Corporate Sustainability: First Evidence on Materiality

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Editor's Note: Accepted by T.J. Wong
Submitted May 2015
Accepted January 2016

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Keywords: *sustainability*, *corporate social responsibility*, *investment performance*

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Abstract

Using newly-available materiality classifications of sustainability topics, we develop a novel dataset by hand-mapping sustainability investments classified as material for each industry into firm-specific sustainability ratings. This allows us to present new evidence on the value implications of sustainability investments. Using both calendar-time portfolio stock return regressions and firm-level panel regressions we find that firms with good ratings on *material* sustainability issues significantly outperform firms with poor ratings on these issues. In contrast, firms with good ratings on *immaterial* sustainability issues do not significantly outperform firms with poor ratings on the same issues. These results are confirmed when we analyze future changes in accounting performance. The results have implications for asset managers who have committed to the integration of sustainability factors in their capital allocation decisions.

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INTRODUCTION

Corporate investment policies are a key determinant of firm value. Multiple studies have investigated different types of investments and how these relate to future financial performance. A relatively newer class of corporate investments, broadly termed sustainability investments, has attracted the attention of firms, institutional investors, societal advocacy groups, and academics (e.g., Dhaliwal et al., 2011, 2012; Kim et al., 2012; Moser and Martin, 2012). A large number of firms identify sustainability issues as strategically important, and an increasing number of investors have committed to the integration of environmental, social, and governance (ESG) data in their capital allocation process.[1] Firms release a wealth of information in the form of ESG data, but the sheer number of sustainability issues that attract investment raises the question of which of these ESG data are more or less material.

The materiality of the different sustainability issues likely varies systematically across firms and industries (Eccles and Serafeim 2013).[2] As such, a new organization, the Sustainability Accounting Standards Board (SASB), adopts a shareholder viewpoint in defining materiality and develops standards for reporting of ESG issues concentrated on discriminating between material and immaterial issues. If the discrimination is meaningful, exploiting variation in materiality across sustainability issues has the potential to improve the signal to noise ratio in testing the future performance implications of sustainability investments, and reduce the dimensionality of

[1] The terms "sustainability", "environmental, social and governance" (ESG), or "corporate social responsibility" (CSR) have been used interchangeably in the past, to describe a firm's voluntary actions to manage its environmental and social impact and increase its positive contribution to society. We use throughout this paper the word sustainability given that more firms around the world use this word rather than CSR to describe the strategic aspect of their efforts to improve performance on ESG issues. A manifestation of this phenomenon is the institutionalization of a new C-level position of the Chief Sustainability Officer (Miller and Serafeim 2015). Moreover, this term is consistent with the labeling of the Sustainability Accounting Standards Board that we use as the source of materiality guidance. The ESG label represents an effort to group all the issues that fall under the umbrella of sustainability.

[2] See for example United Nations Environment Program Finance Initiative and World Business Council for Sustainable Development. 2010. Translating environmental, social and governance factors into sustainable business value http://www.unepfi.org/fileadmin/documents/translatingESG.pdf.

price-relevant investment signals used by the large number of institutional investors committed to ESG initiatives. In this paper we take a first step towards these objectives by examining the future performance implications of material versus immaterial sustainability investments.

We develop a novel data set to measure firm investments on material sustainability issues by hand-mapping recently-available industry-specific guidance on materiality from SASB to MSCI KLD that has firm-level ratings on an array of sustainability issues. SASB considers material issues to be those with evidence of wide interest from a variety of user groups and evidence of financial impact, the same evidence used by the SEC in determining the materiality of financial information (the SASB classification process is described in more detail in Section 3, Appendix I and Appendix II). From the merged data we construct a materiality (immateriality) score for each firm-year that measures performance on material (immaterial) sustainability issues.

To test the future shareholder value implications of sustainability investments we first orthogonalize a firm's change in the sustainability index of material issues with respect to *changes* in firm size, market-to-book ratio, leverage, profitability, R&D intensity, advertising intensity and institutional ownership and sector membership. Next, we form portfolios of firms in the top and bottom quintile of the unexplained portion of the sustainability index change (the residuals from the first step), and estimate Fama and French (1993) calendar-time regressions to test for one-year-ahead abnormal stock return performance of the portfolio. This procedure allows us to attribute the future performance of this portfolio more confidently to material sustainability investments, rather than to underlying firm characteristics of portfolio firms.

Although one would expect that if organizations, such as SASB, perform their standard setting process reasonably then materiality guidance should help return prediction, we view the relation between material investments and firm performance as a testable hypothesis rather than

a tautology for multiple reasons. First, if the research process of organizations such as SASB is captured by special interests that seek to steer the output in preferred directions, then this would lead to no improvement in the informativeness of ESG ratings. For example, it could be that NGOs that support environmental causes influence SASB's standards to classify as material environmental issues when they are not material in a given industry, or that corporations influence SASB's standards to classify labor issues as immaterial when they are material in a given industry. Second, there has previously been a void in the materiality measurement space, in that classification of issues as material or immaterial has not previously been available. As such, it is helpful to validate any such classification efforts for use by future researchers. A naïve classification of sustainability issues as material is less likely to be associated with superior future performance. Consider for example if different materiality classifications were available from different sources, with each source using a different process to identify material issues. The relation between materiality classifications and future firm performance is unlikely to be tautological if there is variation across classifications in their relation with future performance. Rather, the relation between a particular classification and future firm performance is conducive to empirical testing. This is the spirit of our paper.

Results indicate that firms with high residual changes on material sustainability topics outperform firms with low residual changes on these topics. In contrast, firms with high residual changes on immaterial sustainability topics do not outperform firms with low residual changes on the same topics. Across all our specifications, we find that portfolios formed on the basis of the residual materiality index outperform portfolios formed on the basis of the residual total KLD index or portfolios formed on the basis of the residual immaterial index. These findings are confirmed using firm-level panel regressions that account for a host of additional firm

characteristics such as analyst coverage, investments in R&D, advertising and capital expenditures, and board characteristics and firm or industry fixed effects.

A series of additional tests indicate that the results are robust to alternative factor models, alternative methods to calculate firm-level sustainability indices, different subsamples or subperiods, and alternative portfolio construction rules. Finally, firms scoring high on the residual materiality index exhibit higher growth in accounting profitability compared to firms scoring low on the residual materiality index. Consistent, with the stock return analysis, we find that the residual materiality index has much higher predictive power both in economic and statistical sense over the residual total KLD index or the residual immaterial index for accounting performance.

Our interpretation of the significant alpha from a classification of materiality of sustainability investments is as follows: Since materiality classifications were not previously available, investors could not react to them as soon as ESG performance data became available (the sustainability performance data did not distinguish between material and immaterial investments). As such, the price change (or alpha) is realized over a longer horizon as the materiality investments begin to pay off through observable metrics such as higher accounting returns. There is no alpha (or future abnormal stock return) to immaterial investments because these do not appear to pay off through observable metrics over a longer horizon.

Collectively the tests mitigate concerns about endogeneity by using empirical approaches from the forefront of the return predictability literature: (i) The returns tests are predictive rather than contemporaneous regressions; (ii) The return prediction signal is the *change* in the materiality index *orthogonalized* with respect to *changes* in a number of firm characteristics; (iii) The portfolio tests control for conventional risk factors, allowing attribution of the alpha to

material investments. This inferential approach is standard in the asset pricing literature; (iv) The portfolio tests are supplemented by firm-level return prediction regressions saturated with controls for known return predictors, a host of firm characteristics, and time and firm fixed effects. The inclusion of both time and firm fixed effects in the panel regressions is a generalization of the difference-in-differences approach that allows a causal interpretation in a regression setting (as noted in Bertrand and Mullainathan, 2003; Angrist and Pischke, 2009; Armstrong et al., 2012). The fixed effects soak up unobserved firm-specific and economy-wide factors that could otherwise cloud identification.

Our results contribute to the literature on sustainability and corporate social responsibility (CSR) that has recently attracted interest from accounting scholars. Kim et al. (2012) examine the relation between sustainability scores and earnings quality. Dhaliwal et al. (2011, 2012) examine the relation between sustainability disclosures and firms' cost of equity as well as analyst forecast accuracy. Hoi et al. (2013) examine the relation between irresponsible sustainability activities and corporate tax avoidance. Moser and Martin (2012) provide an overview and call for further research on sustainability activities. This paper responds to the interest from accounting scholars, and adds to the evidence on the relation between sustainability or sustainability ratings and firm performance (e.g., Waddock and Graves 1997; Barnett and Salomon 2012; Margolis et al. 2009; Eccles et al. 2014). Past literature has not controlled for the differential importance of sustainability issues across industries therefore treating all sustainability issues as of equal importance across industries. While meta-analyses find an overall small positive relation between sustainability ratings and firm performance, our results suggest that this relation could be significantly more robust if one considers the differential materiality of sustainability issues. Moreover, this paper makes a contribution to a literature that

attempts to construct better measures of a firm's sustainability performance. To date however, the literature has not identified a ranking of importance for the various issues, as a guide for empirical work. The results of this paper suggest that innovations in accounting standard setting practice are useful in guiding researchers on constructing better measures of sustainability. Importantly, our results suggest that ESG performance measures that take into account materiality guidance are more likely to be able to clarify the relation between sustainability investments and financial performance.

The rest of the paper proceeds as follows. Section 2 describes the motivation and literature review. Section 3 presents our sample and data. Section 4 presents the empirical results from a variety of tests of future stock market performance. Section 5 presents analysis of future accounting performance. Section 6 concludes.

MOTIVATION AND LITERATURE REVIEW

An increasing number of investors have committed to integrating sustainability issues in their asset allocation decisions. As of 2014, the United Nations Principles for Responsible Investment (UNPRI) had 1,260 signatories with $45 trillion in assets under management who had committed to six principles 'recognizing the materiality of environmental, social, and governance (ESG) issues.'[3] At the same time an increasing number of companies have been disclosing sustainability information, growing from less than 30 in the early 1990s to more than 7,000 in 2014 (Serafeim 2014). Given this backdrop, understanding the value implications of sustainability issues has been of interest to a wide audience.

The number of sustainability issues firms can potentially invest in is very large. For example KLD, a leading data provider, ranks firms' performance on more than fifty distinct sustainability

[3] See http://www.unpri.org/about-pri/about-pri/

issues.[4] In addition, an increasing number of investors recognize that a given sustainability issue is unlikely to be equally material for firms in distinct industries. For example, managing climate change risk can be strategically important for some firms, while employee health and safety issues are more likely to be strategically important for other firms. As such, exploiting variation in the materiality of sustainability issues across firms in testing the future performance implications of sustainability investments has the potential to increase the signal to noise ratio in the investment-performance relation and reduce the dimensionality of investment signals considered by institutional investors in the asset allocation decisions. Taking a first step toward these goals is the motivation for this paper.

The prior academic literature on the performance implications of sustainability investments has adopted a number of different viewpoints. One viewpoint is that such investments are efficient from shareholders' perspective. For example, enhanced sustainability performance could lead to obtaining better resources (Cochran and Wood, 1984; Waddock and Graves, 1997), higher quality employees (Turban and Greening, 1997), and better marketing of products and services (Moskowitz, 1972; Fombrun, 1996). It could also mitigate the likelihood of negative regulatory, legislative or fiscal action (Freeman, 1984; Berman et al., 1999; Hillman and Keim, 2001), while protecting and enhancing corporate reputation (Fombrun and Shanley, 1990; Fombrun, 2005; Freeman et al., 2007). A number of papers provide empirical evidence consistent with sustainability investments creating financial value. Eccles et al. (2014) identify a set of firms that adopted corporate policies related to environmental and social issues before the adoption of such policies became widespread, and find that these firms outperform their peers in the future in terms of stock market and accounting performance. Borgers et al. (2013) find that

[4] For more information see the dataset list at https://goo.gl/qugXSI.

firms with better sustainability performance have higher risk-adjusted returns in the future (but that this result has reversed in more recent years). Dimson, Karakas and Li (2014) show that after successful engagements, particularly on environmental/social issues, companies experience improved accounting performance.

A second viewpoint is that sustainability investments disproportionately raise a firm's costs, creating a competitive disadvantage in a competitive market (Friedman, 1970; Aupperle et al., 1985; McWilliams and Siegel, 1997; Jensen, 2002). One reason for making such inefficient investments could be that managers capture private benefits (Brammer and Millington, 2008; Cheng, Hong, and Shue, 2014). Another reason for making such inefficient investments could be managers' political beliefs (De Giuli and Kostovetsky, 2014).

There is mixed evidence in the prior literature on the relation between sustainability and performance (Barnett and Salomon, 2006; Margolis and Walsh, 2003; Orlitzky, Schmidt and Rynes, 2003; Hillman and Keim, 2001; McWilliams and Siegel, 2000). Importantly, prior papers have not accounted for the differential importance of the different sustainability issues across industries. This is not a criticism of the literature but rather a reflection of the lack of guidance on the materiality of the sustainability issues. While considerable progress has been made in the past twenty years in the quantity of sustainability disclosure no organization had provided materiality guidance through a standard setting process. SASB was the first to attempt to fill this gap and it provides a unique opportunity to clarify the relation between sustainability investments and future financial performance. Moreover, our results serve as a way to validate whether SASB's output has any meaningful predictive power over future financial performance. Finally, since sustainability performance does not have the feature of aggregation that the

financial statements have, materiality guidance could serve as a new aggregation procedure, which is more informative than aggregating all data items by assigning equal weights.

DATA AND SAMPLE

Materiality Data

Our data collection is driven by the availability of materiality guidance from SASB, which is an independent 501(c)3 non-profit whose mission is to develop and disseminate sustainability accounting standards that help publicly-listed corporations disclose material factors in compliance with SEC requirements. SASB standards are designed for the disclosure of material sustainability issues in mandatory SEC filings, such as the Form 10-K and 20-F. SASB is accredited to establish sustainability accounting standards by the American National Standards Institute (ANSI), and such accreditation is intended to signify that SASB's procedures to develop sustainability accounting standards meet the Institute's requirements for openness, balance, consensus and due process. SASB's board comprises a mix of regulators, academics, lawyers, and investors, including two former Chairwomen of the SEC and a former Chairman of the FASB.

SASB adopts an investor viewpoint and as a result a topic might be classified as immaterial from an investor standpoint although such a topic could be important for other stakeholders. That being said, we expect that there will be overlap between materiality classifications for different stakeholders if sustainability investments affect financial performance by affecting customer satisfaction, loyalty, employee engagement, and regulatory risk, for example. SASB uses the SEC definition of materiality as interpreted by the U.S. Supreme Court.[5][6] The Public Company

[5] TSC Industries v. Northway, Inc., 426 U.S. 438, 449 (1976). See also Basic, Inc. v. Levinson, 485 U.S. 224 (1988).

Accounting Oversight Board (PCAOB) also refers to the U.S. Supreme Court[7] interpretation of securities laws in its materiality guidance, that is, material information is defined as presenting a substantial likelihood that the disclosure of the omitted fact would have been viewed by the reasonable investor as having significantly altered the total mix of information made available. Like the PCAOB, SASB defines material information as information that represents a substantial likelihood that its disclosure will be viewed by the reasonable investor as significantly altering the total mix of information made available.

The investor focus of SASB is narrower compared to other organizations such as the Global Reporting Initiative (GRI), which has a multi-stakeholder focus. The GRI states that the information in a GRI-compliant report should cover Aspects[8] that: reflect the organization's significant economic, environmental, and social impacts; or substantively influence the assessments and decisions of stakeholders. Materiality is the threshold at which Aspects become sufficiently important that they should be reported.[9]

By February 2014, SASB had produced guidance for six sectors (out of a total of 10) that include 45 industries. These sectors were healthcare, financials, technology and communications, non-renewable resources, transportation, and services. SASB's standards are developed via a multi-stakeholder process consisting of research supported by Bloomberg technology, data and analytical tools; balanced, multi-stakeholder industry working groups; a public comment period;

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[6] The Public Company Accounting Oversight Board is a nonprofit corporation established by the U.S. Congress to oversee the audits of public companies in order to protect investors and the public interest by promoting informative, accurate, and independent audit reports. http://pcaobus.org/About/Pages/default.aspx.

[7] TSC Industries v. Northway, Inc., 426 U.S. 438, 449 (1976). See also Basic, Inc. v. Levinson, 485 U.S. 224 (1988).

[8] The term "Aspect" is used in the GRI G4 Guidelines (Guidelines) to refer to the list of subjects for disclosure that are covered by the Guidelines. Aspects are set out into three Categories - Economic, Environmental and Social. The Social Category is further divided into four sub-Categories, which are Labor Practices and Decent Work, Human Rights, Society and Product Responsibility. See https://www.globalreporting.org/resourcelibrary/GRIG4-Part1-Reporting-Principles-and-Standard-Disclosures.pdf.

[9] Global Reporting Initiative. *G4 Sustainability Reporting Guidelines, Reporting Principles and Standard Disclosures*, https://www.globalreporting.org/resourcelibrary/GRIG4-Part1-Reporting-Principles-and-Standard-Disclosures.pdf.

and review by an independent Standards Council comprised of experts in standards development, securities law, environmental law, metrics and accounting. Appendix I illustrates each step of the standard setting process. SASB convenes balanced industry working groups—consisting of 1/3 corporations, 1/3 market participants, and 1/3 other stakeholders—to provide feedback on SASB's draft sustainability accounting standards. For the six sectors mentioned above, more than 2,100 experts representing $21.7 trillion in assets under management and $9.7 trillion in company market capitalization had participated in SASB's industry working groups.

For each topic, SASB conducts an evidence of materiality test, informed by staff research and industry working groups, the results of which ultimately are debated and reviewed by the Standards Council after industry working groups composed of industry experts have provided their input. The test has three components: evidence of interest, evidence of financial impact, and forward impact adjustment. We describe each one in more detail in Appendix II but the interested reader can find more information on the SASB website.

Sustainability Data

We use MSCI KLD as our source of sustainability data, the most widely used dataset by past studies. For the purposes of this paper, KLD has a number of advantages. First, it includes a large number of U.S. companies over a long period of time. In particular, between 1991 and 2000 it included approximately 650 companies, 2001-2002 1,100 companies, and 2003-2012 3,000 companies. Other databases with sustainability data (for example, Thomson Reuters ASSET4) have shorter time-series and cover fewer U.S. companies. Another advantage of the KLD data is that it provides information about performance on a specific issue in a standardized format rather than the presence or absence of disclosure, as is the case for many data items in ASSET4 or Bloomberg.

KLD data have been widely used in the literature by researchers examining the relation between social responsibility and financial performance (e.g., Graves and Waddock, 1994; Turban and Greening, 1997; Fisman, Heal, and Nair, 2005; Mattingly and Berman, 2006; Godfrey, Merrill, and Hansen, 2009; Ioannou and Serafeim 2014). Researchers at KLD review the company's public documents, including the annual report, the company website, corporate social responsibility reporting, and other stakeholders' and data sources. Company ratings represent a snapshot of the firm's profile at calendar year end. KLD researchers also monitor media sources for developing issues on a daily basis. The KLD dataset is compiled around the beginning of every year (i.e. January) and it is typically available in spreadsheets for distribution at the latest by late February.

The KLD historical ratings data set is designed as a binary system and comprises both strengths and concerns. Strengths represent policies, procedures, and outcomes that enable a firm to have a positive impact on the focal issue. Concerns represent policies, procedures, and outcomes that tend to have a negative impact on the focal issue. For each strength or concern rating applied to a company, KLD includes a "1" indicating the presence of that screen/criterion and a "0" indicating its absence. In total, seven issue areas are included: a) Community, b) Corporate Governance, c) Diversity, d) Employee Relations, e) Product, f) Environment, and g) Human Rights. Within each issue area, multiple topics and respective data items exist. For example, under the Environment issue area, KLD tracks performance on waste management, packaging materials and waste, environmental opportunities, climate change, and water stress, among other issues. Under the Social issues area, KLD tracks performance on community engagement, human rights, union relations, workforce diversity, and access to finance, among other issues. Under Governance issues area, KLD tracks performance on issues including

reporting quality, corruption and political instability, financial system instability, governance structure, and business ethics.

Table 1 Panel A shows how we arrive at the final sample from the original KLD dataset. Panel B shows the number of unique firms and unique firm-years that are covered by KLD and included in the sample. The sample comprises 670 firms from the financial, 554 from the healthcare, 359 from the nonrenewable resources, 302 from the services, 388 from the technology and communications, and 120 from the transportation sector. In total there are 2,396 unique firms and 14,388 unique firm-years included in our sample. Firms are allocated to sectors and industries according to the Bloomberg Industrial Classification System (BICS) and the Sustainability Industrial Classification System (SICS).[10] We mapped every industry in BICS to every industry in SICS in order to merge financial data with sustainability data. BICS is the standard system used by investments banks and money management firms.[11] Panel C shows the frequency of firms in our sample by year, which, as expected, increases over time.

Construction of the Materiality and Immateriality Index

To classify each KLD data item as material or immaterial, we follow guidance from SASB for each one of the 45 industries in our sample. Specifically, we download each industry standard that identifies material sustainability issues for companies within an industry. To classify topics, one researcher takes the lead in one sector and all the industries included in that sector. For each industry, KLD data items that are mapped to material SASB items are classified as material for a given industry, and all remaining KLD items are classified immaterial for the same industry. After having a complete mapping, another researcher follows the same process. The two

[10] For more information see http://www.sasb.org/sics/

[11] SASB's industrial classification system is powered by the Bloomberg Industry Classification System. SASB leverages the Bloomberg Industry Classification System to identify which industry companies are assigned to.

mappings are then compared by a third researcher, who assesses any differences. In our case, differences in mappings across researchers were minimal.[12]

Appendix III shows the materiality map of SASB at the sector level. A more granular view at the industry level can be obtained by visiting the SASB website. Industries within a sector generally had similar issues classified as material but differences could be found. Appendix IV provides a mapping of the SASB material topics to the KLD data items across sectors. Approximately 55 percent of all possible sector-SASB issue pairs were either material or immaterial for all industries within the sector. The largest variability across industries within a sector is in the services sector where only 20 percent of the issues were either material or immaterial across all industries. The lowest variability is within the financials and technology and communication sectors with more than 67 percent. The total number of material items identified is small compared to the total number of KLD data items, which is 124, consistent with SASB claims that their guidance narrows significantly the number of issues that a firm needs to disclose. The number of material data items ranges from 13 for the healthcare sector to 32 for services sector while the financials, transportation, and the nonrenewable resources sector have 22 and the technology and communications sector has 19 data items that are material. Broadly speaking, environmental issues tend to be more material for the nonrenewable resources and transportation sectors, governance and product related issues tend to be more material for the financial sector, and social issues tend to be more material for the healthcare, services, and the technology and communications sectors. Appendix III provides more detailed information, and for industry mappings the interested reader can visit the SASB website.

[12] The two researchers disagreed on 2% of the total number of mappings. These differences were resolved by consultation with the third researcher.

To construct a materiality and immateriality index for firm *i* in year *t*, we follow the practice, common in the literature, of subtracting the concerns from the strengths to arrive at a single net index (e.g., Graves and Waddock, 1994; Griffin and Mahon, 1997; Waddock and Graves, 1997; Johnson and Greening, 1999; Ruf et al., 2001; Ioannou and Serafeim, 2014):

$$\text{Material}_{it} = \sum KLD\ STRENGTH\ it, SASB - \sum KLD\ CONCERN\ it, SASB \quad (1)$$

$$\text{Immaterial}_{it} = \sum KLD\ STRENGTH\ it, NONSASB - \sum KLD\ CONCERN\ it, NONSASB \quad (2)$$

Panel B of Table 1 shows the number of firms each year with a materiality index number and an immateriality index number. These are the firms available each year to form portfolios as described next.

Portfolio Formation and Estimation

To test the future performance implications of firms' sustainability performance, we begin by orthogonalizing changes in the materiality index with respect to changes in firm size, market-to-book ratio (MTB), profitability (ROA), financial leverage, amount spent on R&D and advertising, institutional ownership, and sector fixed effects (f_s). We estimate these models cross-sectionally for each year as follows:[13, 14]

$$\Delta\text{Material}_{it} = b_1 + b_2\Delta\text{Size}_{it} + b_3\ \Delta\text{MTB}_{it} + b_4\Delta\text{ROA}_{it} + b_5\Delta\text{Leverage}_{it} + b_6\Delta\text{R\&D}_{it} + b_7\Delta\text{Advertising}_{it} + b_8\Delta\text{InstitutionalOnwership}_{it} + f_s + e_{i,t} \quad (3)$$

$$\Delta\text{Immaterial}_{it} = \alpha_1 + \alpha_2\Delta\text{Size}_{it} + \alpha_3\ \Delta\text{MTB}_{it} + \alpha_4\Delta\text{ROA}_{it} + \alpha_5\Delta\text{Leverage}_{it} + \alpha_6\Delta\text{R\&D}_{it} + \alpha_7\Delta\text{Advertising}_{it} + \alpha_8\Delta\text{InstitutionalOnwership}_{it} + f_s + u_{i,t} \quad (4)$$

[13] We regress on those variables because they are fundamental characteristics of a firm in terms of size, growth opportunities and valuation, financial structure, investment profile, ownership, and profitability. In untabulated results, we added past stock return and earnings volatility, accruals, and dividend yield, but the explanatory power of the model was unchanged. Moreover, in later analysis we control for more firm characteristics and our results remain unchanged.

[14] Substituting sector for industry fixed effects produces very similar results and does not raise the explanatory power of the model. While sustainability investments seem to vary across sectors it varies to a less significant extent across industries within a sector. Moreover, in the early period of the sample, the number of industries is large enough that the average number of companies within an industry is small.

The signals used to construct portfolios are the residuals from equations (3) and (4), which are unexplained changes in the materiality and immateriality indices (hereafter "Materiality" and "Immateriality"). This procedure is intended to mitigate concerns about correlated firm characteristics potentially confounding inferences about the future performance implications of the materiality index. Moreover, by using for each firm the residual change in the material or immateriality index, we attempt to isolate the unexpected level of sustainability investments.

The Materiality portfolios are constructed each year by assigning firms with a residual materiality index at the top (bottom) quintile in that year to the top (bottom) portfolio. Results are robust to constructing the top and bottom portfolios as the top and bottom deciles. The Immateriality portfolios are constructed in the same manner.

The KLD data are released by the end of February each year, and financial statement data needed for estimation of equation (3) are available for almost all firms by the end of March, so we construct portfolios at the end of March to allow an implementable trading strategy. Value-weighted and equal-weighted portfolios are held from the beginning of April until the end of March of the following year. Abnormal stock return performance of the portfolios (i.e. alpha) is estimated from Fama and French (1993) monthly calendar-time regressions that include the market, size, book-to-market, momentum (Carhart, 1997), and liquidity (Pastor and Stambaugh, 2003) factors.

Our research design examines the correlation between changes in sustainability investments to changes in stock prices. Within this research design, alphas capture unexpected performance that cannot be attributed to the five systematic risk factors of the model. As a result, if ESG data are informative about a firm's future performance that is not attributed to its correlation with the market, size, value or growth characteristics, momentum and liquidity then this informativeness

will be captured in a significant alpha estimate. Our research design draws on the return predictability literature which examines whether a given firm characteristic (for example, accruals, investment, sustainability scores in our case, among others) is associated with future stock returns. The approach adopted in that literature is to control for standard risk factors and then test whether a portfolio long and short scoring high or low in the focal characteristic yields alpha. The alpha indicates the future stock returns associated with the relevant firm characteristic and unexplained by the firm's exposure to conventional risk factors.

The return predictability literature offers alternative interpretations of alphas. One interpretation is that the alpha likely captures omitted risk factors and is therefore spurious in some sense. This is not the interpretation we adopt in the present paper. Another interpretation, which we adopt, is that the alpha truly captures return predictability unassociated with risk factors and that the stock price did not fully impound immediately. Our specific interpretation of the materiality alpha we document is as follows: since materiality classifications were not previously available, investors could not react to them as soon as ESG performance data became available (the sustainability data did not distinguish between material and immaterial investments). As such, the price change (or alpha) was realized over a longer horizon as the materiality investments began to pay off through observable metrics, such as higher accounting returns, or as investors better understood the financial implications of sustainability investments through their own analysis.

Table 2, Panels A and B, present summary statistics for our sample and the Compustat universe, respectively. As expected and consistent with prior studies using KLD data our sample includes larger firms, with higher price to book ratios and profitability margins, and higher institutional ownership. Panel C presents summary statistics for the level of the materiality and

immateriality indices as well as for all the variables used to estimate models 3 and 4. Panel D presents the results of estimation of models (3) and (4), as well as the same model for the total KLD index that takes into account both material and immaterial items. We obtain similar results mean-adjusting the raw changes in the indices using either the sector or industry mean raw index. The advantage of the multivariate regression models is that they create a more continuous distribution of residual values therefore allowing us to be more precise in our portfolio allocation rules (i.e. including exactly 10 percent of the firms in a portfolio when we use decile portfolios or 20 percent when we use quintiles). Using the alternative method where we simply mean adjust by sector or industry we are facing the challenge of lumpy distributions where multiple firms receive exactly the same score leading us to include either much lower (if we do not include the last cutoff point) or much higher (if we do include the last cutoff point) percentages of the sample in the portfolio. However, we report results using this alternative specification as well.

Table 3 presents univariate correlations between the variables used in the analysis. The correlation between the materiality and immateriality indices is positive and moderate (0.3). This suggests that different types of investments are related but are sufficiently different to allow us to differentiate firms. The materiality index exhibits small positive correlations with both MTB (0.08) and size (0.03) and a small negative correlation with leverage (-0.02). The immateriality index exhibits small positive correlations with both MTB (0.05) and ROA (0.08) and a moderate correlation with size (0.28). The residuals derived from models 3 and 4 exhibit much lower correlation between them (0.13), compared to the 0.30 of the raw indices, and they have nearly zero correlation with all MTB, ROA, size, R&D and advertising intensity, and leverage.

We also discuss some observations from analyzing the different indices at the sector level (untabulated data). The means of the total KLD, materiality and immateriality indices represent

the differences between strengths and concerns, so that a positive mean indicates more strengths than concerns. In three of the six sectors we currently examine (Financial, Healthcare, Technology and Communication), the signs of total KLD and materiality indices differ. This suggests, for the average firm in these sectors, the total KLD index misrepresents the strengths and concerns on material issues alone. This highlights the relevance for investors of materiality classifications.

Moreover, even in sectors where the means of total KLD and materiality indices have the same sign (Nonrenewable resources, Services, Transportation) the ratio of strengths to concerns for the total KLD index is not necessarily representative of the same ratio for the materiality index. This too suggests some loss of relevant information if an investor uses the total KLD index rather than the materiality index.

In every sector, the standard deviation of the total KLD index is more than twice that of the materiality index. This suggests most of the variability in sustainability indices (the total KLD index) across firms comes from their performance on immaterial issues. If an investor uses the total KLD index to rank firms in a sector on their sustainability score, in order to take a position in higher ranked firms, this ranking on the total index will likely misrepresent firms' rankings on material issues.

Finally, the correlations in every sector suggest that the total KLD index is much more highly correlated with the immaterial index than with the material index (correlations close to 0.8 versus 0.4). This suggests much of the information in the total KLD index is about immaterial issues.

RESULTS

Calendar Time Portfolio Returns

Table 4 presents the estimated coefficients of a five-factor model for the bottom quintile and decile portfolios and top quintile and decile portfolios of performance on all, *material,* and *immaterial* sustainability issues. Panel A presents results using the residual total KLD index, Panel B using the residual material index, and Panel C using the residual immaterial index. We present results using both equal- and value-weighted.

In Panel A, using the residual total KLD index that aggregates both material and immaterial issues, we find mostly insignificant alphas. Specifically, the only alphas that are statistically different between the top and bottom portfolio is for the quintile value-weighted portfolios. The annualized outperformance of the top portfolio is equal to 2.93 percent. The decile value-weighted portfolios yield an outperformance of 2.29 percent that is not statistically significant. The quintile and decile equal-weighted portfolios yield a differential performance of -0.22 percent and 0.11 percent respectively. None of these estimates are statistically significant.

Panel B uses the residual material index and yields stronger results. The estimated alpha for the top portfolio is significant (p-value<0.05), ranging from about 3 percent to about 5 percent annualized. The differential alphas between the bottom and top portfolios are always larger than the ones reported in Panel A. These range from 2.69 percent to 7.47 percent. We find stronger results as we construct portfolios that maximize the difference in residual material index, with the decile results producing a larger difference in alphas compared to the quintile portfolios. The value-weighted alphas are slightly higher than equal-weighted alphas for equivalent specifications.

Panel C uses the residual immaterial index. We find that this index does not consistently predict future stock returns. Using quintiles value-weighted portfolios yields an annualized outperformance of 3.37 percent that is statistically significant. However, this result does not hold

when we use deciles portfolios or equal weights. Using equal-weighted portfolios the top portfolios underperforms the bottom portfolio by -0.49 percent and -2.73 percent using quintile or decile allocation rules respectively.

Table 5 presents a series of robustness tests. Panel A uses the residual material index, and Panel B uses the residual immaterial index. For the sake of brevity we discuss mostly the results of Panel A on the residual material index. As in Table 4 the results in Panel B of Table 5 are mostly insignificant. We mention in parenthesis the estimates for the residual immateriality index. First we assess the robustness of results to different factor models. We estimate alphas using the Fama-French (1993) three-factor model that excludes the momentum and liquidity factors, or a four-factor model that excludes the liquidity factor (Carhart 1997). The results are unchanged using these alternative factor models. We find a 3.91 percent and 3.88 percent outperformance on a three- and four-factor model respectively using value-weighted portfolios (1.34 percent and 1.21 percent using the residual immaterial index). The outperformance is 2.18 percent and 2.86 percent on a three- and four-factor model respectively using equal-weighted portfolios (-1.50 percent and -1.28 percent using the residual immaterial index). Raw returns (i.e. no risk adjustment) show an outperformance of 3.47 percent and 3.67 percent using value and equal-weighted portfolios respectively (1.54 percent and -1.34 percent using the residual immaterial index).

The second robustness test relates to the alternative residual index. Instead of using models (3) and (4) and given the relative modest explanatory power of the firm–level variables and the fact that sector fixed effects provide most of the explanatory power, we construct residual indices by calculating the change in material (immaterial) index for a firm between years t+1 and t and then adjusting this by the change in material (immaterial) index for the focal firm's sector mean

between years t+1 and t. We find outperformance of 5.59 percent and 3.03 percent using value and equal-weighted portfolios respectively (1.40 percent and -1.02 percent using the residual immaterial index). Therefore, simply mean-adjusting the indices leave our results unchanged.

The third series of robustness tests includes a subset of the original sample. First, we exclude any companies with non-December end fiscal year-end. We exclude those firms since their financial information has been reported well before the portfolio construction process therefore potentially influencing our estimates in models (3) and (4) and the risk-adjustment process. We find outperformance of 4.93 percent and 1.54 percent using value and equal-weighted portfolios respectively (3.44 percent and -0.52 percent using the residual immaterial index). Second, we exclude firms with business involvement in controversial businesses. Past literature documents that 'sin' stocks outperform in the future because they have been neglected by the market (Hong and Kacperczyk 2009). Because the involvement in 'sin' business could be directly related to sustainability indices, we assess the robustness of our results excluding firms that participate in such lines of business. Although the industries included in our sample do not involve 'sin' businesses, some of the companies might still have ties to 'sin' businesses through equity ownerships or alliances. KLD provides data on business involvement in the alcohol, firearms, gambling, military, and tobacco businesses. These stocks are just 4 percent of the entire sample and we exclude them from our portfolios. As expected, for the industries in our sample, relatively fewer companies are involved in sin businesses. Therefore, the main results remain robust with outperformance of 4.53 percent and 3.41 percent on a value- and equal-weighted basis respectively (1.03 percent and -1.28 percent using the residual immaterial index).

The fourth series of robustness tests analyzes performance over different time periods. We split the analysis period to before and after 2003. This is the time that KLD increased its

coverage as it was documented in Table 1 and it is also the midpoint of our total period of examination. We find outperformance of 4.27 percent and 1.99 percent using value and equal-weighted portfolios respectively for the period 1991-2002 (4.19 percent and -1.95 percent using the residual immaterial index). We find outperformance of 2.75 percent and 3.39 percent using value and equal-weighted portfolios respectively for the period 2003-2013 (2.61 percent and 0.96 percent using the residual immaterial index).

The fifth series of robustness tests separates the KLD ranking based on strengths and concerns. Since strengths are more likely to reflect actual investments we isolate these data items and replicate our analysis. However, it has been empirically shown that strengths and concerns are positively correlated (Kotchen and Moon 2012; Ioannou and Serafeim 2015). Therefore, ranking firms based on only one or the other is likely to ignore information from the other component (Ioannou and Serafeim 2015). Indeed, we find weaker results when we screen only on strengths or only on concerns. The outperformance on a value-weighted base is 1.37 percent and on an equal-weighted base is 2.91 percent using strengths (0.75 percent and -0.64 percent using the immaterial index).[15]

Across almost all specifications estimated, we find a larger difference in performance across the two groups of firms for value-weighted portfolios, consistent with studies that document sustainability issues to have a larger impact on larger firms. For example, Eccles, Ioannou and Serafeim (2014) show that firms adopting sustainability policies in the early 1990s, before

[15] We also attempted to perform our analysis within each sector separately. This approach is problematic using our sample though because of the small sample that is available to us within each sector. This makes the portfolio approach difficult to implement as especially in the early years we have only 50-70 firms or so within a sector and allocating firms to quintiles leads to very thin portfolios. While we find still significant results for 4 out of the six sectors (financials, healthcare, services, technology) we are careful not to place much confidence to results generated from thin portfolios. An alternative approach would be to run the panel regressions interacting the materiality indicator variable with the sector fixed effects. When we do so we find that across all sectors there is a return premium for firms in the top quintile of the materiality index.

adoption of such policies became common, outperformed their matched peers by 2.4 percent on an equal-weighted basis but by 4.7 percent on a value-weighted basis.[16]

Firm-level Panel Regressions

In Table 6 we estimate firm-level panel regressions of future monthly stock returns on a number of firm characteristics. This specification allows us to control for a host of potential return predictors not captured in the Fama and French (1993) calendar time regression specification above. We control for past stock returns, firm size, book-to-market, share turnover, ROE, analyst coverage, R&D intensity, advertising intensity, SG&A intensity, capital expenditures, and leverage. We include year-month fixed effects and industry or firm fixed effects. Including industry fixed effects in Panel A allows us to estimate estimates across firms. Panel B allows us to estimate within-firm variation in stock returns as a function of a firm's sustainability investments. We also report specifications that control for a host of observable governance characteristics that might be correlated with our residual materiality index. Specifically, we control for the number of institutional blockholders, the number of directors failing to attend the minimum number of board meetings, and the number of directors that are busy (sitting at four or more boards. The variables of interest are indicator variables for firms that score at the top quintile of the residual total KLD, materiality, and immateriality index.

The results are very similar to the results from the time-series portfolio analysis. In Panel A column (1) we find that firms scoring at the top quintile of the residual total KLD index have a

[16] Material issues do not appear to relate predominantly to those that involve technical stakeholders such as employees and customers with whom the firm exchanges resources, while immaterial issues do not relate predominantly to those that involve institutional stakeholders such as communities, environmental groups, and minorities who might impose normative expectations on firms. Prior research has suggested that benefits that accrue to the firm from attending to institutional stakeholders are more uncertain and difficult to assess relative to benefits from attending to employees and customers (Atkinson and Galaskiewicz; Hart 1995; Shrivastava 1995; Delery and Doty 1996). There is variability across industries in whether material sustainability issues fall within the realm of resource exchange stakeholders versus institutional stakeholders, and on average material issues fall roughly equally into the two stakeholder groups. Therefore, our results are unlikely to be explained by the difference between technical and institutional stakeholders.

2.16 percent higher annualized stock return that is marginally significant. Column (2) shows that this outperformance is driven only by firms that score high on the residual materiality index. The estimated coefficient on the indicator for firms that score at the top quintile of the residual materiality index suggests that these firms outperform by 6.47 percent annually. In contrast, the estimated coefficient on the indicator variable for firms in the top quintile of the residual immateriality index is insignificant. Columns (3) and (4) also include governance variables as a control. Our sample decreases by close to 32 percent as a result of missing observations for the governance controls. However, our results remain qualitatively unchanged. Firms scoring at the top quintile of the residual total KLD index have a 1.92 percent higher annualized stock return but it is not significant. The estimated coefficient on the indicator for firms that score at the top quintile of the residual materiality index suggests that these firms outperform by 4.90 percent annually. In contrast, the estimated coefficient on the indicator variable for firms in the top quintile of the residual immateriality index is again negative but insignificant.

Panel B shows estimates after including firm fixed effects. The results are very similar. In column (1) we find that firms scoring at the top quintile of the residual total KLD index have a 2.34 percent higher annualized stock return that is marginally significant. Column (2) shows that this outperformance is driven only by firms that score high on the residual materiality index. The estimated coefficient on the indicator for firms that score at the top quintile of the residual materiality index suggests that these firms outperform by 4.78 percent annually. In contrast, the estimated coefficient on the indicator variable for firms in the top quintile of the residual immateriality index is insignificant. After controlling for the governance variables, firms scoring at the top quintile of the residual total KLD index have a 2.08 percent higher annualized stock return but it is not significant. The estimated coefficient on the indicator for firms that score at

the top quintile of the residual materiality index suggests that these firms outperform by 4.01 percent annually. In contrast, the estimated coefficient on the indicator variable for firms in the top quintile of the residual immateriality index is negative but insignificant.

In untabulated analysis we replicate the analysis in Table 6 using the continuous indices rather than an indicator variable for the firms that score at the top quintile. The indicator variable approach is consistent with our main portfolio-level research design and investment management practice in the responsible investing space that use best-in-class screens, which seek to identify and include in the portfolio the firms that score at the top quintile or decile of the distribution. An advantage of the continuous variable approach is that it can provide evidence of the value of sustainability investments for the full continuum of firms by differentiating not only between firms investing the most and all the rest. A disadvantage of this approach is that it requires relatively high confidence in the ability of the index to differentiate between firms across the whole distribution of values.

We find weaker results using the continuous indices. Although the estimated coefficients are directionally consistent with the analysis so far they do not attain significance or at best attain modest significance. This is consistent with the financial implications from sustainability investments having a non-linear profile. Estimating coefficients on indicator variables that take the value of one for each quintile of firms according to the residual materiality index (omitted category is the bottom quintile) we find that the third quintile is the cause of the weakened results using the continuous residual materiality index. Firms in the third quintile have lower stock returns compared to the first quintile (bottom portfolio). The estimated coefficient on an indicator variable for firms in the third quintile is -0.0020 (t-stat=-1.84) and -0.0017 (t-stat=-1.42) using the second or fourth model as in Table 6, panel B. The highest returns are for the

fifth quintile (top portfolio) as expected. The estimated coefficient on an indicator variable for firms in the fifth quintile is 0.0038 (t-stat=3.65) and 0.0035 (t-stat=2.76) using the second or fourth model as in Table 6, panel B. Another explanation for these results is that the ability of the index to differentiate between firms within more narrow range of differences is more limited therefore increasing noise in the estimation and biasing the coefficients towards zero.

Materiality Index, Immateriality Index and Stock Returns

To shed more light on the differential return on investment from material versus immaterial sustainability issues, we compare firms that score high on the residual materiality index and low on the residual immateriality index ('Material investment firms') versus firms that score low on the residual materiality index and high on the residual immateriality index('Immaterial investment firms'). This allows us to provide sharper evidence on the shareholder value implications of sustainability investments.

We use quartile portfolios as cutoff values both for bad and good performance as quintile and decile portfolios are too thin due to the positive univariate correlation between material and immaterial indices. However, quartile portfolio cutoffs yield weaker results overall so the results in this section should be benchmarked against that backdrop. Imposing a quartile cutoff for the portfolio results in approximately 35 stocks on average every year in each one of the portfolios for Material and Immaterial investment firms. The number of stocks in the All and No investment firms is closer to on average 50 every year. This is likely due to the positive correlation between the residual material and the immaterial index. The number of firms that exhibit high performance on one index and low performance on the other is lower compared to firms that perform good or bad on both. As before, we use the residuals of the indices to construct the portfolios.

Table 7 presents the estimated coefficients of a five-factor model for value-weighted portfolios. The estimated alpha for the portfolio of Material investment firms is larger in magnitude and statistically different from zero. We find estimated annualized alphas of 4.83 and -0.38 percent for top performers on material issues and immaterial issues, respectively, for a difference of 5.20 percent which is statistically significant at the 1 percent level. Material investment firms also outperform All investment firms by 3.32 percent. This result shows the importance of firms distinguishing between the types of investments they make. Grouping both material and immaterial investments together yields lower performance. Firms that make no investments have the worst performance across all groups of firms with an estimated alpha of -2.20 percent. The results are similar using equal-weighted instead of value-weighted portfolios. Comparing the alphas on the set of firms with good performance on material sustainability suggests that the positive effect from investments in material sustainability issues are larger for firms that make investments only in material sustainability issues versus firms that make investments on both material and immaterial issues. Firms that invest only in material issues are likely to have concentrated their efforts only the material issues after undertaking a careful materiality analysis. Indeed, in the last ten years the number of firms that perform a materiality assessment through stakeholder engagement has been increasing (Eccles and Krzus 2014). One potential interpretation therefore is that while two firms could both score at the top quartile of the residual material index, their relative score on the residual immaterial index provides information about the extent of commitment of resources on the material sustainability issues. We are careful not to over-emphasize the results of this analysis though since the two portfolios that require high scores on one index and low scores on the other index are somewhat thin.

Future Accounting Performance

Until this point we have examined future stock market performance to understand the value implications of sustainability investments. We complement this analysis by examining future changes in accounting performance. The number of investors integrating ESG data in investment decisions has grown considerably over the period of study potentially putting price pressure on the stocks of firms with good ESG performance and contributing to the positive alphas found earlier for firms with good sustainability performance. If firms investing in material sustainability issues exhibit superior future accounting performance, this would suggest that price pressure alone cannot explain the superior future stock price performance.

Table 8 shows future changes in accounting performance (return-on-sales or ROS) of firms scoring high and low on the residual materiality index for quintile portfolios. In untabulated analysis, we find similar patterns when we examine changes in return-on-assets, and return-on-equity. We tabulate changes in ROS up to five years in the future. Panel A presents results using the residual total KLD index, the residual material index, and the residual immaterial index. We do not find a consistent outperformance for firms scoring in the top quintile of the residual total KLD index relative to firms scoring at the bottom.

In contrast, firms scoring high on the residual material index s experience relatively more positive changes in profitability margins. Specifically, we find that changes in ROS are more positive for the portfolio of firms performing better on material issues. Across all time horizons the difference in future changes in profitability margins is positive. Starting from the second year in the future and until the fifth year in the future we find significant difference in ROS growth of 6.89 percent to 9.20 percent. While the top portfolio experiences increases in ROS, the bottom portfolio experiences declines. The residual immaterial index fails to predict future changes in

profitability margins. We find no difference in future accounting performance between firms scoring at the top or bottom quintile of the residual immaterial index.

Panel B presents panel-level regressions, similar to the analysis in Table 6. Columns (1) and (2) include industry fixed effects while columns (3) and (4) use firm fixed effects. Columns (2) and (4) also control for the governance variables. We use as dependent variable the two year ahead change in ROS. Using three, four or five year changes leads to similar results. We find that all else equal firms scoring at the top quintile of the residual material index have higher future ROS growth. In contrast, the coefficient on the indicator variable for firms scoring at the top quintile of the residual immaterial index is insignificant. Overall, the results from the analysis of the accounting performance complement the analysis of stock returns and suggest that the materiality guidance helps construct measures of sustainability investments that are better predictors of future financial performance.

Consistent with the profitability margin analysis in Table 8, in untabulated analysis we find that investors incorporate in stock prices the financial implications from sustainability investments in the future. Specifically, we replicate the analysis in Table 4 now constructing the portfolios starting in April of year t+2 and holding the stocks until March of t+3 (sustainability data are for year t). We find insignificant differences in alphas across the top and bottom portfolios when we use the residual materiality index. Using value-weighted (equal-weighted) portfolios we find a statistically insignificant difference of -0.2 percent (-2.0 percent). As the impact from sustainability investments flows through a company's financial numbers, investors are incorporating this information in stock prices and as a result the differential alpha across portfolio disappears.

Collectively the results are unlikely to be driven by stock demand by sustainability-conscious investors whose buying exerts upward stock price pressure, because the price pressure story: (i) Does not explain the better future accounting performance of firms with strong material sustainability ratings, as we document; (ii) Requires that investors were able to discriminate between material and immaterial investments in the absence of publicly-available materiality classifications, and increase demand only for firms with investments in material sustainability issues. However, as described earlier, this appears to conflict with the expressed demand of institutional investors for better investment signals in the form of materiality classifications.

CONCLUSION

We use recent guidance by SASB to classify sustainability issues as material or immaterial according to industry membership. Exploiting variation in materiality across the large number of sustainability issues has the potential to improve the signal to noise ratio in testing the future performance implications of sustainability investments and reduce the dimensionality of price-relevant investment signals used by the large number of institutional investors committed to ESG initiatives. In this paper we take a first step towards these objectives by examining the future performance implications of material versus immaterial sustainability investments.

We find that firms with strong ratings on material sustainability issues have better future performance than firms with inferior ratings on the same issues. In contrast, firms with strong ratings on immaterial issues do not outperform firms with poor ratings on these issues. Finally, firms with strong ratings on material issues and concurrently poor ratings on immaterial issues have the best future performance. Collectively these results are consistent with materiality guidance being helpful in improving the informativeness of ESG data for investors. As in any

study that uses archival data our results can be attributed to sustainability investments to the extent that we have adequately controlled for other factors in our models.

Our paper leaves many questions unanswered and opens up avenues for future research. Given the robust relation between investments on material sustainability issues and future financial performance, it would be important to examine the structural relations that lead to this association. How do investments on material issues influence customer loyalty and satisfaction, employee engagement, brand and reputation, or access to finance? Another fruitful area for future research would be examining why firms choose to make different types of investments as well as why and how firms choose to make different types of disclosures around those investments. Finally, it would be helpful to extend our work using different ESG data since past research has shown that social ratings from different raters do not converge (Chatterji, Durand, Levine, and Touboul 2015).

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Table 1
Panel A: Sample Construction

	# of firms	# of firm-years
KLD Data (From 1991 to 2013)	6,397	40,518
Less: not covered by SASB	(3,420)	(22,353)
Less: missing firm fundamentals (COMPUSTAT/CRSP items)	(52)	(315)
Less: deletion from changes spec	(529)	(3,462)
Total	2,396	14,388

Panel B: Frequency by Sector

Sector	# unique firms	# of firm-years
Financial	670	4,166
Healthcare	554	3,135
Non-renewable Resources	359	2,324
Services	302	1,814
Technology and Communication	388	2,063
Transportation	123	886
Total	2,396	14,388

Panel C: Frequency by year

Year	# of firms
1992	194
1993	196
1994	193
1995	156
1996	183
1997	180
1998	183
1999	193
2000	189
2001	211
2002	376
2003	462
2004	1,107
2005	1,151
2006	1,136
2007	1,111
2008	1,185
2009	1,237
2010	1,211
2011	1,285
2012	1,205
2013	1,044
Sum	14,388

Table 2

Panel A: Summary Statistics for the Sample in this Study

	Mean	Median	St Dev.	Q1	Q3	N
ROA	0.02	0.03	0.12	0.01	0.07	14,388
Leverage	0.19	0.16	0.18	0.04	0.29	14,388
MTB	1.19	1.09	0.53	0.80	1.46	14,388
Size	7.37	7.20	1.62	6.16	8.37	14,388
Market Cap	6993.17	1354.77	17664.86	459.89	4429.96	14,388
R&D	0.12	0.00	0.53	0.00	0.06	14,388
Advertising Intensity	0.01	0.00	0.02	0.00	0.01	14,388
Institutional Ownership	0.68	0.71	0.25	0.51	0.87	14,388
Capex	0.11	0.09	0.10	0.03	0.15	14,388
SG&A	0.24	0.19	0.24	0.04	0.36	14,388

Panel B: Summary Statistics for the Compustat Universe

	Mean	Median	St Dev.	Q1	Q3	N
ROA	-0.17	0.01	0.74	-0.09	0.06	224,312
Leverage	0.31	0.19	0.51	0.03	0.39	224,312
MTB	0.93	0.86	0.74	0.47	1.30	224,312
Size	4.39	4.46	2.78	2.46	6.38	224,312
Market Cap	1708.17	86.62	5924.78	11.74	588.41	224,312
R&D	0.19	0.00	0.98	0.00	0.02	224,312
Advertising Intensity	0.01	0.00	0.03	0.00	0.00	224,312
Institutional Ownership	0.19	0.00	0.29	0.00	0.32	224,312
Capex	0.13	0.08	0.16	0.02	0.16	224,312
SG&A	0.43	0.18	1.24	0.00	0.36	224,312

Panel C: Summary Statistics for Sustainability Scores and Firm Characteristics

	Mean	Median	St Dev.	Q1	Q3	N
KLD Index	-0.2240	0.0000	2.4212	-2.0000	1.0000	14,388
Material Index	-0.0954	0.0000	0.9413	-1.0000	0.0000	14,388
Immaterial Index	-0.1286	0.0000	1.9652	-1.0000	1.0000	14,388
ΔKLD Index	0.0306	0.0000	1.5518	-1.0000	1.0000	14,388
ΔMaterial Index	0.0003	0.0000	0.6912	0.0000	0.0000	14,388
ΔImmaterial Index	0.0303	0.0000	1.2880	-1.0000	1.0000	14,388
ΔSize	0.0550	0.0867	0.4927	-0.1556	0.3107	14,388
ΔMTB	-0.0199	-0.0021	0.3209	-0.1550	0.1293	14,388
ΔROA	-0.0015	0.0000	0.0988	-0.0175	0.0154	14,388
ΔLeverage	0.0036	0.0000	0.0783	-0.0229	0.0160	14,388
ΔR&D	-0.0138	0.0000	1.2213	0.0000	0.0000	14,388
ΔAdvertising Intensity	-0.0002	0.0000	0.0067	0.0000	0.0000	14,388
ΔInstitutional Ownership	0.0318	0.0214	0.1122	-0.0166	0.0704	14,388

Panel D: Changes in Sustainability Investments

	ΔKLD Index		ΔMaterial Index		ΔImmaterial Index	
Parameter	Estimate	t	Estimate	t	Estimate	t
Intercept	0.0869	0.14	0.0118	0.27	0.0752	0.15
ΔSize	0.0659	-0.11	-0.0075	-0.18	0.0734	-0.11
ΔMTB	-0.0768	0.25	0.0214	0.40	-0.0982	0.26
ΔROA	0.2858	0.34	0.0833	0.74	0.2025	0.43
ΔLeverage	0.1955	0.62	0.1806	1.74	0.0149	0.77
ΔR&D	0.3748	0.06	0.0678	0.12	0.3070	0.05
ΔAdvertising Intensity	7.6956	0.52	2.5531	1.92	5.1425	0.58
ΔInstitutional Ownership	-0.1108	0.04	0.0077	0.07	-0.1185	0.05
Sector f.e.	Yes		Yes		Yes	
N	22		22		22	
Adj R-squared	5.23%		7.35%		6.03%	

Panel A presents summary statistics for the analysis sample. Panel B presents summary statistics for the Compustat universe. Panel C reports summary statistics for the variables used to estimate models (3) and (4) in Panel D. Panel D reports the time-series average of estimated coefficients from yearly cross-sectional regressions. The first column uses the change in the total KLD index as the dependent variable. The second column uses the change in the materiality index as the dependent variable. The third column uses the change in the immateriality index as the dependent variable. The materiality index is calculated as can be seen in equation (1) and the immateriality index according to (2). ROA is income before extraordinary items over the average of total assets of the current and previous year. Leverage is long-term debt plus current debt over the average of total assets of the current and previous year. MTB is market value of equity over book value of equity. Size is the natural logarithm of calendar year end market capitalization. Market cap is calendar year end market capitalization. R&D is research and development expenditures over sales. Advertising intensity is advertising expenses over sales. Institutional ownership is the percentage of shares held by institutional investors. Capex is capital expenditures over property, plant and equipment. SG&A is sales, general and administrative expenses over sales.

Table 3

Correlation Matrix

	KLD Index	KLD Index (Residual)	Material Index	Material Index (Residual)	Immaterial Index	Immaterial Index (Residual)	MTB	Size	ROA	Leverage	R&D	Advertising Intensity
KLD Index (Residual)	0.35251	1										
	<.0001											
Material Index	0.63328	0.20318	1									
	<.0001	<.0001										
Material Index (Residual)	0.24955	0.55274	0.42068	1								
	<.0001	<.0001	<.0001									
Immaterial Index	0.92875	0.337	0.30126	0.10597	1							
	<.0001	<.0001	<.0001	<.0001								
Immaterial Index (Residual)	0.2878	0.89828	0.01995	0.13032	0.34504	1						
	<.0001	<.0001	0.0167	<.0001	<.0001							
MTB	0.06674	0.01772	0.08362	0.01207	0.04218	0.01464	1					
	<.0001	0.0335	<.0001	0.1477	<.0001	0.0791						
Size	0.27088	0.11108	0.06914	0.08914	0.30063	0.08516	0.24624	1				
	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001					
ROA	0.06554	0.031	-0.00491	0.02254	0.0831	0.02506	0.01973	0.29318	1			
	<.0001	0.0002	0.5562	0.0069	<.0001	0.0026	0.018	<.0001				
Leverage	-0.00961	0.01042	-0.02277	0.00372	-0.00093	0.01042	-0.04258	0.07134	-0.08941	1		
	0.249	0.2115	0.0063	0.6554	0.9109	0.2114	<.0001	<.0001	<.0001			
R&D	-0.02321	-0.01133	0.03504	-0.01122	-0.04226	-0.00798	0.11429	-0.1263	-0.49103	-0.01587	1	
	0.0666	0.3705	0.0056	0.3752	0.0008	0.5282	<.0001	<.0001	<.0001	0.2099		
Advertising Intensity	0.03185	0.00977	-0.00808	0.00794	0.04289	0.00751	0.14828	0.09524	-0.0856	0.03848	0.19638	1
	0.0132	0.447	0.5296	0.5365	0.0008	0.5587	<.0001	<.0001	<.0001	0.0027	<.0001	
Institutional Ownership	-0.01957	0.02301	0.01454	0.02444	-0.03108	0.01446	0.07656	0.18385	0.12964	0.08006	-0.11333	0.01274

	0.0197	0.0061	0.0831	0.0036	0.0002	0.0847	<.0001	<.0001	<.0001	<.0001	<.0001	0.3237

The table presents a univariate correlation matrix. KLD index is calculated by summing all KLD strengths and subtracting all KLD concerns. Material and immaterial indices calculated as in models (1) and (2). The residuals for all indices are calculated as in models (3) and (4). ROA is income before extraordinary items over the average of total assets of the current and previous year. Leverage is long-term debt plus current debt over the average of total assets of the current and previous year. MTB is market value of equity over book value of equity. Size is the natural logarithm of calendar year end market capitalization. Market cap is calendar year end market capitalization. R&D is research and development expenditures over sales. Advertising intensity is advertising expenses over sales. Institutional ownership is the percentage of shares held by institutional investors. Capex is capital expenditures over property, plant and equipment. SG&A is sales, general and administrative expenses over sales.

Table 4

Panel A: Investments in ***All*** Sustainability Issues

	Value-Weighted								Equal-Weighted							
	Low Investment		High Investment		Low Investment		High Investment		Low Investment		High Investment		Low Investment		High Investment	
	Quintile				Decile				Quintile				Decile			
Parameter	Estimate	t	Estimate	t	Estimate	t	Estimate	t	Estimate	t	Estimate	t	Estimate	t	Estimate	t
Intercept	-0.0003	-0.19	0.0021	1.78	-0.0002	-0.11	0.0017	1.15	0.0021	1.78	0.0019	1.55	0.0020	1.42	0.0021	1.58
Market	0.9903	22.25	0.9647	32.88	1.0363	17.66	1.0215	26.71	1.0589	36.35	1.0623	37.06	1.0717	33.03	1.1285	34.22
SMB	-0.0674	-0.97	-0.1396	-3.21	0.0295	0.34	-0.2074	-4.26	0.2067	4.46	0.2351	5.39	0.2741	4.96	0.1583	2.98
HML	0.0546	0.74	0.1527	3.62	0.0494	0.51	0.1634	2.56	0.4699	9.78	0.5002	11.15	0.4239	7.71	0.4885	9.61
UMD	-0.0979	-1.60	-0.0129	-0.39	-0.1847	-2.30	-0.0074	-0.17	-0.1471	-5.68	-0.1866	-4.70	-0.1486	-4.04	-0.2114	-4.72
LIQ	0.1048	2.42	-0.0145	-0.44	0.1313	2.46	-0.0181	-0.41	0.0924	3.28	0.0191	0.61	0.0683	1.90	0.0468	1.37
N	261		261		261		261		261		261		261		261	
Annualized Alpha	-0.38%		2.55%		-0.29%		2.00%		2.54%		2.32%		2.38%		2.49%	
Difference Alphas			2.93%*				2.29%				-0.22%				0.11%	

Panel B: Investments in ***Material*** Sustainability Issues

	Value Weighted								Equal Weighted							
	Low Investment		High Investment		Low Investment		High Investment		Low Investment		High Investment		Low Investment		High Investment	
	Quintile				Decile				Quintile				Decile			
Parameter	Estimate	t	Estimate	t	Estimate	t	Estimate	t	Estimate	t	Estimate	t	Estimate	t	Estimate	t
Intercept	-0.0011	-0.63	0.0024	1.85	-0.0019	-1.04	0.0043	2.63	0.0016	1.44	0.0038	2.34	0.0014	0.90	0.0036	2.17
Market	1.0812	22.31	0.9344	28.23	1.0913	20.91	0.9532	23.46	1.0636	38.25	1.0636	25.92	1.0741	29.87	1.0567	24.10
SMB	-0.2158	-2.52	-0.2342	-4.26	-0.2631	-2.93	-0.1902	-3.15	0.1430	2.90	0.2418	4.08	0.1484	2.21	0.1700	2.83
HML	-0.0962	-1.13	0.1051	1.94	0.0231	0.20	0.0683	1.17	0.3819	8.25	0.6367	8.66	0.5659	9.76	0.5580	7.69
UMD	-0.0231	-0.39	-0.0186	-0.45	-0.0506	-0.82	-0.1153	-2.24	-0.1167	-4.09	-0.1875	-2.90	-0.1243	-2.58	-0.1686	-3.43
LIQ	0.1279	2.72	0.0818	1.96	0.1505	2.65	0.0830	1.86	0.1055	3.70	0.1258	2.19	0.1888	4.83	0.1150	2.11
N	261		261		261		261		261		261		261		261	
Annualized Alpha	-1.27%		2.91%		-2.23%		5.24%		1.96%		4.65%		1.63%		4.38%	
Difference in Alphas			4.18%**				7.47%***				2.69%*				2.75%*	

Panel C: Investments in ***Immaterial*** Sustainability Issues

	Value Weighted								Equal Weighted							
	Low Investment		High Investment		Low Investment		High Investment		Low Investment		High Investment		Low Investment		High Investment	
	Quintile				Decile				Quintile				Decile			
Parameter	Estimate	t	Estimate	t	Estimate	t	Estimate	t	Estimate	t	Estimate	t	Estimate	t	Estimate	t
Intercept	-0.0001	-0.08	0.0026	2.11	-0.0004	-0.27	0.0019	1.23	0.0029	2.25	0.0025	2.08	0.0032	2.35	0.0010	0.73
Market	0.9564	23.46	0.9979	31.24	0.9668	26.03	1.0805	21.55	1.0456	34.54	1.0620	33.59	1.0590	32.53	1.0139	22.99
SMB	-0.1083	-1.63	-0.1497	-3.14	-0.1705	-3.30	-0.1333	-1.92	0.2235	4.51	0.2195	3.92	0.1569	2.96	0.1990	3.24
HML	0.0409	0.57	0.1021	1.98	0.1548	2.63	0.4842	7.06	0.4554	9.40	0.4667	9.39	0.3975	6.42	0.5780	7.87
UMD	-0.0681	-1.14	0.0235	0.61	-0.0259	-0.82	0.1114	1.89	-0.1492	-4.65	-0.1772	-4.17	-0.1298	-4.08	-0.0606	-1.03
LIQ	0.0775	1.93	-0.0791	-2.22	0.0985	2.73	0.0371	0.76	0.0390	1.20	0.0136	0.42	0.0657	2.00	0.0369	0.77
N	261		261		261		261		261		261		261		261	
Annualized Alpha	-0.15%		3.22%		-0.45%		2.27%		3.49%		3.01%		3.92%		1.18%	
Difference in Alphas			3.37%**				2.72%				-0.49%				-2.73%*	

Table 4 reports alphas, factor loadings, and t-statistics from monthly calendar-time Fama-French regressions. Panel A reports results for value-weighted and equal-weighted portfolios of firms scoring at the bottom (Low Investment) and top (High Investment) quintiles of the residual total KLD index. Panel B reports results for value-weighted and equal-weighted portfolios of firms scoring at the bottom (Low Investment) and top (High Investment) quintiles of the residual material index. Panel C reports results for value-weighted and equal-weighted portfolios of firms scoring at the bottom (Low Investment) and top (High Investment) quintiles of the residual immaterial index. The regressions are estimated from April 1993 to March 2014. Mkt-Rf is the market excess return; SMB and HML are the Fama and French (1993) size and book-to-market factors; UMD is the Carhart (1997) momentum factor; LIQ is the liquidity factor from Pastor and Stambaugh (2003). ***, **, and * indicate one-tailed p-value less than 1, 2.5, and 5%, respectively.

Table 5

Robustness Tests

Panel A: Investments in ***Material*** Sustainability Issues

	Low Investment	High Investment			Low Investment	High Investment		
	Value-weighted				Equal-weighted			
	Annualized Alpha		Difference		Annualized Alpha		Difference	
Alternative Factor Models								
Raw return	7.18%	10.64%	3.47%	**	12.05%	15.72%	3.67%	**
3-factor alpha	-0.56%	3.35%	3.91%	**	1.67%	3.85%	2.18%	*
4-factor alpha	-0.37%	3.51%	3.88%	**	2.73%	5.59%	2.86%	*
Alternative Residual Index								
Mean-adjusted	-2.01%	3.58%	5.59%	***	2.30%	5.33%	3.03%	**
Subset of Firms								
Excluding non-December year-end firms	-2.36%	2.57%	4.93%	***	1.29%	2.83%	1.54%	
Excluding 'sin' firms	-0.79%	3.74%	4.53%	**	2.54%	5.94%	3.41%	**
Subperiods								
Analysis Period: 1991-2002	0.18%	4.44%	4.27%	**	3.10%	5.09%	1.99%	
Analysis Period: 2003-2013	0.17%	2.92%	2.75%	*	2.29%	5.68%	3.39%	**
Subrankings								
Ranking only on strengths	1.43%	2.80%	1.37%		2.43%	5.34%	2.91%	*
Ranking only on concerns	1.03%	-1.19%	-2.22%		1.52%	1.80%	0.29%	

Panel B: Investments in ***Immaterial*** Sustainability Issues

	Low Investment	High Investment			Low Investment	High Investment	
	Value-weighted				Equal-weighted		
	Annualized Alpha		Difference		Annualized Alpha		Difference
Alternative Factor Models							
Raw Return	7.11%	8.65%	1.54%		13.11%	11.77%	-1.34%
3-factor alpha	-0.33%	1.01%	1.34%		2.31%	0.81%	-1.50%
4-factor alpha	-0.37%	0.84%	1.21%		3.71%	2.43%	-1.28%
Alternative Residual Index							
Mean-adjusted	-0.29%	1.11%	1.40%		3.91%	2.89%	-1.02%
Subset of Firms							
Excluding non-December year-end firms	-0.44%	2.99%	3.44%	**	2.63%	2.11%	-0.52%
Excluding 'sin' firms	0.42%	1.45%	1.03%		4.35%	3.07%	-1.28%
Subperiods							
Analysis Period: 1991-2002	1.03%	5.22%	4.19%	**	4.70%	2.75%	-1.95%
Analysis Period: 2003-2013	-1.03%	1.58%	2.61%	*	2.74%	3.70%	0.96%
Subrankings							
Ranking only on strengths	1.20%	1.95%	0.75%		3.55%	2.91%	-0.64%
Ranking only on concerns	4.47%	0.91%	-3.56%		3.53%	3.35%	-0.18%

The table reports alphas from Fama-French (1993) and Carhart (1997) calendar-time regressions of monthly returns. Under 'Alternative Factor Models' we report estimates and differences in raw returns and in alphas from 3 and 4-factor models. Under 'Alternative Residual Index' we report estimates and differences in alphas from 5-factor models using a residual index that adjusts changes in indices from models (1) and (2) with changes in sector mean indices (not using models (3) and (4)). Under 'Subset of Firms' we report estimates and differences in alphas from 5-factor models after excluding firms that have fiscal year-end other than December or companies involved in 'sin' business. Under 'Subperiods' we report estimates and differences in alphas from 5-factor models separately for the period from 1991-2002 and 2003-2013. Under 'Subrankings' we construct the residual materiality and immateriality index by taking into account only the KLD strengths or concerns. Panel A reports results using the residual materiality index while panel B reports results using the residual immateriality index. Firms scoring at the bottom (Low Investment) and top (High Investment) quintiles of the residual index are included in the portfolios. ***, **, and * indicate one-tailed p-value less than 1, 2.5, and 5%, respectively.

Table 6

Firm-level Panel Regressions for Investments in Sustainability Issues and Stock Returns

Panel A: Cross-sectional Estimates

Parameter	Estimate	t	Estimate	t	Estimate	t	Estimate	t
Intercept	0.0322	4.35	0.0323	4.36	0.0411	3.07	0.0407	3.03
High All Sustainability Issues	0.0018	1.86			0.0016	1.58		
High Material Sustainability Issues			0.0052	6.60			0.0040	3.83
High Immaterial Sustainability Issues			-0.0002	-0.31			-0.0005	-0.50
Last Year's Return	-0.0319	-2.47	-0.0313	-2.42	-0.0710	-4.68	-0.0691	-4.55
Size	-0.0009	-4.26	-0.0009	-4.79	-0.0017	-5.71	-0.0017	-5.80
BTM	0.0008	1.34	0.0007	1.22	0.0020	2.93	0.0019	2.89
Turnover	-0.0007	-2.24	-0.0007	-2.31	-0.0002	-0.64	-0.0002	-0.65
ROE	-0.0076	-3.29	-0.0076	-3.32	-0.0051	-2.11	-0.0051	-2.10
Analyst Coverage	-0.0030	-1.05	-0.0030	-1.04	-0.0055	-1.07	-0.0055	-1.07
Leverage	0.0003	0.17	0.0001	0.05	0.0026	1.03	0.0023	0.93
R&D	0.0000	6.51	0.0000	6.36	0.0000	14.74	0.0000	14.42
Advertising Intensity	-0.0140	-6.11	-0.0139	-6.14	-0.0107	-1.26	-0.0104	-1.25
SG&A	-0.0001	-0.70	-0.0001	-0.70	0.0000	-0.32	0.0000	-0.32
Capital Expenditure	-0.0014	-0.31	-0.0015	-0.34	-0.0025	-0.52	-0.0025	-0.54
Institutional Blockholders					-0.0011	-4.06	-0.0011	-4.05
Directors Failing					0.0130	1.38	0.0135	1.43
Busy Directors					0.0120	2.81	0.0120	2.83
Year-Month F.E.	Yes		Yes		Yes		Yes	
Industry F.E.	Yes		Yes		Yes		Yes	
N	154,786		154,786		105,674		105,674	
Adj R -squared	17.41%		17.43%		20.72%		20.73%	
Annualized abnormal performance	2.16%		6.47%		1.92%		4.90%	

Panel B: Within-Firm Estimates

Parameter	Estimate	t	Estimate	t	Estimate	t	Estimate	t
Intercept	0.2728	16.39	0.2710	15.65	0.2748	9.98	0.2730	12.55
High Residual KLD index	0.0019	2.24			0.0017	1.75		
High Residual Materiality Index			0.0039	4.50			0.0033	3.10
High Residual Immateriality Index			0.0000	0.01			-0.0003	-0.27
Last Year's Return	-0.0427	-2.65	-0.0418	-3.42	-0.0796	-4.48	-0.0777	-5.40
Size	-0.0319	-23.08	-0.0319	-32.95	-0.0418	-20.19	-0.0418	-32.34
BTM	-0.0011	-0.64	-0.0011	-1.16	-0.0003	-0.17	-0.0003	-0.25
Turnover	-0.0027	-5.68	-0.0027	-9.23	-0.0024	-5.04	-0.0024	-7.22
ROE	-0.0027	-0.98	-0.0027	-1.42	-0.0033	-0.99	-0.0033	-1.45
Analyst Coverage	-0.0232	-5.52	-0.0231	-7.71	-0.0140	-1.64	-0.0140	-2.63
Leverage	-0.0021	-0.41	-0.0018	-0.42	0.0068	1.02	0.0067	1.22
R&D	0.0000	1.39	0.0000	2.27	0.0000	1.28	0.0000	2.17
Advertising Intensity	-0.0157	-3.05	-0.0157	-3.37	-0.0097	-0.68	-0.0095	-0.72
SG&A	-0.0002	-1.52	-0.0002	-1.98	-0.0001	-1.01	-0.0001	-1.41
Capital Expenditure	-0.0136	-2.18	-0.0137	-2.67	-0.0138	-1.75	-0.0137	-2.22
Institutional Blockholders					-0.0024	-5.62	-0.0024	-6.41
Directors Failing					0.0165	1.45	0.0171	1.52
Busy Directors					-0.0031	-0.55	-0.0030	-0.46
Year-Month F.E.	Yes		Yes		Yes		Yes	
Firm F.E.	Yes		Yes		Yes		Yes	
N	154,786		154,786		105,674		105,674	
Adj R -squared	20.38%		20.38%		24.02%		24.02%	
Annualized abnormal performance	2.34%		4.78%		2.08%		4.01%	

Dependent variable is the monthly stock return for each firm measured as in the calendar-time portfolios for every month beginning in April of the year after a KLD index is calculated (year t+1) until March of the year after (year t+2). High Residual KLD Index in an indicator variable for firms scoring at the top quintile of the residual total KLD index. High Residual Materiality Index in an indicator variable for firms scoring at the top quintile of the residual material index. High Residual Immateriality Index in an indicator variable for firms scoring at the top quintile of the residual immaterial index. Lag Return is the 12-month stock return of the firm between April in year t-1 and March in year t. Size is the natural logarithm of the market capitalization of the firm in the end of the previous month. BTM is shareholders equity in the last fiscal year over market capitalization at the end of the previous month. Turnover is shares traded over shares outstanding calculated each month. ROE is net income over beginning shareholders equity in the previous fiscal year. Analyst coverage is calculated as the

number of analysts making EPS forecasts for a firm over the previous fiscal year. Leverage is total liabilities over total assets calculated over the previous calendar year. R&D is research and development expenditures divided by sales. Advertising Intensity is advertising expenditures over sales. SG&A is sales, general and administrative expenditures over sales. Capital Expenditure is capital expenditures over sales. Institutional Blockholders is the natural logarithm of one plus the number of institutions that own 5% or more of the outstanding shares. Directors Failing is the number of directors that failed to attend the minimum number of board meetings. Busy Directors is the number of directors that sit on four or more boards. Standard errors are robust and clustered at the firm-level.

Table 7

Performance on ***Material and Immaterial*** Sustainability Issues

	Low Investment on Immaterial Issues & High Investment on Material		High Investment on Immaterial Issues & High Investment on Material		High Investment on Immaterial Issues & Low Investment on Material		Low Investment on Immaterial Issues & Low Investment on Material	
Parameter	Estimate	t	Estimate	t	Estimate	t	Estimate	t
Intercept	0.0039	1.96	0.0012	0.57	-0.0003	-0.15	-0.0019	-0.78
Market	0.8882	17.99	0.9358	17.96	1.0641	19.24	1.0242	16.22
SMB	-0.2222	-3.13	-0.0557	-0.73	-0.2448	-2.70	-0.0181	-0.14
HML	0.3145	4.47	-0.0846	-0.82	-0.1508	-1.34	0.0310	0.28
UMD	0.0214	0.46	-0.1994	-2.78	-0.0438	-0.73	-0.1633	-1.79
LIQ	0.0514	0.93	0.0287	0.39	0.0383	0.59	0.2554	3.94
N	261		261		261		261	
Annualized Alpha	4.83%		1.50%		-0.38%		-2.20%	
Difference Alphas - Column 1 is the benchmark			3.32%*		5.20%**		7.03%***	

The table reports alphas, factor loadings, and t-statistics from monthly calendar-time Fama-French regressions for value-weighted portfolios. Classifications are based on the residual materiality and immateriality indices as calculated in models (3) and (4). The intersections of quartile portfolios are formed to estimate the regressions. Firms scoring at the bottom (Low Investment) and top (High Investment) quintiles of the residual index are included in the portfolios. The regressions are estimated from April 1993 to March 2013. Mkt-Rf is the market excess return; SMB and HML are the Fama and French (1993) size and book-to-market factors; UMD is the Carhart (1997) momentum factor; LIQ is the liquidity factor from Pastor and Stambaugh (2003). ***, **, and * indicate one-tailed p-value less than 1, 2.5, and 5%, respectively.

Table 8

Future Accounting Performance

Panel A: Portfolio Results

All Sustainability Issues	t=0 to t=1	t=0 to t=2	t=0 to t=3	t=0 to t=4	t=0 to t=5
Low Investment	-0.58%	-0.41%	-0.70%	-3.48%	-7.52%
High Investment	-0.56%	4.18%	-1.13%	-0.13%	-2.15%
Difference	0.02%	4.59%	-0.44%	3.36%	5.37%
t-stat	0.01	2.08	-0.17	1.25	1.90

Material Sustainability Issues	t=0 to t=1	t=0 to t=2	t=0 to t=3	t=0 to t=4	t=0 to t=5
Low Investment	0.71%	-0.97%	-2.51%	-4.69%	-5.61%
High Investment	0.99%	5.91%	4.74%	3.04%	3.59%
Difference	0.28%	6.89%	7.26%	7.74%	9.20%
t-stat	0.14	2.93	2.73	2.69	3.10

Immaterial Sustainability Issues	t=0 to t=1	t=0 to t=2	t=0 to t=3	t=0 to t=4	t=0 to t=5
Low Investment	-0.69%	-0.70%	-0.27%	-3.23%	-8.23%
High Investment	-2.44%	-0.08%	-3.68%	-1.98%	-4.36%
Difference	-1.75%	0.63%	-3.41%	1.25%	3.88%
t-stat	-0.93	0.28	-1.34	0.45	1.36

Panel B: Panel Regressions

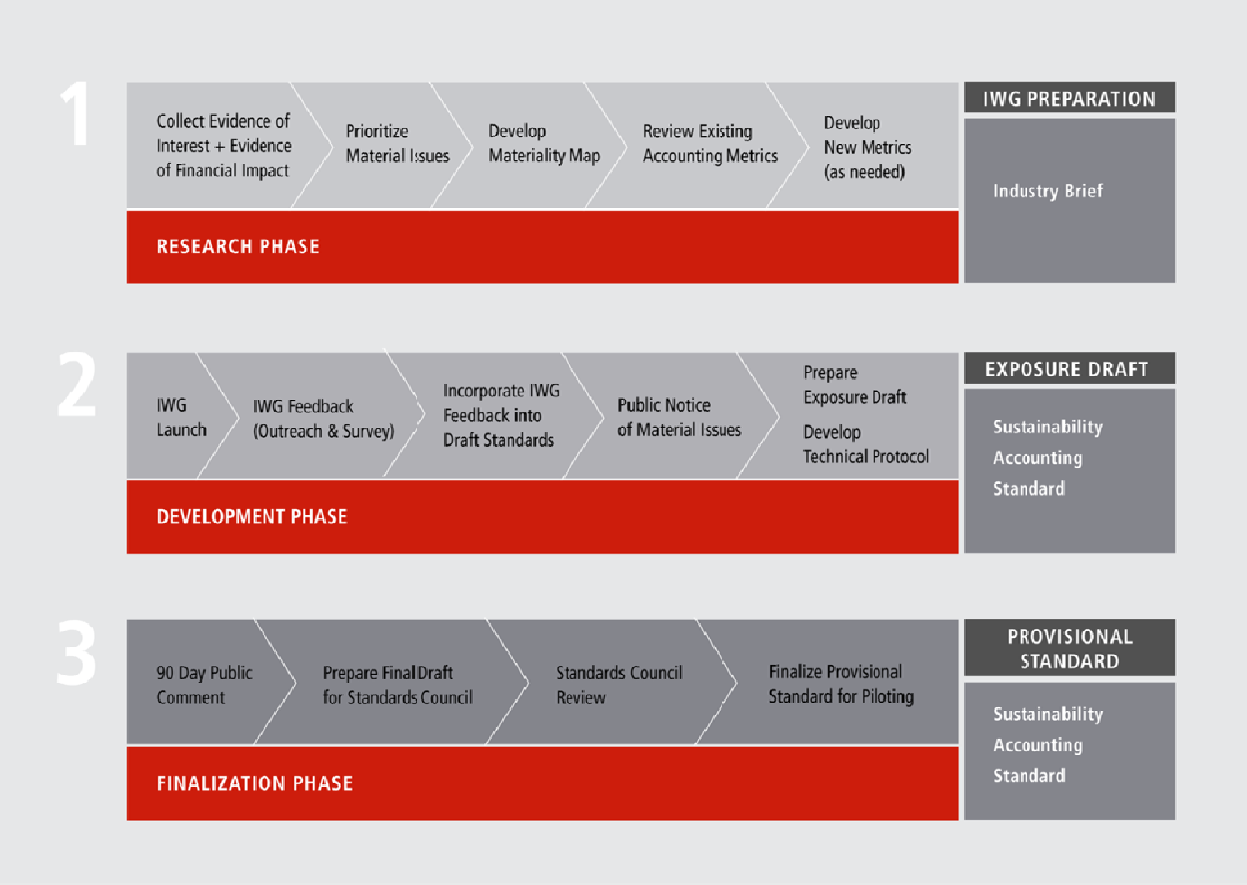
Parameter	Estimate	t	Estimate	t	Estimate	t	Estimate	t
Intercept	-0.4268	-2.77	-0.3644	-0.97	-0.1362	-0.43	-0.5829	-0.83
High Residual Materiality Index	0.0802	3.79	0.0695	2.58	0.0823	3.76	0.0894	3.20
High Residual Immateriality Index	0.0066	0.35	0.0136	0.62	-0.0042	-0.21	-0.0147	-0.61
Last Year's Return	1.6287	4.71	1.7241	4.07	0.6388	1.57	0.5003	0.98
Size	0.0181	3.75	0.0226	3.29	-0.0355	-1.09	-0.0372	-0.80
BTM	-0.0563	-4.22	-0.0575	-3.50	-0.1992	-6.13	-0.2436	-5.57
Turnover	0.0033	0.54	0.0069	0.95	0.0062	0.62	0.0110	0.93
ROE	0.1608	3.24	0.2232	3.81	0.1278	1.42	0.2738	2.52
Analyst Coverage	0.0854	1.94	-0.0791	-0.75	0.0968	1.94	-0.0075	-0.05
Leverage	-0.1068	-2.25	-0.0999	-1.68	-0.5343	-4.03	-0.4227	-2.33
R&D	0.0001	15.97	0.0001	20.48	0.0018	1.38	0.0019	1.01
Advertising Intensity	-1.0689	-2.92	-1.3902	-3.26	0.8854	1.14	0.0515	0.04
SG&A	-0.0021	-1.06	-0.0015	-0.70	-0.0009	-0.40	0.0005	0.36
Capital Expenditure	-0.6284	-6.14	-0.5824	-4.72	-0.7178	-4.64	-0.8152	-4.16
Institutional Blockholders			-0.0031	-0.46			-0.0186	-1.81
Directors Failing			0.2600	0.98			0.3918	1.27
Busy Directors			0.0890	0.83			-0.0818	-0.50
Year F.E.	Yes		Yes		Yes		Yes	
Industry F.E.	Yes		Yes		No		No	
Firm F.E.	No		No		Yes		Yes	
N	9,385		6,439		9,385		6,439	
Adj R -squared	5.39%		6.67%		27.17%		33.12%	

Panel A reports changes in return-on-sales (ROS) between the year of portfolio formation and future years. ROS is net income over average sales. t=x to t=y represents a change between year x and year y. Low Investment is firms that score at the bottom quintile of the residual index. High Investment is firms that score at the top quintile of the residual index. Firms are allocated for all three indices: residual total KLD, materiality and immateriality. In Panel B dependent variable is two year ahead change in ROS. High Residual Materiality Index in an indicator variable for firms scoring at the top quintile of the residual materiality index. High Residual Immateriality Index in an indicator variable for firms scoring at the top quintile of the residual immateriality index. Lag Return is the 12-month stock return of the firm between April in year t-1 and March in year t. Size is the natural logarithm of the market capitalization of the firm in the end of the previous month. BTM is shareholders equity in the last fiscal year over market capitalization at the end of the previous month. Turnover is shares traded over

shares outstanding calculated each month. ROE is net income over beginning shareholders equity in the previous fiscal year. Analyst coverage is calculated as the number of analysts making EPS forecasts for a firm over the previous fiscal year. Leverage is total liabilities over total assets calculated over the previous calendar year. R&D is research and development expenditures divided by sales. Advertising Intensity is advertising expenditures over sales. SG&A is sales, general and administrative expenditures over sales. Capital Expenditure is capital expenditures over sales. Institutional Blockholders is the natural logarithm of one plus the number of institutions that own 5% or more of the outstanding shares. Directors Failing is the number of directors that failed to attend the minimum number of board meetings. Busy Directors is the number of directors that sit on four or more boards. Standard errors are robust and clustered at the firm-level.

Appendix I

SASB's Standard Setting Process



Source: Sustainability Accounting Standards Board. www.sasb.org

Appendix II

SASB's Materiality Process

For each topic, SASB conducts an evidence of materiality test, the results of which ultimately are debated and reviewed by the Standards Council after industry working groups composed of industry experts have provided their input. The test has three components: evidence of interest, evidence of financial impact, and forward impact adjustment.

The interest test has two components, a heat map score and an industry working group score. The heat map score is derived from a search for relevant keywords in documents stored on Bloomberg servers and indicates the relative importance of the issue among SASB's initial list of 43 generic sustainability issues. Evidence of interest is gathered by searching tens of thousands of industry-related documents—Form 10-Ks, shareholder resolutions, CSR reports, media and SEC comment letters—for key words related to 30 general sustainability issues. The industry working group score signals the percentage of industry working group members that found the issue to be material. SASB convenes an industry working group to provide feedback on the disclosure items and accounting metrics identified in the initial research phase. The industry working groups are composed of balanced representation from corporations, market participants, and public interest intermediaries. Primary industry working group feedback is collected via an online survey. After the conclusion of online survey, SASB's research team conducts outreach to industry working group members to gain additional insight.

The financial impact test uses a value framework developed by McKinsey and seeks to identify evidence of financial impact on revenues/costs, assets/liabilities, or cost of capital from the focal issue in an industry. Evidence of financial impact is gathered by examining sell side research, investor call transcripts, third party case studies, anecdotal evidence, and news articles. After identifying a minimum set of disclosure topics for an industry, for which there is solid evidence of both investor interest and financial impact, SASB identifies and documents existing metrics and practices used to account for performance on each disclosure topic. Any evidences found are publically disseminated through industry-specific industry briefs.

The forward-looking impact test assesses the future probability and magnitude of financial impact from the focal issue to capture issues that may fail the financial impact test but may still be relevant for investors. The forward-looking impact test also assesses whether the issue will generate significant externalities in the future. However, it should be noted that to date the forward looking impact adjustment has been rarely used by SASB to switch a topic from immaterial to material. After the consultation with the industry working group has finished, SASB prepares an Exposure Draft Standard with accounting metrics and technical protocols for each of the disclosure topics.

In the next phase, SASB releases the Exposure Draft Standard for a 90 day public comment period. At this time, any member of the public can download the Exposure Draft Standard from SASB's website and provide feedback via a letter. At the conclusion of the public comment period, SASB incorporates feedback received into the standard. The Standards Council then reviews the standard to ensure consistency, completeness and accuracy. With the Standards Council's final review, the Provisional Standard is considered complete. The Provisional Sustainability Accounting Standard is then published and made available to the public.

Appendix III

Sector-level Materiality Map

Issues	Health Care	Financials	Technology and Communication	Non-Renewable Resources	Transportation	Services
Environment						
GHG emissions						
Air quality						
Energy management						
Fuel management						
Water and wastewater management						
Waste and hazardous materials management						
Biodiversity impacts						
Social Capital						
Human rights and community relations						
Access and affordability						
Customer welfare						
Data security and customer privacy						
Fair disclosure and labeling						
Fair marketing and advertising						
Human Capital						
Labor relations						
Fair labor practices						
Employee health, safety and wellbeing						
Diversity and inclusion						
Compensation and benefits						
Recruitment, development and retention						
Business Model and Innovation						
Lifecycle impacts of products and services						
Environmental, social impacts on core assets and operations						
Product packaging						
Product quality and safety						
Leadership and Governance						
Systemic risk management						
Accident and safety management						
Business ethics and transparency of payments						
Competitive behavior						
Regulatory capute and political influence						
Materials sourcing						
Supply chain management						

Source: Sustainability Accounting Standards Board. www.sasb.org
Note: Dark (light) grey color means that for more (less) than 50% of the industries within the sector the issue is material. White means that the issue is not material for any industry within the sector. To see materiality maps at the industry level visit www.sasb.org . The labels under each issue are generic. This means that the substance of the issue can differ dramatically from one industry to another. For example, supply chain management appears as material for both Pharmaceutical and iron ore steel producer firms. However, in the case of Pharmaceutical companies "Manufacturing and Supply Chain Quality Management" refers to "Description of FDA enforcement actions taken in response to violations of current good manufacturing practices (cGMP), including: product deemed adulterated, form 483s, suggested recall (Class I, II, III), Warning Letters, Border Alerts, license suspension or revocation, product seizure, Consent Decrees, criminal prosecution. Description of corrective actions implemented in response to actions" and to "Percentage of facilities and Tier I suppliers participating in the Rx-360 International Pharmaceutical Supply Chain Consortium audit program or equivalent third-party audit programs for integrity of supply chain and ingredients (e.g., APIs, chemical, raw material, excipients, etc.)." In contrast, for firms in the iron steel producers industry "Contractor and Supply Chain Management" refers to "Discussion of the process for managing iron ore and/or coking coal sourcing risks arising from environmental and social issues." The interested reader can access each industry standard on the SASB website.

Appendix IV

Financials		Healthcare		Nonrenewables	
KLD Code	**SASB Topic**	**KLD Code**	**SASB Topic**	**KLD Code**	**SASB Topic**
CGOV_STR_G	Transparent Information & Fair Advice for Customers	DIV_STR_B	Employee Recruitment, Development, and Retention	CGOV_STR_G	Business Ethics & Payments Transparency
CGOV_STR_H	Systemic Risk Management	EMP_STR_G	Employee Health and Safety	COM_STR_C	Community Relations
COM_STR_D	Financial Inclusion & Capacity Building	EMP_STR_K	Employee Recruitment, Development, and Retention	COM_STR_D	Financial Inclusion & Capacity Building
DIV_STR_C	Employee Inclusion	EMP_STR_L	Employee Recruitment, Development, and Retention	COM_STR_H	Community Relations
DIV_STR_E	Employee Inclusion	ENV_STR_C	Product Lifecycle Management	EMP_STR_G	Health, Safety, and Emergency Management
DIV_STR_H	Employee Inclusion	ENV_STR_D	Climate Change Impacts on Human Health and Infrastructure	ENV_STR_B	Hazardous Materials Management
EMP_STR_I	Employee Incentives & Risk Taking	ENV_STR_H	Energy, Water, and Waste Efficiency	ENV_STR_D	Greenhouse Gas Emissions
EMP_STR_L	Employee Incentives & Risk Taking	PRO_STR_A	Drug Safety and Side Effects	HUM_STR_D	Community Relations
ENV_STR_D	Environmental Risk Exposure	PRO_STR_C	Access to Medicines	PRO_STR_A	Health, Safety, and Emergency Management
PRO_STR_A	Customer Privacy & Data Security				
PRO_STR_C	Financial Inclusion & Capacity Building				
PRO_STR_D	Financial Inclusion & Capacity Building				
CGOV_CON_B	Employee incentives & risk taking	CGOV_CON_M	Corruption and Bribery	CGOV_CON_M	Business Ethics & Payments Transparency
CGOV_CON_F	Environmental, social impacts on core assets and operations	ENV_CON_K	Energy, Water, and Waste Efficiency	EMP_CON_A	Labor Relations
CGOV_CON_K	Management of the Legal & Regulatory Environment	PRO_CON_A	Drug Safety and Side Effects	EMP_CON_B	Health, Safety, and Emergency Management
COM_CON_B	Management of the Legal & Regulatory Environment	PRO_CON_D	Ethical Marketing	EMP_CON_F	Supply Chain Management
DIV_CON_A	Management of the Legal & Regulatory Environment			ENV_CON_B	Competitive Behavior
DIV_CON_C	Employee Inclusion			ENV_CON_D	Air Quality
DIV_CON_D	Employee Inclusion			ENV_CON_F	Greenhouse Gas Emissions
PRO_CON_A	Management of the Legal & Regulatory Environment			ENV_CON_H	Biodiversity Impacts
PRO_CON_E	Management of the Legal & Regulatory Environment			ENV_CON_J	Supply Chain Management
PRO_CON_F	Management of the Legal & Regulatory Environment			ENV_CON_K	Water Management
				HUM_CON_C	Security, Human Rights, and Rights of Indigenous Peoples
				HUM_CON_J	Security, Human Rights, and Rights of Indigenous Peoples
				HUM_CON_K	Security, Human Rights, and Rights of Indigenous Peoples

Services		Technology		Transportation	
KLD Code	**SASB Topic**	**KLD Code**	**SASB Topic**	**KLD Code**	**SASB Topic**
CGOV_STR_G	Internal Controls on Money Laundering	CGOV_STR_G	Managing Systemic Risks from Technology Disruptions	EMP_STR_G	Accidents & Safety Management
DIV_STR_C	Workforce Diversity & Inclusion	DIV_STR_C	Recruiting & Managing a Global, Diverse Skilled Workforce	EMP_STR_H	Fair Labor Practices
DIV_STR_E	Workforce Diversity & Inclusion	DIV_STR_E	Recruiting & Managing a Global, Diverse Skilled Workforce	EMP_STR_J	Labor Relations
DIV_STR_H	Workforce Diversity & Inclusion	DIV_STR_H	Recruiting & Managing a Global, Diverse Skilled Workforce	EMP_STR_L	Driver Working Conditions
EMP_STR_G	Customer & Worker Safety	EMP_STR_G	Fair Labor Practices	ENV_STR_A	Product Lifecycle Management
EMP_STR_H	Fair Labor Practices	EMP_STR_J	Recruiting & Managing a Global, Diverse Skilled Workforce	ENV_STR_B	Materials Efficiency & Recycling
EMP_STR_I	Fair Labor Practices	EMP_STR_L	Fair Labor Practices	ENV_STR_D	Environmental Footprint of Fuel Use
EMP_STR_J	Workforce Diversity & Engagement	ENV_STR_B	Product Lifecycle Management	ENV_STR_I	Ecological Impacts
EMP_STR_L	Workforce Diversity & Engagement	ENV_STR_H	Water & Waste Management in Manufacturing	ENV_STR_J	Materials Sourcing
ENV_STR_B	Food & Packaging Waste Management	ENV_STR_J	Supply Chain Management & Materials Sourcing	PRO_STR_A	Product Safety
ENV_STR_C	Food & Packaging Waste Management	PRO_STR_A	Data Privacy & Freedom of Expression		
ENV_STR_D	Fuel Use& Air Emissions				
ENV_STR_H	Energy & Water Management				
ENV_STR_I	Ecosystem Protection & Climate Adaptation				
PRO_STR_A	Food Safety				
CGOV_CON_M	Professional Integrity	DIV_CON_A	Recruiting & Managing a Global, Diverse Skilled Workforce	CGOV_CON_M	Business Ethics
DIV_CON_A	Workforce Diversity & Inclusion	DIV_CON_C	Recruiting & Managing a Global, Diverse Skilled Workforce	EMP_CON_A	Labor Relations
DIV_CON_C	Workforce Diversity & Inclusion	DIV_CON_D	Recruiting & Managing a Global, Diverse Skilled Workforce	EMP_CON_B	Accidents & Safety Management
DIV_CON_D	Workforce Diversity & Inclusion	ENV_CON_J	Supply Chain Management & Materials Sourcing	EMP_CON_F	Fair Labor Practices
EMP_CON_B	Fair Labor Practices	ENV_CON_K	Water & Waste Management in Manufacturing	EMP_CON_G	Fair Labor Practices
EMP_CON_F	Fair Labor Practices	HUM_CON_C	Supply Chain Management & Materials Sourcing	ENV_CON_D	Environmental Footprint of Fuel Use
EMP_CON_G	Fair Labor Practices	HUM_CON_J	Data Privacy & Freedom of Expression	ENV_CON_F	Environmental Footprint of Fuel Use
ENV_CON_D	Fuel Use& Air Emissions	PRO_CON_E	Intellectual Property Protection & Competitive Behavior	ENV_CON_G	Fuel Economy & Use-phase Emissions
ENV_CON_F	Fuel Use& Air Emissions			ENV_CON_I	Materials Efficiency & Recycling
ENV_CON_G	Discharge Management & Ecological Impacts			ENV_CON_K	Ecological Impacts
ENV_CON_H	Ecosystem Protection & Climate Adaptation			PRO_CON_A	Product Safety
ENV_CON_I	Food & Packaging Waste Management			PRO_CON_E	Competitive Behavior
ENV_CON_K	Energy & Water Management				
PRO_CON_A	Food Safety				
PRO_CON_D	Marketing & Recruiting Practices				
PRO_CON_E	Discharge Management & Ecological Impacts				
PRO_CON_F	Shipboard Health & Safety Management				

This appendix provides a mapping between material SASB topics and KLD data items for the different sectors. Not all topics are material for all industries within a sector. Therefore, some KLD data items that are listed as material for a sector might not be material for a specific industry within that sector.