- 0.076	- 0.042	0.023	- 0.052	- 0.129
Size	0.573***	0.590***	0.547***	0.547***	0.767***	0.488***	0.365***
Beta	0.775	1.025	0.650	1.346	1.404	0.337	- 0.676
Idiosyncratic risk	- 0.031	0.328	- 0.402	0.204	0.594	- 0.182	- 0.475
Dividend payer	1.731	2.337	1.545	0.814	1.189	2.225	- 0.020
Market/Book	0.346	0.233	0.446	0.434	- 0.381	0.339	2.520***
Retained earnings	0.624	0.332	1.395	5.376	- 0.640	- 2.360	1.714
Capital expenditure	- 0.364	- 0.340	- 0.481	- 0.124	- 0.956*	- 0.049	- 0.780*
Cash holdings	17.807**	19.916**	16.727**	10.230	23.633	22.209**	5.940
Tangibility	10.794*	14.678*	8.269	15.806*	14.830	5.449	6.368
R&D	59.895*	97.150***	26.059	71.754*	273.861***	14.775	- 14.689
GDP growth	- 98.903**	- 136.019***	- 62.564	- 99.273*	- 131.479	- 101.008*	69.976
Time dummies	Y	Y	Y	Y	Y	Y	Y
Industry dummies	Y	Y	Y	Y	Y	Y	Y
Weak instruments	0.160	0.310	0.112	0.360	0.009	0.140	0.000

Table 14 continued

	Ov. CSP	Environm.	Social	Emission	Env. inno.	Resources	Prod. resp.
	0.437	0.429	0.361	0.365	0.406	0.303	0.251
N	1500	1500	1500	1500	1500	1500	1500
	Comm.	Hum. rights	Diversity	Health	Employm.	Training	
<i>Coefficients</i>							
Intercept	9.519	10.485	46.773	8.995	42.035	41.664**	
CSR country average	- 0.280***	- 0.063	- 0.191**	- 0.110	- 0.195**	- 0.138*	
Regulatory framework	0.233	0.100	0.316	0.109	- 0.658***	0.468***	
Anti self-dealing	28.803***	9.843	- 4.246	3.634	14.768**	- 7.000*	
Corruption	- 0.342	0.588	- 2.581	1.123	4.306*	- 3.502*	
Union density	- 0.113	0.184*	- 0.048	- 0.051	- 0.115	0.072	
Skilled labor	6.015**	3.511	- 5.276	0.530	2.716	- 0.434	
Power distance	- 0.060	0.201*	0.124	0.063	0.169	0.191***	
Individualism	- 0.203	- 0.114	0.107	- 0.062	- 0.294***	0.155*	
Interest coverage A	0.282	- 0.780	0.150	0.719	0.345	- 0.594	
Interest coverage B	- 0.020	0.004	0.594	- 0.170	0.222	0.280	
Interest coverage C	- 0.292	0.138	- 0.022	- 0.363	0.476	0.448*	
Interest coverage D	0.024	0.099	- 0.054	0.140***	- 0.070	- 0.029	
Operating margin	- 0.273**	- 0.456***	- 0.325**	- 0.104	- 0.122	- 0.082	
Total debt	- 0.123*	- 0.135	0.018	- 0.024	0.023	- 0.059	
Size	0.378***	0.661***	0.662***	0.419***	0.470***	0.395***	
Beta	0.946	- 1.490	0.655	3.248	0.048	0.801	
Idiosyncratic risk	- 0.323	0.971	- 1.064	- 1.070	- 0.888	0.107	
Dividend payer	5.854*	1.757	1.525	3.976	- 2.057	0.501	
Market/Book	0.550	0.351	0.069	0.180	- 0.482	- 0.186	
Retained earnings	- 1.499	10.031	- 0.301	- 3.531	1.753	0.470	
Capital expenditure	- 0.353	- 0.723	- 1.091*	- 0.005	- 0.315	- 0.062	
Cash holdings	31.671**	25.870*	14.190	- 10.724	6.013	18.768**	
Tangibility	- 0.848	- 4.501	17.815*	21.325***	3.854	- 2.880	

Table 14 continued

	Comm.	Hum. rights	Diversity	Employm.	Health	Training
R&D	- 13.985	9.589	88.379	- 6.061	135.060**	3.622
GDP growth	- 35.386	15.482	- 224.664***	- 113.689	- 50.685	- 93.949*
Time dummies	Y	Y	Y	Y	Y	
Industry dummies	Y	Y	Y	Y	Y	
Weak instruments	0.002	0.090	0.037	0.422	0.004	0.000
R ²	0.196	0.293	0.339	0.231	0.259	0.280
N	1500	1500	1500	1500	1500	1500

This table displays the estimation results of the first stage of the instrumental variable approach for each CSP impact score in the Europe panel. The second stage is reported in Sect. 5.2. Coefficients of all variables are displayed including the significance level marked by asterisks. They are regarded as being significant on the level of 1% (***), 5% (**) or 10% (*) when the *p* value is below these levels. The lower boundaries of the rating categories according to Sect. 4 are also displayed

Table 15 First stage panel Asia

	Ov. CSP	Environm.	Social	Emission	Env. inno.	Resources	Prod. resp.
<i>Coefficients</i>							
Intercept	- 18.853	- 6.364	- 27.039	9.217	- 0.749	- 18.994	82.363***
CSR country average	0.040	0.010	- 0.026	- 0.014	0.163	- 0.109	- 0.633***
Regulatory framework	0.272	0.369**	0.242	0.553***	- 0.054	0.514***	0.745***
Corruption	- 0.900	- 1.039	- 0.751	- 0.971	- 1.973	0.490	- 3.106**
Union density	- 0.564	- 0.362	- 0.800**	- 0.623*	- 0.524	- 0.022	- 1.287***
Interest coverage A	1.772	1.447	2.158	2.007	1.618	0.669	2.582*
Interest coverage B	2.068**	1.955**	2.140**	1.395	1.878**	1.955**	1.769

Table 15 continued

	Ov. CSP	Environm.	Social	Emission	Env. inno.	Resources	Prod. resp.
Interest coverage C	- 0.271	- 0.497	- 0.032	- 0.225	- 0.585	- 0.375	0.130
Interest coverage D	0.078	0.045	0.112*	0.016	0.034	0.063	- 0.080
Operating margin	- 0.129	- 0.040	- 0.228	0.113	- 0.419*	0.069	- 0.444**
Total debt	0.105	0.168	0.037	0.072	0.103	0.240**	- 0.380**
Size	0.875***	0.799***	0.962***	0.722***	0.790***	0.789***	0.094
Beta	1.748	2.275	1.340	2.663	1.756	1.063	5.401*
Idiosyncratic risk	1.499	1.163	1.904	1.256	0.781	1.079	1.218
Dividend payer	- 1.065	- 1.504	- 0.845	- 8.679	1.233	0.406	- 9.946
Market/Book	- 2.570	- 3.531*	- 1.756	- 4.665**	- 2.693	- 2.435	0.900
Retained earnings	- 23.759*	- 19.319	- 28.457**	- 14.975	- 24.920*	- 17.234	- 26.391
Capital expenditure	0.021	0.112	- 0.089	0.033	0.325	0.126	- 0.295
Cash holdings	13.454	25.022	1.694	20.470	22.328	16.636	- 9.986
Tangibility	3.896	4.037	4.003	10.750	- 1.749	1.531	21.824
R&D	189.006***	230.004***	151.300**	183.260***	322.650***	207.690***	193.795**
GDP growth	- 209.588**	- 393.821***	- 60.013	- 408.751***	- 395.080***	- 249.452***	- 102.799
Time dummies	Y	Y	Y	Y	Y	Y	Y
Industry dummies	Y	Y	Y	Y	Y	Y	Y
Weak instruments	0.001	0.002	0.006	0.000	0.124	0.006	0.000
R ²	0.518	0.540	0.440	0.527	0.491	0.489	0.310
N	823	823	823	823	823	823	823

	Comm.	Hum. rights	Diversity	Employm.	Health	Training
<i>Coefficients</i>						
Intercept	3.641	- 13.335	- 39.581	9.310	- 20.580	1.438
CSR country average	- 0.223	0.057	0.190	0.027	- 0.461***	- 0.443***
Regulatory framework	0.450***	0.452**	0.341	- 0.364**	0.243	- 0.044
Corruption	1.797	- 2.882*	0.772	- 3.106*	3.623**	- 0.458
Union density	- 1.029***	- 0.422	- 0.786	- 0.581	- 0.014	- 0.731*
Interest coverage A	0.893	- 0.054	1.564	0.029	1.754	1.541

Table 15 continued

	Comm.	Hum. rights	Diversity	Employm.	Health	Training
Interest coverage B	2.254**	2.689**	1.435	0.742	2.177**	1.281
Interest coverage C	- 0.088	- 0.653	0.219	0.215	- 0.931*	0.004
Interest coverage D	0.029	0.125	0.208***	0.051	0.268***	0.060
Operating margin	0.004	- 0.329	- 0.356	0.082	- 0.128	- 0.013
Total debt	- 0.025	0.008	0.051	- 0.132	0.063	0.254*
Size	0.822***	0.658***	1.064***	0.755***	0.595***	0.941***
Beta	1.447	- 1.727	0.000	6.283*	1.763	- 2.317
Idiosyncratic risk	2.294	1.297	0.783	- 0.031	1.432	2.092
Dividend payer	- 1.227	9.888	- 9.322	2.910	10.512	- 2.045
Market/Book	- 3.245	- 1.106	- 3.083	0.149	- 0.626	- 1.767
Retained earnings	- 28.758*	- 21.882	- 26.177*	- 21.655	- 12.370	- 11.858
Capital expenditure	0.256	- 0.690	- 0.309	- 1.002	0.141	0.773
Cash holdings	18.083	- 9.972	- 3.591	- 17.905	5.800	9.632
Tangibility	- 1.906	- 4.852	7.833	- 10.331	31.452**	- 13.154
R&D	46.100	136.451	161.037**	32.543	95.522	81.380
GDP growth	- 108.918	- 142.871	- 153.630	153.696	- 128.524	45.023
Time dummies	Y	Y	Y	Y	Y	
Industry dummies	Y	Y	Y	Y	Y	
Weak instruments	0.000	0.000	0.000	0.130	0.006	0.080
R ²	0.368	0.359	0.466	0.352	0.300	0.324
N	823	823	823	823	823	823

This table displays the estimation results of the first stage of the instrumental variable approach for each CSP impact score in the Asia panel. The second stage is reported in Sect. 5.2. Coefficients of all variables are displayed including the significance level marked by asterisks. They are regarded as being significant on the level of 1% (***) , 5% (**) or 10% (*) when the *p* value is below these levels. The lower boundaries of the rating categories according to Sect. 4 are also displayed

Table 16 Robustness checks

Stage	Ov. CSP		Environm.		Social	
	Stage 1 Ov. CSP	Stage 2 Cr. rat.	Stage 1 Environm.	Stage 2 Cr. rat.	Stage 1 Social	Stage 2 Cr. rat.
<i>U.S. average CSP on state level</i>						
\widehat{CSP}		0.040***		0.044***		0.032**
Intercept	– 31.250**		– 17.871		– 37.630***	
Dummy North Am.	– 11.405***	0.522	– 11.419***	0.574*	– 12.635***	0.354
Dummy Asia	– 20.021***	1.310***	– 16.589***	1.187***	– 24.717***	1.309***
Weak instruments	0.000		0.000		0.000	
R ²	0.505	0.364	0.478	0.365	0.457	0.364
N	7032		7032		7032	
<i>All instruments included (individualism added)</i>						
\widehat{CSP}		0.044***		0.048***		0.034**
Intercept	– 45.776***		– 39.546**		– 46.232***	
Dummy North Am.	– 12.550***	0.608*	– 13.540***	0.665**	– 13.081***	0.417
Dummy Asia	– 15.213***	1.373***	– 8.741**	1.249***	– 22.067***	1.349***
Weak instruments	0.000		0.000		0.000	
R ²	0.507	0.365	0.480	0.366	0.458	0.364
N	7032		7032		7032	
<i>North America sample including the anti-self-dealing index as instrument</i>						
\widehat{CSP}		0.039***		0.036**		0.042**
Intercept	951.611***		1024.607***		890.375***	
Weak instruments	0.000		0.000		0.000	
R ²	0.448	0.370	0.413	0.370	0.410	0.370
N	4709		4709		4709	
<i>Europe sample including the political orientation as instrument</i>						
\widehat{CSP}		0.071		0.097***		0.017
Intercept	31.653***		31.273**		36.173***	
Weak instruments	0.150		0.449		0.114	
R ²	0.436	0.393	0.428	0.395	0.362	0.392
N	1500		1500		1500	

Table 16 continued

Stage	Ov. CSP		Environm.		Social	
	Stage 1 Ov. CSP	Stage 2 Cr. rat.	Stage 1 Environm.	Stage 2 Cr. rat.	Stage 1 Social	Stage 2 Cr. rat.
<i>Asia sample including the power distance as instrument</i>						
\widehat{CSP}		0.019		0.037**		- 0.013
Intercept	- 40.934*		1.348		- 68.981***	
Weak instruments	0.003		0.004		0.010	
R^2	0.522	0.416	0.545	0.417	0.445	0.415
N	823		823		823	
<i>Resources</i>						
Stage	Emission		Env. inno.		Resources	
Dependent variable	Stage 1 Emission	Stage 2 Cr. rat.	Stage 1 Env. inno.	Stage 2 Cr. rat.	Stage 1 Resources	Stage 2 Cr. rat.
<i>U.S. average CSP on state level</i>						
\widehat{CSP}		0.038***		0.069***		0.038***
Intercept	- 8.656		2.384		- 8.752	
Dummy North Am.	- 11.450***	0.541 *	- 9.530***	0.722***	- 12.229***	0.415
Dummy Asia	- 18.419***	1.135***	- 9.784**	1.289***	- 18.822***	1.128***
Weak instruments	0.000		0.109		0.000	
R^2	0.476	0.365	0.386	0.365	0.401	0.364
N	7032		7032		7032	
<i>All instruments included (individualism added)</i>						
\widehat{CSP}		0.041***		0.071***		0.041***
Intercept	- 31.345		- 31.759		- 22.800	
Dummy North Am.	- 13.369***	0.610**	- 13.125***	0.726***	- 13.252***	0.487
Dummy Asia	- 10.658**	1.175***	4.101	1.327***	- 14.151***	1.168***
Weak instruments	0.000		0.010		0.000	
R^2	0.478	0.366	0.390	0.366	0.402	0.365
N	7032		7032		7032	
<i>North America sample including the anti-self-dealing index as instrument</i>						

Table 16 continued

Stage	Emission		Env. inno.		Resources			
	Stage 1 Emission	Stage 2 Cr. rat.	Stage 1 Env. inno.	Stage 2 Cr. rat.	Stage 1 Resources	Stage 2 Cr. rat.		
\widehat{CSP}		0.030**		0.079***		0.037**		
Intercept	1228.816***		478.812*		1006.511***			
Weak instruments	0.000		0.060		0.000			
R^2	0.418	0.370	0.314	0.370	0.352	0.370		
N	4709		4709		4709			
<i>Europe sample including the political orientation as instrument</i>								
\widehat{CSP}		0.048		0.070***		0.019		
Intercept	51.097***		- 25.451		48.718***			
Weak instruments	0.328		0.053		0.114			
R^2	0.365	0.392	0.405	0.399	0.304	0.392		
N	1500		1500		1500			
<i>Asia sample including the power distance as instrument</i>								
\widehat{CSP}		0.020		0.099***		0.040*		
Intercept	- 3.906		25.556		1.491			
Weak instruments	0.000		0.073		0.004			
R^2	0.528	0.416	0.503	0.421	0.498	0.417		
N	823		823		823			
Stage	Prod. resp.		Comm.		Hum. rights		Diversity	
	Stage 1 Prod. resp.	Stage 2 Cr. rat.	Stage 1 Comm.	Stage 2 Cr. rat.	Stage 1 Hum. rights	Stage 2 Cr. rat.	Stage 1 Diversity	Stage 2 Cr. rat.
\widehat{CSP}		0.015		0.020		0.016		0.046***
Intercept	28.154*		- 30.982**		- 10.844		13.486	

Table 16 continued

Stage	Prod. resp.		Comm.		Hum. rights		Diversity	
	Stage 1 Prod. resp.	Stage 2 Cr. rat.	Stage 1 Comm.	Stage 2 Cr. rat.	Stage 1 Hum. rights	Stage 2 Cr. rat.	Stage 1 Diversity	Stage 2 Cr. rat.
Dummy North Am.	- 14.028***	- 0.067	- 3.537*	- 0.143	- 12.531***	- 0.013	- 10.763***	0.380
Dummy Asia	- 28.248***	0.910***	- 14.870***	0.852***	- 23.288***	0.996**	- 24.244***	1.369***
Weak instruments	0.000		0.000		0.000		0.000	
R ²	0.238	0.363	0.285	0.363	0.324	0.363	0.370	0.365
N	7032		7032		7032		7032	
<i>All instruments included (individualism added)</i>								
\widehat{CSP}		0.011		0.023*		0.022		0.048***
Intercept	42.988**		- 47.238***		- 27.420		- 6.875	
Dummy North Am.	- 13.357***	- 0.102	- 4.543*	- 0.103	- 14.516***	0.128	- 11.989***	0.417*
Dummy Asia	- 32.921***	0.833***	- 9.604	0.861***	- 17.002***	1.095***	- 17.750***	1.414***
Weak instruments	0.000		0.000		0.000		0.000	
R ²	0.238	0.363	0.286	0.364	0.324	0.363	0.372	0.366
N	7032		7032		7032		7032	
<i>North America sample including the anti-self-dealing index as instrument</i>								
\widehat{CSP}		0.076**		0.034**		0.088***		0.067**
Intercept	532.946***		1099.437***		445.579		544.423**	
Weak instruments	0.003		0.000		0.115		0.008	
R ²	0.214	0.370	0.310	0.370	0.280	0.370	0.308	0.370
N	4709		4709		4709		4709	
<i>Europe sample including the political orientation as instrument</i>								
\widehat{CSP}		0.011		- 0.040		- 0.036		0.070**
Intercept	78.308***		54.605***		39.176**		3.771	
Weak instruments	0.000		0.009		0.161		0.051	

Table 16 continued

Stage	Prod. resp.		Comm.		Hum. rights		Diversity	
	Stage 1 Prod. resp.	Stage 2 Cr. rat.	Stage 1 Comm.	Stage 2 Cr. rat.	Stage 1 Hum. rights	Stage 2 Cr. rat.	Stage 1 Diversity	Stage 2 Cr. rat.
R^2	0.249	0.392	0.190	0.394	0.292	0.392	0.335	0.395
N	1500		1500		1500		1500	
<i>Asia sample including the power distance as instrument</i>								
\widehat{CSP}		- 0.003		- 0.013				
Intercept	25.018		- 54.099***		5.099		- 55.807**	
Weak instruments	0.000		0.002		0.001		0.002	
R^2	0.312	0.415	0.366	0.416	0.363	0.416	0.467	0.417
N	823		823		823		823	
Stage	Employm.		Health		Training			
	Stage 1 Employm.	Stage 2 Cr. rat.	Stage 1 Health	Stage 2 Cr. rat.	Stage 1 Training	Stage 2 Cr. rat.		
<i>U.S. average CSP on state level</i>								
\widehat{CSP}		- 0.017		0.033*				
Intercept	- 76.749***		- 2.778		- 17.999			
Dummy North Am.	- 9.913***		- 12.081***		- 23.028***			
Dummy Asia	- 18.272***		- 23.882***		- 23.953***			
Weak instruments	0.000		0.002		0.001			
R^2	0.309	0.363	0.329	0.363	0.359	0.363		
N	7032		7032		7032			
<i>All instruments included (individualism added)</i>								
\widehat{CSP}		- 0.024		0.036*				
Intercept	- 55.929***		- 11.284		- 22.951			
Dummy North Am.	- 8.905***		- 12.534***		- 23.147***			
Dummy Asia	- 25.605***		- 21.191***		- 22.657***			
R^2	0.158	0.158	0.387	1.370***	0.057	0.922*		

Table 16 continued

Stage	Employ.		Health		Training	
	Stage 1 Employ.	Stage 2 Cr. rat.	Stage 1 Health	Stage 2 Cr. rat.	Stage 1 Training	Stage 2 Cr. rat.
Weak instruments	0.000		0.004		0.001	
R ²	0.310	0.364	0.329	0.364	0.361	0.363
N	7032		7032		7032	
<i>North America sample including the anti-self-dealing index as instrument</i>						
CSP		0.044**		0.050**		0.063***
Intercept	833.028***		760.514***		590.837***	
Weak instruments	0.000		0.000		0.021	
R ²	0.274	0.370	0.322	0.370	0.262	0.370
N	4709		4709		4709	
<i>Europe sample including the political orientation as instrument</i>						
CSP		0.010		0.008		0.067*
Intercept	12.839		62.697***		37.887***	
Weak instruments	0.385		0.004		0.000	
R ²	0.231	0.391	0.258	0.391	0.280	0.394
N	1500		1500		1500	
<i>Asia sample including the power distance as instrument</i>						
CSP		- 0.081*		0.036		0.000
Intercept	- 37.575*		13.693		- 39.659*	
Weak instruments	0.117		0.000		0.038	
R ²	0.362	0.421	0.316	0.417	0.334	0.418
N	823		823		823	

This table displays the estimation results of our robustness checks referring to both stages of the instrumental variable approach for each CSP impact score. Coefficients of all variables are displayed including the significance level marked by asterisks. They are regarded as being significant on the level of 1% (***) or 5% (**) or 10% (*) when the *p* value is below these levels. The lower boundaries of the rating categories according to Sect. 4 are also displayed

significant. In the case of *diversity*, the pressure of the market seems so strong that smaller variation suffices for a significant impact. In the Asia panel, not even *diversity* is significant, although obtaining the most intensive effects among social components in Europe and North America—likely due to cultural reasons. Previous literature has provided similar implications for Asia by finding limiting or reducing the effects of diversity aspects on firm performance. Based on a sample of Asian countries (Hong Kong, South Korea, Malaysia, and Singapore), Low et al. (2015) primarily find a positive effect of the numbers of female board directors on firm performance, although it is substantially reduced in countries with higher female economic participation and empowerment likely due to tokenism. Li and Chen (2018) only find a positive relationship between board gender diversity and firm performance for Chinese firms if they do not exceed a critical size. Darmadi (2011) even found a negative relationship between the diversity of board members and financial performance for Indonesia.

When comparing our results with those of earlier studies on credit risk, we find accordance with Jiraporn et al. (2014) in the sense that overall CSP has a positive impact on credit ratings in North America. Stellner et al. (2015) do not find such a relationship for their Europe sample. In contrast, we find a significant positive impact of both overall CSP and some of its components. In agreement with Oikonomou et al. (2014), product characteristics are relevant in this context. Further, we identify the workforce categories of employment quality and diversity as being drivers inside the workforce pillar. We can confirm the first empirical evidence of Attig et al. (2013), with CSP strengths and concerns related to primary stakeholder management (i.e. community relations, diversity, employee relations, environmental performance, and product characteristics) being linked to credit ratings and extending their work in terms of causality and a more sophisticated CSP measurement approach, respectively.

6 Robustness checks

We prove the robustness of our results concerning the specification of instruments in the first stage, to the period selection, missing data, and the relevance of environmental sensitive industries. Regression coefficients of CSP variables are presented in Tables 16 and 17. At first, we address the average CSP performance of surrounding firms used as an instrument based on the research of Jiraporn et al. (2014). While in the standard analysis, the average CSP for the USA is calculated based on the country level, we demonstrate the robustness of our results when surrounding firms are defined as located in the same state. All results remain almost unchanged. Also, in the main analysis, instruments and controls are subject to a selection process based on VIFs. To prove the robustness of our results for the entire sample, we include the individualism variable, which was discarded in the selection process. Referring to the three regional panels, we replace one instrument in each. Again, we derive similar results to our main findings.

During recent years, there have been several changes in the political alignment of some countries, e.g., since 2017, US climate politics have shifted from renewable

Table 17 Robustness checks

Stage	Ov. CSP		Environm.		Social	
	Stage 1 Ov. CSP	Stage 2 Cr. rat.	Stage 1 Environm.	Stage 2 Cr. rat.	Stage 1 Social	Stage 2 Cr. rat.
<i>Subset till 2018</i>						
<i>CSP</i>						
Intercept	- 31.370**	0.040***	- 19.509	0.043***	- 36.185**	0.031 *
Dummy North Am.	- 11.161***	0.493	- 11.100***	0.551 *	- 12.410***	0.321
Dummy Asia	- 19.937***	1.272***	- 16.489***	1.155***	- 24.628***	1.263***
Weak Instruments	0.000	0.363	0.000	0.363	0.000	0.362
R ²	0.506		0.478		0.459	
N	6887		6887		6887	
<i>Subset till 2017</i>						
<i>CSP</i>						
Intercept	- 29.561 *	0.044***	- 17.317	0.047***	- 35.599**	0.035**
Dummy North Am.	- 12.785***	0.524	- 12.412***	0.548*	- 14.155***	0.350
Dummy Asia	- 21.923***	1.337***	- 18.358***	1.184***	- 26.733***	1.336***
Weak Instruments	0.000	0.354	0.000	0.354	0.000	0.353
R ²	0.504		0.477		0.456	
N	6050		6050		6050	
<i>Subset till 2016</i>						
<i>CSP</i>						
Intercept	- 30.040	0.051***	- 16.775	0.049***	- 37.723**	0.044**
Dummy North Am.	- 14.356***	0.564	- 13.563***	0.490	- 15.949***	0.452
Dummy Asia	- 23.547***	1.408***	- 19.905***	1.161***	- 28.463***	1.492***
Weak instruments	0	0.345	0	0.346	0	0.344
R ²	0.497		0.471		0.446	
N	5214		5214		5214	
<i>Imputed input variables</i>						
<i>CSP</i>						
Intercept	- 28.430**	0.033**	- 18.411	0.038***	- 35.395***	0.020
Dummy North Am.	- 12.647***	0.229	- 11.860***	0.326	- 14.407***	- 0.052

Table 17 continued

Stage	Ov. CSP		Environm.		Social	
	Stage 1 Ov. CSP	Stage 2 Cr. rat.	Stage 1 Environm.	Stage 2 Cr. rat.	Stage 1 Social	Stage 2 Cr. rat.
Dummy Asia	- 20.014***	1.242***	- 17.263***	1.171***	- 24.156***	1.108***
Weak instruments	0.000		0.000		0.000	
R ²	0.482	0.348	0.455	0.349	0.433	0.348
N	11879		11879		11879	
<i>Interaction between CSP and environmental sensitive industries included</i>						
CSP		0.040***		0.043***		0.032**
Interaction CSP & env. sens.		0.003		0.003		0.002
Intercept	- 30.795**		- 17.518		- 37.065***	
Dummy North Am.	- 11.463***	0.529	- 11.467***	0.576*	- 12.700***	0.367
Dummy Asia	- 20.150***	1.320***	- 16.682***	1.195***	- 24.875***	1.326***
Weak instruments	0.000		0.000		0.000	
R ²	0.506	0.364	0.478	0.365	0.459	0.364
N	7032		7032		7032	
Stage	Emission		Env. immo.		Resources	
Dependent variable	Stage 1 Emission	Stage 2 Cr. rat.	Stage 1 Env. immo.	Stage 2 Cr. rat.	Stage 1 Resources	Stage 2 Cr. rat.
<i>Subset till 2018</i>						
CSP		0.038***		0.065***		0.037**
Intercept	- 8.251		4.695		- 12.128	
Dummy North Am.	- 10.94***	0.530*	- 9.643***	0.653***	- 12.083***	0.392
Dummy Asia	- 18.028***	1.108***	- 10.058**	1.231***	- 18.738***	1.094***
Weak Instruments	0.000		0.113		0.000	

Table 17 continued

Stage	Emission		Env. inno.		Resources	
	Stage 1 Emission	Stage 2 Cr. rat.	Stage 1 Env. inno.	Stage 2 Cr. rat.	Stage 1 Resources	Stage 2 Cr. rat.
R^2	0.475	0.364	0.385	0.363	0.404	0.363
N	6887		6887		6887	
<i>Subsset till 2017</i>						
\widehat{CSP}		0.040***		0.066***		0.041***
Intercept	- 8.281		4.280		- 8.870	
Dummy North Am.	- 11.159***	0.484	- 10.986**	0.585***	- 13.303***	0.399
Dummy Asia	- 19.247***	1.095***	- 11.692**	1.224***	- 20.569***	1.124***
Weak Instruments	0.000		0.141		0.000	
R^2	0.473	0.355	0.383	0.354	0.406	0.354
N	6050		6050		6050	
<i>Subsset till 2016</i>						
\widehat{CSP}		0.039***		0.064***		0.044***
Intercept	- 7.879		0.959		- 10.201	
Dummy North Am.	- 11.241***	0.375	- 12.157***	0.441**	- 13.840***	0.372
Dummy Asia	- 19.726***	1.020***	- 13.540***	1.165***	- 21.322***	1.112***
Weak instruments	0		0.013		0	
R^2	0.465	0.346	0.376	0.345	0.406	0.345
N	5214		5214		5214	
<i>Imputed input variables</i>						
\widehat{CSP}		0.035***		0.048***		0.034**
Intercept	- 13.464		5.127		- 10.578	
Dummy North Am.	- 11.701***	0.310	- 10.279***	0.261	- 12.705***	0.200
Dummy Asia	- 17.767***	1.122***	- 13.227***	1.158***	- 18.100***	1.113***
Weak instruments	0.000		0.024		0.000	
R^2	0.449	0.349	0.376	0.349	0.379	0.348
N	11879		11879		11879	
<i>Interaction between CSP and environmental sensitive industries included</i>						

Table 17 continued

Stage	Emission		Env. inno.		Resources			
	Stage 1 Emission	Stage 2 Cr. rat.	Stage 1 Env. inno.	Stage 2 Cr. rat.	Stage 1 Resources	Stage 2 Cr. rat.		
\widehat{CSP}		0.037***		0.069***		0.037**		
Interaction \widehat{CSP} & env. sens.		0.004		0.002		0.004		
Intercept	- 8.119		2.627		- 8.577			
Dummy North Am.	- 11.534***	0.540*	- 9.563***	0.730***	- 12.246***	0.416		
Dummy Asia	- 18.529***	1.142***	- 9.875**	1.298***	- 18.900***	1.136***		
Weak instruments	0.000		0.104		0.000			
R^2	0.476	0.366	0.387	0.365	0.401	0.365		
N	7032		7032		7032			
Stage	Prod. resp.		Comm.		Hum. rights		Diversity	
Dependent variable	Stage 1 Prod. resp.	Stage 2 Cr. rat.	Stage 1 Comm.	Stage 2 Cr. rat.	Stage 1 Hum. rights	Stage 2 Cr. rat.	Stage 1 Diversity	Stage 2 Cr. rat.
<i>Subsct till 2018</i>								
\widehat{CSP}		0.013		0.020		0.014		0.045***
Intercept	24.795		- 25.823*		- 18.750		15.698	
Dummy North Am.	- 14.002***	- 0.108	- 3.307	- 0.163	- 12.399***	- 0.060	- 10.209***	0.355
Dummy Asia	- 28.070***	0.853***	- 14.843***	0.820***	- 23.247***	0.929**	- 23.697***	1.332***
Weak Instruments	0.000		0.000		0.000		0.000	
R^2	0.239	0.362	0.283	0.362	0.328	0.362	0.372	0.364
N	6887		6887		6887		6887	
<i>Subsct till 2017</i>								
\widehat{CSP}		0.017		0.021		0.019		0.048***
Intercept	21.787		- 24.667*		- 27.185		14.822	
Dummy North Am.	- 14.648***	- 0.113	- 3.979*	- 0.221	- 12.716***	- 0.040	- 10.911***	0.318

Table 17 continued

Stage	Prod. resp.		Comm.		Hum. rights		Diversity	
	Stage 1 Prod. resp.	Stage 2 Cr. rat.	Stage 1 Comm.	Stage 2 Cr. rat.	Stage 1 Hum. rights	Stage 2 Cr. rat.	Stage 1 Diversity	Stage 2 Cr. rat.
Dummy Asia	- 29.185***	0.865***	- 15.823***	0.800***	- 24.520***	0.979**	- 24.773***	1.330***
Weak Instruments	0.000		0.000		0.000		0.000	
R ²	0.237	0.352	0.267	0.353	0.331	0.352	0.365	0.355
N	6050		6050		6050		6050	
<i>Subset till 2016</i>								
CSP		0.026*		0.024		0.023		0.052***
Intercept	27.835		- 17.269		- 41.055**		16.338	
Dummy North Am.	- 15.403***	- 0.060	- 4.828*	- 0.294	- 13.667***	- 0.045	- 12.338***	0.253
Dummy Asia	- 30.934***	0.961***	- 15.744***	0.776***	- 25.637***	0.996**	- 25.406***	1.292***
Weak Instruments	0.000		0.000		0.000		0.001	
R ²	0.228	0.344	0.243	0.344	0.329	0.344	0.351	0.346
N	5214		5214		5214		5214	
<i>Imputed input variables</i>								
CSP		- 0.004		0.013		- 0.001		0.033***
Intercept	26.230*		- 31.706***		- 4.031		- 2.906	
Dummy North Am.	- 14.702***	- 0.534**	- 4.418**	- 0.372**	- 13.449***	- 0.506	- 7.764***	0.006
Dummy Asia	- 24.820***	0.658**	- 13.392***	0.807***	- 20.085***	0.679*	- 18.151***	1.191***
Weak instruments	0.000		0.000		0.000		0.000	
R ²	0.225	0.348	0.255	0.348	0.320	0.348	0.331	0.349

Table 17 continued

Stage	Prod. resp.		Comm.		Hum. rights		Diversity	
	Stage 1 Prod. resp.	Stage 2 Cr. rat.	Stage 1 Comm.	Stage 2 Cr. rat.	Stage 1 Hum. rights	Stage 2 Cr. rat.	Stage 1 Diversity	Stage 2 Cr. rat.
<i>N</i>	11879		11879		11879		11879	
<i>Interaction between CSP and environmental sensitive industries included</i>								
\widehat{CSP}		0.015		0.020		0.016		0.047***
Interaction \widehat{CSP} & env. sens.		0.004		0.005		0.002		0.000
Intercept	29,460*		- 30,205**		- 10,321		13,639	
Dummy North Am.	- 14,232***	- 0.062	- 3,652*	- 0.140	- 12,608***	- 0.004	- 10,783***	0.386
Dummy Asia	- 28,578***	0.923***	- 15,064***	0.861***	- 23,409***	1.013**	- 24,288***	1.382***
Weak instruments	0.000		0.000		0.000		0.000	
R^2	0.240	0.363	0.286	0.364	0.324	0.363	0.370	0.366
<i>N</i>	7032		7032		7032		7032	

Stage	Employm.		Health		Training	
	Stage 1 Employm.	Stage 2 Cr. rat.	Stage 1 Health	Stage 2 Cr. rat.	Stage 1 Training	Stage 2 Cr. rat.
<i>Subset till 2018</i>						
\widehat{CSP}		- 0.018		0.032		0.013
Intercept	- 60,364***		- 3,146		- 16,327	
Dummy North Am.	- 10,654***	- 0.619**	- 11,714***	0.282	- 22,638***	0.028
Dummy Asia	- 19,324***	0.259	- 23,468***	1.275***	- 23,638***	0.901**
Weak Instruments	0.000		0.001		0.001	
R^2	0.300	0.362	0.331	0.362	0.364	0.361

Table 17 continued

Stage	Ov. CSP		Environm.		Social	
	Stage 1 Ov. CSP	Stage 2 Cr. rat.	Stage 1 Environm.	Stage 2 Cr. rat.	Stage 1 Social	Stage 2 Cr. rat.
<i>N</i>	6887		6887		6887	
<i>Subset till 2017</i>						
\widehat{CSP}		– 0.025*		0.028		0.015
Intercept	– 62.117***		– 0.623		– 18.583	
Dummy North Am.	– 11.369***	– 0.790**	– 12.889***	0.151	– 23.894***	0.001
Dummy Asia	– 19.470***	0.047	– 25.035***	1.185**	– 25.786***	0.890*
Weak Instruments	0.000		0.007		0.000	
R^2	0.292	0.353	0.330	0.352	0.361	0.352
<i>N</i>	6050		6050		6050	
<i>Subset till 2016</i>						
\widehat{CSP}		– 0.029*		0.030		0.022
Intercept	– 64.058***		– 2.951		– 13.069	
Dummy North Am.	– 12.992***	– 0.937***	– 14.359***	0.131	– 27.274***	0.132
Dummy Asia	– 20.635***	– 0.126	– 27.305***	1.226**	– 29.408***	1.010**
Weak Instruments	0.000		0.074		0.000	
R^2	0.276	0.344	0.327	0.343	0.356	0.343
<i>N</i>	5214		5214		5214	
<i>Imputed input variables</i>						
\widehat{CSP}		– 0.010		0.012		0.006
Intercept	– 67.318***		– 19.590		– 18.772*	
Dummy North Am.	– 11.631***	– 0.642**	– 13.401***	– 0.251	– 24.207***	– 0.324
Dummy Asia	– 18.643***	0.486	– 24.487***	0.944**	– 23.588***	0.812*
Weak instruments	0.000		0.000		0.000	
R^2	0.282	0.348	0.312	0.348	0.357	0.348
<i>N</i>	11879		11879		11879	
<i>Interaction between CSP and environmental sensitive industries included</i>						
\widehat{CSP}		– 0.017		0.032		0.013

Table 17 continued

Stage	Ov. CSP		Environm.		Social	
	Stage 1 Ov. CSP	Stage 2 Cr. rat.	Stage 1 Environm.	Stage 2 Cr. rat.	Stage 1 Social	Stage 2 Cr. rat.
Interaction \widehat{CSP} & env. sens.		0.000		0.007		0.002
Intercept	- 76.362***		- 2.338		- 17.918	
Dummy North Am.	- 9.856***	- 0.581*	- 12.145***	0.327	- 22.881***	0.049
Dummy Asia	- 18.281***	0.337	- 24.000***	1.345***	- 24.003***	0.945**
Weak instruments	0.000		0.002		0.000	
R^2	0.309	0.363	0.329	0.364	0.362	0.363
N	7032		7032		7032	

This table displays the estimation results of our robustness checks referring to both stages of the instrumental variable approach for each CSP impact score. Coefficients of all variables are displayed including the significance level marked by asterisks. They are regarded as being significant on the level of 1% (***) or 5% (**) or 10% (*) when the p value is below these levels. The lower boundaries of the rating categories according to Sect. 4 are also displayed

Table 18 Marginal effects panel North America

Predicted	AAA	AA	A	BBB	BB	B	CCC	CC	D
<i>Overall CSP</i>									
AAA	2.602***	4.980***	- 2.559***	- 4.826***	- 0.192***	- 0.004***	0.000	0.000***	0.000**
AA	1.507***	3.803***	1.977***	- 6.928***	- 0.351***	- 0.008***	0.000	0.000***	0.000**
A	0.508***	1.633***	7.634***	- 8.694***	- 1.056***	- 0.025***	0.000	0.000***	0.000**
BBB	0.087***	0.307***	4.288**	0.294	- 4.825***	- 0.148**	0.000	- 0.002**	0.000**
BB	0.006***	0.020***	0.369***	7.242***	- 5.527***	- 2.071***	- 0.002	- 0.032***	- 0.004**
B	0.000***	0.001***	0.021***	0.725***	9.006***	- 9.092***	- 0.027	- 0.556***	- 0.078**
CCC	0.000***	0.000***	0.003***	0.107***	3.841***	- 0.140	- 0.182	- 3.096***	- 0.533**
CC	0.000***	0.000***	0.003***	0.112***	3.992***	- 0.445	- 0.173	- 2.982***	- 0.507**
D	0.000***	0.000***	0.001***	0.033***	1.410***	6.503***	- 0.507	- 5.822***	- 1.617**
<i>Environment</i>									
AAA	2.419***	4.630***	- 2.379***	- 4.487***	- 0.178***	- 0.004***	0.000	0.000***	0.000**
AA	1.401***	3.536***	1.838***	- 6.441***	- 0.326***	- 0.007***	0.000	0.000***	0.000**
A	0.473***	1.518***	7.098***	- 8.083***	- 0.982***	- 0.023***	0.000	0.000***	0.000**
BBB	0.080***	0.286***	3.986***	0.273	- 4.486***	- 0.137***	0.000	- 0.002**	0.000**
BB	0.005***	0.019***	0.343***	6.733***	- 5.139***	- 1.926***	- 0.001	- 0.029***	- 0.004**
B	0.000***	0.001***	0.019***	0.674***	8.373***	- 8.453***	- 0.025	- 0.517***	- 0.072**
CCC	0.000***	0.000***	0.003***	0.099***	3.571***	- 0.130	- 0.169	- 2.878***	- 0.496**
CC	0.000***	0.000***	0.003***	0.104***	3.711***	- 0.413	- 0.161	- 2.772***	- 0.472**
D	0.000***	0.000***	0.001***	0.031***	1.311***	6.046***	- 0.471	- 5.413***	- 1.504**
<i>Social</i>									
AAA	2.778***	5.315***	- 2.732***	- 5.152***	- 0.205***	- 0.005***	0.000	0.000***	0.000**
AA	1.608***	4.060***	2.111***	- 7.396***	- 0.375***	- 0.008***	0.000	0.000***	0.000**
A	0.543***	1.743***	8.149***	- 9.281***	- 1.127***	- 0.026***	0.000	0.000***	0.000**
BBB	0.092***	0.328***	4.577***	0.314	- 5.151***	- 0.158**	0.000	- 0.002**	0.000**
BB	0.006***	0.021***	0.394***	7.730***	- 5.900***	- 2.211***	- 0.002	- 0.034***	- 0.005**
B	0.000***	0.001***	0.022***	0.774***	9.613***	- 9.705***	- 0.029	- 0.593***	- 0.083**
CCC	0.000***	0.000***	0.003***	0.114***	4.100***	- 0.149	- 0.194	- 3.305***	- 0.569**
CC	0.000***	0.000***	0.003***	0.120***	4.261***	- 0.475	- 0.185	- 3.183***	- 0.542**
D	0.000***	0.000***	0.001***	0.036***	1.505***	6.942***	- 0.541	- 6.215***	- 1.727**
<i>Emission</i>									
AAA	2.013***	3.853***	- 1.980***	- 3.734***	- 0.148***	- 0.003***	0.000	0.000***	0.000**

Table 18 continued

Predicted	AAA	AA	A	BBB	BB	B	CCC	CC	D
AA	1.166***	2.943***	1.530***	- 5.360***	- 0.271***	- 0.006***	0.000	0.000**	0.000**
A	0.393***	1.263***	5.907***	- 6.727***	- 0.817***	- 0.019***	0.000	0.000***	0.000**
BBB	0.067***	0.238***	3.317***	0.227	- 3.733***	- 0.114***	0.000	- 0.002***	0.000**
BB	0.004***	0.016***	0.285***	5.603***	- 4.276***	- 1.603***	- 0.001	- 0.024***	- 0.003**
B	0.000***	0.001***	0.016***	0.561***	6.968***	- 7.034***	- 0.021	- 0.430***	- 0.060**
CCC	0.000***	0.000***	0.002***	0.083***	2.972***	- 0.108	- 0.141	- 2.396***	- 0.412**
CC	0.000***	0.000***	0.002***	0.087***	3.088***	- 0.343	- 0.134	- 2.307***	- 0.392**
D	0.000***	0.000***	0.001***	0.026***	1.091***	5.032***	- 0.394	- 4.505***	- 1.251**
<i>Environmental innovation</i>									
AAA	5.230***	10.008***	- 5.144***	- 9.700***	- 0.385***	- 0.009***	0.000	0.000**	0.000**
AA	3.028***	7.644***	3.973***	- 13.924***	- 0.705***	- 0.016***	0.000	0.000***	0.000**
A	1.022***	3.282***	15.344***	- 17.474***	- 2.122***	- 0.050***	0.000	- 0.001***	0.000**
BBB	0.174***	0.617***	8.617***	0.591	- 9.698***	- 0.297***	0.000	- 0.004***	- 0.001**
BB	0.011***	0.040***	0.741***	14.554***	- 11.108***	- 4.163***	- 0.003	- 0.064***	- 0.009**
B	0.001***	0.002***	0.041***	1.457***	18.100***	- 18.273**	- 0.055	- 1.117***	- 0.156**
CCC	0.000***	0.000***	0.006***	0.215***	7.719***	- 0.281	- 0.365	- 6.223***	- 1.071**
CC	0.000***	0.000***	0.006***	0.226***	8.022***	- 0.893	- 0.348	- 5.993***	- 1.020**
D	0.000***	0.000***	0.002***	0.067***	2.833***	13.071***	- 1.019	- 11.703***	- 3.250**
<i>Resources</i>									
AAA	2.484***	4.754***	- 2.443***	- 4.608***	- 0.183***	- 0.004***	0.000	0.000**	0.000**
AA	1.439***	3.631***	1.888***	- 6.615***	- 0.335***	- 0.008***	0.000	0.000***	0.000**
A	0.485***	1.559***	7.289***	- 8.301***	- 1.008***	- 0.024***	0.000	0.000***	0.000**
BBB	0.083***	0.293***	4.094***	0.281	- 4.607***	- 0.141***	0.000	- 0.002***	0.000**
BB	0.005***	0.019***	0.352***	6.914***	- 5.277***	- 1.978***	- 0.001	- 0.030***	- 0.004**
B	0.000***	0.001***	0.020***	0.692***	8.598***	- 8.681***	- 0.026	- 0.531***	- 0.074**
CCC	0.000***	0.000***	0.003***	0.102***	3.667***	- 0.134	- 0.174	- 2.956***	- 0.509**
CC	0.000***	0.000***	0.003***	0.107***	3.811***	- 0.425	- 0.166	- 2.847***	- 0.485**
D	0.000***	0.000***	0.001***	0.032***	1.346***	6.209***	- 0.484	- 5.559***	- 1.544**
<i>Product responsibility</i>									
AAA	5.083***	9.727***	- 5.000***	- 9.428***	- 0.374***	- 0.008***	0.000	0.000***	0.000**
AA	2.944***	7.429***	3.862***	- 13.534***	- 0.685***	- 0.015***	0.000	0.000***	0.000**
A	0.993***	3.190***	14.913***	- 16.984***	- 2.063***	- 0.048***	0.000	- 0.001***	0.000**

Table 18 continued

Predicted	AAA	AA	A	BBB	BB	B	CCC	CC	D
BBB	0.169***	0.600***	8.376***	0.573	- 9.425***	- 0.288***	0.000	- 0.004***	- 0.001**
BB	0.011***	0.039***	0.720***	14.146***	- 10.797***	- 4.046***	- 0.003	- 0.062***	- 0.008**
B	0.001***	0.002***	0.040***	1.416***	17.592***	- 17.761***	- 0.054	- 1.086***	- 0.152**
CCC	0.000***	0.000***	0.006***	0.209***	7.504***	- 0.275	- 0.355	- 6.047***	- 1.041**
CC	0.000***	0.000***	0.006***	0.220***	7.797***	- 0.869	- 0.339	- 5.824***	- 0.991**
D	0.000***	0.000***	0.002***	0.065***	2.754***	12.703***	- 0.991	- 11.374***	- 3.159**
<i>Community</i>									
AAA	2.278***	4.359***	- 2.240***	- 4.225***	- 0.168***	- 0.004***	0.000	0.000***	0.000**
AA	1.319***	3.329***	1.731***	- 6.065***	- 0.307***	- 0.007***	0.000	0.000***	0.000**
A	0.445***	1.429***	6.683***	- 7.611***	- 0.924***	- 0.022***	0.000	0.000***	0.000**
BBB	0.076***	0.269***	3.753***	0.257	- 4.224***	- 0.129***	0.000	- 0.002***	0.000**
BB	0.005***	0.018***	0.322***	6.339***	- 4.838***	- 1.813***	- 0.001	- 0.028***	- 0.004**
B	0.000***	0.001***	0.018***	0.635***	7.883***	- 7.959***	- 0.024	- 0.487***	- 0.068**
CCC	0.000***	0.000***	0.003***	0.094***	3.363***	- 0.123	- 0.159	- 2.710***	- 0.467**
CC	0.000***	0.000***	0.003***	0.098***	3.494***	- 0.390	- 0.152	- 2.610***	- 0.444**
D	0.000***	0.000***	0.001***	0.029***	1.234***	5.692***	- 0.444	- 5.097***	- 1.416**
<i>Human rights</i>									
AAA	5.842***	11.181***	- 5.747***	- 10.836***	- 0.430***	- 0.010***	0.000	0.000***	0.000**
AA	3.383***	8.539***	4.439***	- 15.555***	- 0.788***	- 0.018***	0.000	0.000***	0.000**
A	1.141***	3.666***	17.141***	- 19.521***	- 2.371***	- 0.056***	0.000	- 0.001***	0.000**
BBB	0.194***	0.690***	9.627***	0.660	- 10.834***	- 0.332***	0.000	- 0.005***	- 0.001**
BB	0.012***	0.045***	0.828***	16.259***	- 12.410***	- 4.651***	- 0.003	- 0.071***	- 0.010**
B	0.001***	0.002***	0.046***	1.628***	20.221***	- 20.414***	- 0.062	- 1.248***	- 0.175**
CCC	0.000***	0.000***	0.007***	0.240***	8.624***	- 0.314	- 0.408	- 6.952***	- 1.197**
CC	0.000***	0.000***	0.007***	0.252***	8.962***	- 0.998	- 0.389	- 6.695***	- 1.139**
D	0.000***	0.000***	0.002***	0.075***	3.165***	14.602***	- 1.139	- 13.073***	- 3.631**
<i>Diversity</i>									
AAA	4.479***	8.571***	- 4.405***	- 8.307***	- 0.330***	- 0.007***	0.000	0.000***	0.000**
AA	2.594***	6.546***	3.403***	- 11.925***	- 0.604***	- 0.014***	0.000	0.000***	0.000**
A	0.875***	2.810***	13.140***	- 14.965***	- 1.818***	- 0.043***	0.000	- 0.001***	0.000**
BBB	0.149***	0.529***	7.380***	0.505	- 8.305***	- 0.254***	0.000	- 0.003***	0.000**
BB	0.010***	0.034***	0.635***	12.465***	- 9.514***	- 3.565***	- 0.003	- 0.054***	- 0.007**

Table 18 continued

Predicted	AAA	AA	A	BBB	BB	B	CCC	CC	D
B	0.001***	0.002***	0.036***	1.248***	15.501***	- 15.649***	- 0.047	- 0.957***	- 0.134***
CCC	0.000***	0.000***	0.005***	0.184***	6.612***	- 0.241	- 0.312	- 5.329***	- 0.918***
CC	0.000***	0.000***	0.005***	0.193***	6.871***	- 0.766	- 0.298	- 5.132***	- 0.874***
D	0.000***	0.000***	0.002***	0.057***	2.427***	11.193***	- 0.872	- 10.023***	- 2.784***
<i>Employment</i>									
AAA	2.940***	5.624***	- 2.890***	- 5.452***	- 0.217***	- 0.005***	0.000	0.000***	0.000**
AA	1.702***	4.295***	2.234***	- 7.826***	- 0.396***	- 0.009***	0.000	0.000***	0.000**
A	0.574***	1.844***	8.623***	- 9.820***	- 1.193***	- 0.028***	0.000	0.000***	0.000**
BBB	0.098***	0.347***	4.843***	0.332	- 5.450***	- 0.167***	0.000	- 0.002***	0.000**
BB	0.006***	0.023***	0.417***	8.180***	- 6.243***	- 2.340***	- 0.002	- 0.036***	- 0.005**
B	0.000***	0.001***	0.023***	0.819***	10.172***	- 10.269***	- 0.031	- 0.628***	- 0.088**
CCC	0.000***	0.000***	0.003***	0.121***	4.339***	- 0.159	- 0.205	- 3.497***	- 0.602**
CC	0.000***	0.000***	0.003***	0.127***	4.509***	- 0.503	- 0.196	- 3.368***	- 0.573**
D	0.000***	0.000***	0.001***	0.038***	1.593***	7.345***	- 0.573	- 6.577***	- 1.827**
<i>Health</i>									
AAA	3.309***	6.334***	- 3.256***	- 6.138***	- 0.244***	- 0.005***	0.000	0.000***	0.000**
AA	1.916***	4.837***	2.514***	- 8.811***	- 0.446***	- 0.010***	0.000	0.000***	0.000**
A	0.647***	2.077***	9.710***	- 11.058***	- 1.343***	- 0.031***	0.000	0.000***	0.000**
BBB	0.110***	0.391***	5.454***	0.373	- 6.137***	- 0.188***	0.000	- 0.003***	0.000**
BB	0.007***	0.025***	0.469***	9.210***	- 7.030***	- 2.634***	- 0.002	- 0.040***	- 0.005**
B	0.000***	0.001***	0.026***	0.922***	11.454***	- 11.564***	- 0.035	- 0.707***	- 0.099**
CCC	0.000***	0.000***	0.004***	0.136***	4.885***	- 0.179	- 0.231	- 3.937***	- 0.678**
CC	0.000***	0.000***	0.004***	0.143***	5.077***	- 0.567	- 0.221	- 3.792***	- 0.645**
D	0.000***	0.000***	0.001***	0.042***	1.793***	8.270***	- 0.645	- 7.405***	- 2.056**
<i>Training</i>									
AAA	4.195***	8.030***	- 4.127***	- 7.782***	- 0.309***	- 0.007***	0.000	0.000***	0.000**
AA	2.429***	6.132***	3.188***	- 11.171***	- 0.566***	- 0.013***	0.000	0.000***	0.000**
A	0.820***	2.633***	12.310***	- 14.020***	- 1.703***	- 0.040***	0.000	- 0.001***	0.000**
BBB	0.140***	0.495***	6.914***	0.474	- 7.780***	- 0.238***	0.000	- 0.003***	0.000**
BB	0.009***	0.032***	0.595***	11.677***	- 8.912***	- 3.340***	- 0.002	- 0.051***	- 0.007**
B	0.000***	0.002***	0.033***	1.169***	14.522***	- 14.660***	- 0.044	- 0.896***	- 0.125**
CCC	0.000***	0.000***	0.005***	0.172***	6.194***	- 0.225	- 0.293	- 4.993***	- 0.860**

Table 18 continued

Predicted	AAA	AA	A	BBB	BB	B	CCC	CC	D
CC	0.000***	0.000***	0.005***	0.181***	6.436***	-0.717	-0.280	-4.808***	-0.818**
D	0.000***	0.000***	0.001***	0.054***	2.273***	10.487***	-0.818	-9.389***	-2.608**

This table displays marginal effects at means for panel America. The marginal effects of the CSP describe the impact on the predicted probabilities per actual accrued rating class if the CSP impact score increases ceteris paribus by 1% point. Displayed effects in rows must sum up to zero because they are changes to probabilities summing up to 100%. Marginal effects are shown in per mille and are regarded as significant on the level of 1% (***) or 5% (**) or 10% (*) when the *p* value is below these levels

Table 19 Marginal effects panel Europe

Predicted	AAA	AA	A	BBB	BB	B	CCC	CC	D
<i>Overall CSP</i>									
AAA	3.285*	11.511**	-12.804***	-1.964**	-0.027*	-0.001	0.000	0.000	0.000
AA	1.269**	10.705**	-7.040**	-4.856***	-0.075**	-0.002*	0.000	0.000	0.000
A	0.201*	2.942**	11.067***	-13.706***	-0.488**	-0.015**	0.000	0.000*	0.000
BBB	0.022*	0.363**	6.891***	-3.293**	-3.845**	-0.134**	-0.001	-0.003*	-0.001
BB	0.001*	0.021**	0.544**	13.946***	-12.304***	-2.130**	-0.010	-0.057*	-0.012
B	0.000	0.001*	0.015**	1.134**	13.099***	-11.602**	-0.348	-1.868**	-0.432
CCC	0.000	0.001	0.024*	1.756*	13.030***	-13.081**	-0.223	-1.233**	-0.274
CC	0.000	0.000*	0.003*	0.254**	6.326**	2.335	-1.380	-5.652**	-1.886*
D	0.000	0.000	0.002	0.141*	3.954**	8.112**	-2.147	-6.829**	-3.233
<i>Environment</i>									
AAA	4.338*	15.131***	-16.876***	-2.558**	-0.035**	-0.001*	0.000	0.000	0.000
AA	1.668**	14.118***	-9.325***	-6.360***	-0.097***	-0.003**	0.000	0.000*	0.000
A	0.266**	3.911***	14.475***	-18.009***	-0.623***	-0.019**	0.000	0.000*	0.000
BBB	0.029**	0.469***	8.980***	-4.249***	-5.050***	-0.173***	-0.001	-0.004**	-0.001
BB	0.002**	0.028***	0.704***	18.371***	-16.244***	-2.761***	-0.012	-0.072**	-0.015
B	0.000*	0.001**	0.019***	1.436***	17.211***	-15.185***	-0.457	-2.452***	-0.572*
CCC	0.000	0.001*	0.030**	2.264**	17.204***	-17.264***	-0.288	-1.592**	-0.356
CC	0.000	0.000**	0.004**	0.311**	7.991***	3.670	-1.863	-7.540***	-2.574**

Table 19 continued

Predicted	AAA	AA	A	BBB	BB	B	CCC	CC	D
D	0.000	0.000*	0.002*	0.187**	5.295***	10.284**	- 2.740	- 8.913***	- 4.116
<i>Social</i>									
AAA	0.950	3.265	- 3.649	- 0.559	- 0.008	0.000	0.000	0.000	0.000
AA	0.361	3.027	- 1.965	- 1.401	- 0.022	- 0.001	0.000	0.000	0.000
A	0.058	0.831	3.168	- 3.909	- 0.142	- 0.004	0.000	0.000	0.000
BBB	0.007	0.104	1.978	- 0.952	- 1.098	- 0.038	0.000	- 0.001	0.000
BB	0.000	0.006	0.157	3.972	- 3.505	- 0.608	- 0.003	- 0.017	- 0.003
B	0.000	0.000	0.004	0.328	3.736	- 3.311	- 0.100	- 0.536	- 0.123
CCC	0.000	0.000	0.007	0.480	3.737	- 3.700	- 0.068	- 0.374	- 0.083
CC	0.000	0.000	0.001	0.072	1.784	0.731	- 0.403	- 1.637	- 0.549
D	0.000	0.000	0.000	0.038	1.076	2.464	- 0.642	- 1.964	- 0.973
Emission									
AAA	2.352	7.986	- 8.956	- 1.362	- 0.019	- 0.001	0.000	0.000	0.000
AA	0.878	7.409	- 4.754	- 3.477	- 0.054	- 0.002	0.000	0.000	0.000
A	0.143	2.062	7.736	- 9.587	- 0.343	- 0.010	0.000	0.000	0.000
BBB	0.016	0.256	4.829	- 2.318	- 2.686	- 0.093	0.000	- 0.002	0.000
BB	0.001	0.015	0.382	9.751	- 8.611	- 1.482	- 0.007	- 0.040	- 0.008
B	0.000	0.000	0.010	0.792	9.163	- 8.099	- 0.246	- 1.316	- 0.305
CCC	0.000	0.001	0.016	1.197	9.148	- 9.111	- 0.162	- 0.890	- 0.198
CC	0.000	0.000	0.002	0.181	4.490	1.528	- 0.962	- 3.931	- 1.308
D	0.000	0.000	0.001	0.094	2.647	6.015	- 1.571	- 4.797	- 2.389
Environmental innovation									
AAA	3.149**	12.064***	- 13.088***	- 2.097***	- 0.027**	- 0.001*	0.000	0.000	0.000
AA	1.311***	11.068***	- 7.488***	- 4.819***	- 0.070***	- 0.002**	0.000	0.000*	0.000
A	0.205**	3.040***	11.240***	- 14.010***	- 0.461***	- 0.014***	0.000	0.000*	0.000
BBB	0.021**	0.349***	6.890***	- 3.223***	- 3.903***	- 0.131***	- 0.001	- 0.003**	- 0.001
BB	0.001**	0.020***	0.529***	14.339***	- 12.697***	- 2.120***	- 0.009	- 0.053**	- 0.011*
B	0.000*	0.001**	0.013***	1.069***	13.384***	- 11.794***	- 0.345	- 1.893***	- 0.434*
CCC	0.000*	0.001**	0.019**	1.524***	13.646***	- 13.294***	- 0.241	- 1.355**	- 0.300
CC	0.000*	0.000**	0.002**	0.188***	5.195***	5.067**	- 1.666	- 6.416***	- 2.370*

Table 19 continued

Predicted	AAA	AA	A	BBB	BB	B	CCC	CC	D
<i>Resources</i>									
D	0.000	0.000*	0.002*	0.144**	4.160***	7.697**	- 2.034*	- 6.938***	- 3.031*
AAA	1.105	3.774	- 4.223	- 0.646	- 0.009	0.000	0.000	0.000	0.000
AA	0.419	3.498	- 2.263	- 1.627	- 0.026	- 0.001	0.000	0.000	0.000
A	0.067	0.966	3.658	- 4.521	- 0.164	- 0.005	0.000	0.000	0.000
BBB	0.008	0.121	2.287	- 1.096	- 1.273	- 0.044	0.000	- 0.001	0.000
BB	0.000	0.007	0.182	4.598	- 4.064	- 0.698	- 0.003	- 0.019	- 0.004
B	0.000	0.000	0.005	0.376	4.325	- 3.828	- 0.116	- 0.620	- 0.143
CCC	0.000	0.000	0.008	0.562	4.317	- 4.293	- 0.077	- 0.424	- 0.094
CC	0.000	0.000	0.001	0.083	2.071	0.831	- 0.465	- 1.888	- 0.633
D	0.000	0.000	0.001	0.044	1.253	2.830	- 0.739	- 2.269	- 1.120
<i>Product responsibility</i>									
AAA	0.859	3.047*	- 3.373*	- 0.525	- 0.007	0.000	0.000	0.000	0.000
AA	0.342	2.833*	- 1.890	- 1.265*	- 0.020*	- 0.001*	0.000	0.000	0.000
A	0.053	0.775*	2.919*	- 3.613*	- 0.129*	- 0.004*	0.000	0.000	0.000
BBB	0.006	0.095*	1.821*	- 0.867*	- 1.019*	- 0.035*	0.000	- 0.001	0.000
BB	0.000	0.006*	0.144*	3.676*	- 3.244*	- 0.561*	- 0.003	- 0.015*	- 0.003
B	0.000	0.000	0.004*	0.304*	3.467*	- 3.087*	- 0.090	- 0.488*	- 0.111
CCC	0.000	0.000	0.007	0.488	3.401*	- 3.463*	- 0.056	- 0.310*	- 0.068
CC	0.000	0.000	0.001	0.069	1.707	0.541	- 0.356	- 1.480*	- 0.482
D	0.000	0.000	0.000	0.038	1.057	2.116*	- 0.562	- 1.808*	- 0.840
<i>Community</i>									
AAA	- 2.212*	- 7.910***	8.719***	1.384**	0.019**	0.001*	0.000	0.000	0.000
AA	- 0.855**	- 7.198***	4.594***	3.404***	0.053***	0.002**	0.000	0.000	0.000
A	- 0.142**	- 2.029***	- 7.504***	9.341***	0.324***	0.010**	0.000	0.000*	0.000
BBB	- 0.015**	- 0.244***	- 4.671***	2.211***	2.628***	0.089***	0.000	0.002*	0.000
BB	- 0.001**	- 0.014***	- 0.364***	- 9.524***	8.429***	1.423***	0.006	0.038**	0.008
B	0.000*	0.000**	- 0.010**	- 0.740***	- 8.956***	7.895***	0.237	1.281**	0.294*
CCC	0.000	- 0.001*	- 0.016**	- 1.232**	- 8.842***	8.990***	0.141	0.788**	0.173
CC	0.000	0.000**	- 0.002**	- 0.145***	- 3.875***	- 2.591	1.044	4.117**	1.452*

Table 19 continued

Predicted	AAA	AA	A	BBB	BB	B	CCC	CC	D
D	0.000	0.000*	- 0.001*	- 0.091**	- 2.634**	- 5.679**	1.478	4.694**	2.233
Human rights									
AAA	- 2.402	- 7.749**	8.853**	1.280*	0.018*	0.001	0.000	0.000	0.000
AA	- 0.884*	- 7.308**	4.803**	3.335**	0.052**	0.002*	0.000	0.000	0.000
A	- 0.139*	- 1.982**	- 7.666**	9.437**	0.340**	0.010*	0.000	0.000	0.000
BBB	- 0.016*	- 0.248**	- 4.773**	2.307**	2.635**	0.092**	0.000	0.002	0.000
BB	- 0.001	- 0.015**	- 0.375**	- 9.585**	8.453**	1.468**	0.007	0.040*	0.008
B	0.000	0.000*	- 0.011*	- 0.793**	- 9.029**	8.043**	0.232	1.276*	0.282
CCC	0.000	0.000*	- 0.012**	- 0.930**	- 9.136**	8.542**	0.197	1.100	0.239
CC	0.000	0.000*	- 0.002*	- 0.154**	- 3.960**	- 2.505	1.039	4.169*	1.413
D	0.000	0.000	- 0.001*	- 0.084*	- 2.409**	- 6.377*	1.610	4.817**	2.445
Diversity									
AAA	4.085**	15.441***	- 16.836***	- 2.654***	- 0.035**	- 0.001*	0.000	0.000	0.000
AA	1.714***	14.221***	- 9.772***	- 6.071***	- 0.089***	- 0.003**	0.000	0.000*	0.000
A	0.263**	3.850***	14.470***	- 17.972***	- 0.593***	- 0.018***	0.000	0.000*	0.000
BBB	0.027**	0.445***	8.905***	- 4.209***	- 4.988***	- 0.174***	- 0.001	- 0.004**	- 0.001
BB	0.002**	0.025***	0.676***	18.377***	- 16.130***	- 2.851***	- 0.012	- 0.073**	- 0.014*
B	0.000*	0.001**	0.020***	1.559***	17.336***	- 15.737***	- 0.399	- 2.301***	- 0.479*
CCC	0.000*	0.000**	0.013**	1.072***	15.962***	- 12.548***	- 0.578	- 3.221**	- 0.701
CC	0.000*	0.000**	0.004**	0.300***	7.647***	4.204	- 1.842	- 7.872***	- 2.441*
D	0.000	0.000*	0.002**	0.164**	4.667***	11.700***	- 2.896*	- 9.399***	- 4.238*
Employment									
AAA	- 0.052	- 0.177	0.199	0.030	0.000	0.000	0.000	0.000	0.000
AA	- 0.020	- 0.164	0.106	0.077	0.001	0.000	0.000	0.000	0.000
A	- 0.003	- 0.045	- 0.172	0.213	0.008	0.000	0.000	0.000	0.000
BBB	0.000	- 0.006	- 0.108	0.052	0.060	0.002	0.000	0.000	0.000
BB	0.000	0.000	- 0.009	- 0.216	0.191	0.033	0.000	0.001	0.000
B	0.000	0.000	0.000	- 0.018	- 0.203	0.180	0.005	0.029	0.007
CCC	0.000	0.000	0.000	- 0.026	- 0.204	0.201	0.004	0.021	0.005
CC	0.000	0.000	0.000	- 0.004	- 0.095	- 0.044	0.022	0.090	0.031

Table 19 continued

Predicted	AAA	AA	A	BBB	BB	B	CCC	CC	D
<i>Health</i>									
D	0.000	0.000	0.000	- 0.002	- 0.058	- 0.137	0.035	0.107	0.054
AAA	0.225	0.762	- 0.855	- 0.130	- 0.002	0.000	0.000	0.000	0.000
AA	0.084	0.706	- 0.455	- 0.330	- 0.005	0.000	0.000	0.000	0.000
A	0.014	0.194	0.742	- 0.916	- 0.033	- 0.001	0.000	0.000	0.000
BBB	0.002	0.024	0.464	- 0.223	- 0.257	- 0.009	0.000	0.000	0.000
BB	0.000	0.001	0.037	0.930	- 0.821	- 0.142	- 0.001	- 0.004	- 0.001
B	0.000	0.000	0.001	0.076	0.875	- 0.774	- 0.023	- 0.126	- 0.029
CCC	0.000	0.000	0.002	0.112	0.875	- 0.866	- 0.016	- 0.088	- 0.019
CC	0.000	0.000	0.000	0.017	0.416	0.177	- 0.095	- 0.385	- 0.130
D	0.000	0.000	0.000	0.009	0.248	0.588	- 0.153	- 0.460	- 0.232
<i>Training</i>									
AAA	3.565*	13.246***	- 14.467***	- 2.311**	- 0.032**	- 0.001*	0.000	0.000	0.000
AA	1.480**	12.263***	- 8.327***	- 5.332***	- 0.082***	- 0.002**	0.000	0.000*	0.000
A	0.228**	3.337***	12.511***	- 15.517***	- 0.542***	- 0.017**	0.000	0.000*	0.000
BBB	0.025**	0.403***	7.772***	- 3.680***	- 4.361***	- 0.153***	- 0.001	- 0.004*	- 0.001
BB	0.001**	0.024***	0.614***	15.831***	- 13.966***	- 2.420***	- 0.010	- 0.062**	- 0.012
B	0.000*	0.001**	0.017**	1.298***	14.865***	- 13.343***	- 0.363	- 2.027**	- 0.448*
CCC	0.000*	0.001**	0.017**	1.327**	14.906***	- 13.472***	- 0.356	- 1.986*	- 0.438
CC	0.000	0.000**	0.003**	0.242***	6.256***	4.422	- 1.700	- 6.882***	- 2.340*
D	0.000	0.000*	0.002*	0.164*	4.549***	8.700**	- 2.283	- 7.784***	- 3.349

This table displays marginal effects at means for panel Europe. The marginal effects of the CSP describe the impact on the predicted probabilities per actual accrued rating class if the CSP impact score increases ceteris paribus by 1% point. Displayed effects in rows must sum up to zero because they are changes to probabilities summing up to 100%. Marginal effects are shown in per mille and are regarded as significant on the level of 1% (***) or 5% (**) or 10% (*) when the *p* - value is below these levels

Table 20 Marginal effects panel Asia

predicted	AAA	AA	A	BBB	BB	B	CCC	CC	D
<i>Overall CSP</i>									
AAA	0.630	4.449*	- 4.717**	- 0.354	- 0.007	0.000	0.000	0.000	0.000
AA	0.326*	6.223**	- 5.853**	- 0.682**	- 0.014**	0.000	0.000	0.000	0.000
A	0.031*	3.040**	1.691**	- 4.612**	- 0.146**	- 0.004*	0.000	0.000	0.000
BBB	0.002*	0.288**	4.198**	- 2.704**	- 1.732**	- 0.050*	0.000	0.000	0.000
BB	0.000	0.025**	0.562**	6.264**	- 6.274**	- 0.550*	- 0.025	0.000	- 0.004
B	0.000	0.001	0.032	1.493	4.129	- 5.153**	- 0.438	0.000	- 0.065
CCC	0.000	0.000	0.000	0.011	0.425	4.851*	0.063	- 0.001	- 5.349
D	0.000	0.000	0.000	0.014	0.522	5.273**	- 1.016	- 0.001**	- 4.792
<i>Environment</i>									
AAA	0.572	3.888*	- 4.145**	- 0.309	- 0.006	0.000	0.000	0.000	0.000
AA	0.291*	5.524**	- 5.196**	- 0.606**	- 0.012**	0.000	0.000	0.000	0.000
A	0.028*	2.696**	1.513**	- 4.103**	- 0.131**	- 0.003*	0.000	0.000	0.000
BBB	0.002*	0.257**	3.734***	- 2.409***	- 1.539**	- 0.044*	- 0.002	0.000	0.000
BB	0.000	0.023**	0.502**	5.560**	- 5.570**	- 0.490**	- 0.022	0.000	- 0.003
B	0.000	0.001	0.029	1.335	3.650	- 4.576*	- 0.384	0.000	- 0.056
CCC	0.000	0.000	0.000	0.010	0.367	4.284*	0.103	0.000	- 4.764
D	0.000	0.000	0.000	0.012	0.447	4.649**	- 0.815	0.000**	- 4.293
<i>Social</i>									
AAA	0.586	3.957	- 4.224*	- 0.312	- 0.006	0.000	0.000	0.000	0.000
AA	0.295	5.651**	- 5.315**	- 0.619**	- 0.013*	0.000	0.000	0.000	0.000
A	0.028	2.760**	1.526*	- 4.178**	- 0.133*	- 0.003	0.000	0.000	0.000
BBB	0.002	0.261**	3.807**	- 2.444*	- 1.578*	- 0.046	- 0.002	0.000	0.000
BB	0.000	0.023*	0.516**	5.675*	- 5.690*	- 0.499	- 0.023	0.000	- 0.003
B	0.000	0.001	0.029	1.366	3.737	- 4.663	- 0.408	0.000	- 0.062
CCC	0.000	0.000	0.000	0.011	0.405	4.431	0.005	- 0.002	- 4.850
D	0.000	0.000	0.000	0.013	0.500	4.812*	- 0.989	- 0.002*	- 4.334
<i>Emission</i>									
AAA	0.386	2.654	- 2.825*	- 0.211	- 0.004	0.000	0.000	0.000	0.000
AA	0.197	3.753*	- 3.530*	- 0.412**	- 0.008*	0.000	0.000	0.000	0.000

Table 20 continued

predicted	AAA	AA	A	BBB	BB	B	CCC	CC	D
A	0.019	1.832*	1.028*	- 2.787*	- 0.089*	- 0.002	0.000	0.000	0.000
BBB	0.001	0.175**	2.535**	- 1.635**	- 1.044*	- 0.030*	- 0.001	0.000	0.000
BB	0.000	0.015**	0.340**	3.778*	- 3.784*	- 0.333*	- 0.015	0.000	- 0.002
B	0.000	0.001	0.019	0.904	2.486	- 3.109	- 0.263	0.000	- 0.039
CCC	0.000	0.000	0.000	0.007	0.252	2.914	0.061	- 0.001	- 3.233
D	0.000	0.000	0.000	0.008	0.306	3.159*	- 0.557	- 0.001*	- 2.915
<i>Environmental innovation</i>									
AAA	1.536	9.996**	- 10.757***	- 0.759**	- 0.015	0.000	0.000	0.000	0.000
AA	0.752**	14.626***	- 13.797***	- 1.548***	- 0.031***	- 0.001*	0.000	0.000	0.000
A	0.071*	7.145***	3.809***	- 10.678***	- 0.338***	- 0.009*	0.000	0.000	0.000
BBB	0.005*	0.652***	9.829***	- 6.210***	- 4.149***	- 0.122**	- 0.005	0.000	- 0.001
BB	0.000*	0.060***	1.373***	14.649***	- 14.733***	- 1.284***	- 0.058	0.000	- 0.009
B	0.000	0.003	0.079	3.638	9.473	- 12.019**	- 1.016	0.000	- 0.157
CCC	0.000	0.000	0.001	0.028	1.053	11.622**	- 0.177	- 0.001*	- 12.526
D	0.000	0.000	0.001	0.041	1.501	13.124***	- 4.424	- 0.001***	- 10.242
<i>Resources</i>									
AAA	0.467	2.958	- 3.186	- 0.234	- 0.005	0.000	0.000	0.000	0.000
AA	0.228	4.329	- 4.070	- 0.477	- 0.010	0.000	0.000	0.000	0.000
A	0.022	2.111	1.192	- 3.219	- 0.103	- 0.003	0.000	0.000	0.000
BBB	0.002	0.202	2.925	- 1.885	- 1.207	- 0.035	- 0.001	0.000	0.000
BB	0.000	0.018	0.397	4.349	- 4.360	- 0.385	- 0.017	0.000	- 0.002
B	0.000	0.001	0.023	1.054	2.851	- 3.585	- 0.300	0.000	- 0.044
CCC	0.000	0.000	0.000	0.008	0.286	3.352	0.091	- 0.001	- 3.736
D	0.000	0.000	0.000	0.009	0.344	3.625	- 0.590	- 0.001	- 3.388
<i>Product responsibility</i>									
AAA	0.479	3.027	- 3.267	- 0.235	- 0.005	0.000	0.000	0.000	0.000
AA	0.233	4.461*	- 4.203*	- 0.482*	- 0.010*	0.000	0.000	0.000	0.000
A	0.022	2.169*	1.228*	- 3.312*	- 0.105*	- 0.003	0.000	0.000	0.000
BBB	0.002	0.206*	3.022*	- 1.950*	- 1.241*	- 0.036	- 0.002	0.000	0.000
BB	0.000	0.018*	0.406*	4.496*	- 4.500*	- 0.398	- 0.020	0.000	- 0.003

Table 20 continued

predicted	AAA	AA	A	BBB	BB	B	CCC	CC	D
B	0.000	0.001	0.024	1.134	2.823	- 3.600	- 0.332	0.000	- 0.050
CCC	0.000	0.000	0.000	0.009	0.338	3.453	0.057	0.000	- 3.857
D	0.000	0.000	0.000	0.010	0.376	3.614	- 0.349	0.000	- 3.651
<i>Community</i>									
AAA	0.334	2.140	- 2.302	- 0.169	- 0.003	0.000	0.000	0.000	0.000
AA	0.163	3.121	- 2.933	- 0.344	- 0.007	0.000	0.000	0.000	0.000
A	0.016	1.525	0.843	- 2.308	- 0.074	- 0.002	0.000	0.000	0.000
BBB	0.001	0.144	2.098	- 1.341	- 0.875	- 0.026	- 0.001	0.000	0.000
BB	0.000	0.013	0.288	3.127	- 3.137	- 0.276	- 0.013	0.000	0.000
B	0.000	0.001	0.016	0.758	2.062	- 2.580	- 0.223	0.000	- 0.002
CCC	0.000	0.000	0.000	0.006	0.220	2.446	0.004	0.000	- 0.034
D	0.000	0.000	0.000	0.007	0.274	2.664	- 0.564	- 0.002	- 2.674
<i>Human rights</i>									
AAA	0.395	2.548	- 2.739	- 0.200	- 0.004	0.000	0.000	0.000	0.000
AA	0.195	3.707	- 3.488	- 0.405	- 0.008	0.000	0.000	0.000	0.000
A	0.018	1.809	1.012	- 2.749	0.088	- 0.002	0.000	0.000	0.000
BBB	0.001	0.172	2.509	- 1.614	- 1.037	- 0.030	- 0.001	0.000	0.000
BB	0.000	0.015	0.342	3.723	- 3.735	- 0.329	- 0.015	0.000	- 0.002
B	0.000	0.001	0.020	0.909	2.429	- 3.066	- 0.255	0.000	- 0.038
CCC	0.000	0.000	0.000	0.007	0.246	2.877	0.069	- 0.001	- 3.197
D	0.000	0.000	0.000	0.008	0.301	3.130	- 0.570	- 0.001	- 2.869
<i>Diversity</i>									
AAA	0.471	4.261	- 4.369*	- 0.357	- 0.007	0.000	0.000	0.000	0.000
AA	0.283*	5.383**	- 5.063**	- 0.591**	- 0.012**	0.000	0.000	0.000	0.000
A	0.027*	2.634**	1.460**	- 3.995**	- 0.123**	- 0.003*	0.000	0.000	0.000
BBB	0.002*	0.247**	3.607**	- 2.337**	1.477**	- 0.041*	- 0.002	0.000	0.000
BB	0.000*	0.021**	0.457***	5.464**	- 5.444**	- 0.474**	- 0.021	0.000	- 0.003
B	0.000	0.001	0.025	1.237	3.655	- 4.491*	- 0.373	0.000	- 0.054
CCC	0.000	0.000	0.000	0.009	0.354	4.197*	0.021	- 0.002	- 4.580
D	0.000	0.000	0.000	0.011	0.423	4.520*	- 0.790	- 0.002**	- 4.163

Table 20 continued

predicted		AAA	AA	A	BBB	BB	B	CCC	CC	D
<i>Employment</i>										
AAA	- 0.281	- 1.629	1.780	0.127	0.003	0.000	0.000	0.000	0.000	0.000
AA	- 0.130	- 2.481	2.332	0.274	0.006	0.000	0.000	0.000	0.000	0.000
A	- 0.013	- 1.210	- 0.675	1.837	0.059	0.002	0.000	0.000	0.000	0.000
BBB	- 0.001	- 1.115	- 1.672	1.070	0.696	0.021	0.000	0.000	0.000	0.000
BB	0.000	- 0.011	- 0.232	- 2.480	2.491	0.221	0.010	0.000	0.000	0.001
B	0.000	- 0.001	- 0.013	- 0.611	- 1.629	- 0.611	2.057	0.171	0.000	0.026
CCC	0.000	0.000	0.000	- 0.005	- 0.165	- 1.934	- 1.934	- 0.032	0.001	2.135
D	0.000	0.000	0.000	- 0.006	- 0.202	- 2.096	- 2.096	0.379	0.001	1.923
<i>Health</i>										
AAA	0.472	2.545	- 2.817	- 0.196	- 0.004	0.000	0.000	0.000	0.000	0.000
AA	0.210	4.022	- 3.782	- 0.441	- 0.009	0.000	0.000	0.000	0.000	0.000
A	0.020	1.958	1.091	- 2.971	- 0.096	- 0.002	- 0.002	0.000	0.000	0.000
BBB	0.001	0.186	2.713	- 1.734	- 1.130	- 0.034	- 0.034	- 0.002	0.000	0.000
BB	0.000	0.017	0.381	4.012	- 4.035	- 0.356	- 0.356	- 0.017	0.000	- 0.002
B	0.000	0.001	0.022	0.994	2.640	- 3.316	- 3.316	- 0.294	0.000	- 0.046
CCC	0.000	0.000	0.000	0.008	0.291	3.145	3.145	0.044	- 0.002	- 3.485
D	0.000	0.000	0.000	0.010	0.356	3.406	3.406	- 0.636	- 0.002	- 3.134
<i>Training</i>										
AAA	- 0.255	- 1.419	1.562	0.110	0.002	0.000	0.000	0.000	0.000	0.000
AA	- 0.116	- 2.211	2.079	0.243	0.005	0.000	0.000	0.000	0.000	0.000
A	- 0.011	- 1.079	- 0.595	1.631	0.053	0.001	0.000	0.000	0.000	0.000
BBB	- 0.001	- 1.102	- 1.491	0.951	0.624	0.019	0.019	0.001	0.000	0.000
BB	0.000	- 0.010	- 0.212	- 2.201	2.217	0.196	0.196	0.009	0.000	0.001
B	0.000	- 0.001	- 0.012	- 0.549	- 1.445	1.831	1.831	0.153	0.000	0.023
CCC	0.000	0.000	0.000	- 0.004	- 0.151	- 1.738	- 1.738	- 0.001	0.000	1.894
D	0.000	0.000	0.000	- 0.005	- 0.184	- 1.878	- 1.878	0.359	0.000	1.707

This table displays marginal effects at means for panel Asia. The marginal effects of the CSP describe the impact on the predicted probabilities per actual accrued rating class if the CSP impact score increases ceteris paribus by 1% point. Displayed effects in rows must sum up to zero because they are changes to probabilities summing up to 100%. Marginal effects are shown in per mille and are regarded as significant on the level of 1% (***) or 10% (*) when the *p* - value is below these levels

energies back to a stronger focus on fossil fuels. Hence, we analyze whether our findings are subject to any development in recent years. We run estimations with a sample reduced by observations of the most recent year in the sample, and also the same for the second and the third recent year. As a result, we see no substantial deviations in the CSP effects for any of those time variations in the sample. In this context, we also address the case of missing data. After matching the final dataset, each combination of credit rating, CSP, and control variables per time and company is dismissed if any data value relating to these variables is missing. To measure the impact of the missing control variables' data, we implement a mean imputation according to Schafer (1997). Instead of discarding missing observations, we substitute them by the mean. Again, the corresponding estimations support our main result.

As the industry appears to be significant in terms of the impact of environmental CSP dimensions (Khan et al. 2016), we additionally analyze the impact of the industry through an interaction of CSP with a dummy variable expressing whether a firm belongs to the “NAICs Codes of Environmental Sensitive Industries” published by the US Small Business Administration. In our sample, we find no evidence that the impact is stronger there.

7 Conclusion

While the corresponding literature has researched the general impact of overall CSP on credit risk, the identification of the actual drivers on a lower aggregation level of CSP has so far not been addressed adequately. We supplement earlier studies by using CSP measures based on the more sophisticated and more transparent methodology of Asset4. Moreover, international data coverage allows us to analyze (and compare) the three regions of North America, Europe, and Asia with a consistent methodology and data set. Compared with the majority of previous studies, our analysis focuses on single components of CSP. We account for the requirements of both the consideration of endogeneity regarding the impact of CSP on credit ratings and recent credit risk modeling by applying the instrumental variable approach in terms of the two-stage predictor substitution with an established credit risk model in the second stage. This approach allows us in particular to provide clearer indications of a causal relationship in terms of how CSP components impact credit ratings in contrast to the common approaches, which only reveal correlational relationships.

We initially estimate the impact of overall CSP on credit ratings to confirm the findings of the previous literature. Then we investigate which of the CSP dimensions can improve the quality of credit rating predictions. Each of the three environmental categories has a significant positive impact while environmental innovation is most distinct. As part of social performance, measures for community and diversity (involving equal opportunities) are significant. With respect to differences between North America, Europe, and Asia, the impact of social performance is driven by the extent of diversity only in North America and Europe,

which has no impact in Asia and is likely due to cultural reasons. Product innovation is still the determining driver within the environmental performance of all regions.

The identification of the drivers of impact for CSP on credit ratings has important implications for practice. Some of the CSP dimensions generally act in a risk-mitigating manner in terms of default risk, for which credit ratings are a proxy. From this point of view, investments in CSP are not a waste of resources. Moreover, because better credit ratings are associated with lower financing costs, our results help to target investments in CSP for the purpose of referring cost reductions efficiently. In particular investments in product innovation and diversity appear to have the highest impact.

With the identification of these CSP components that lead to lower credit risk, our analysis shows that some, but not all aspects of CSP produce favorable effects beyond a philanthropic rationale. However, as a limitation, it has to be noted that real-world causality in the context of this relationship can only be proven by means of natural or quasi-experiments, therefore confirming the necessity for continued research in the future.

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