Sustain and Deliver:
Capturing the Valuation Effects of Corporate Sustainability

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Abstract

This paper identifies a select few indicators from within a large set of environmental, social and governance (ESG) factors that contribute towards firm's triple bottom line; and introduces a corporate sustainability measure. Sustainable part of corporate social responsibility completely explains its well-documented relation with firm values. Using instrumental variables and simultaneous equation models, I show that changes in sustainability scores for a firm can indeed cause changes in its valuation as measured by Tobin's Q. Moreover, firms with poor corporate governance and high managerial entrenchment experience comparatively lower marginal influence of sustainability initiatives than the good governance firms. Lastly, sustainability-based hedge portfolios show a potential risk-adjusted return of over 3% per year in my sample period. These results indicate that *only* the sustainable aspects of ESG are associated with superior financial performance in terms of both accounting-based value (Tobin's Q) and market-based value (stock returns).

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"Sustainable investing is simply smart investing. Sustainable investing seeks to drive positive social or environmental impact alongside financial results, allowing investors to accomplish more with their money."

[*BlackRock, Inc.*]

1. Introduction

Increasingly investors, and especially large institutional investors such as BlackRock, are employing screening processes to identify firms with better environmental, social and governance (ESG henceforth) practices. Do these social responsibility screens benefit investors? While this question has drawn a lot of attention in the literature over last 10 years, the jury is still out as empirical evidences are mixed. While some studies indicate that such screens work for investors (e.g. Kempf and Osthoff, 2007), there are others that show no significant benefits from such investments (e.g. Humphrey et al., 2012). In this paper, I explore the sustainability – returns relationship by first identifying those ESG indicators that are truly important as contributors to firms' triple bottom line. Using this subset of ESG factors, I construct a corporate sustainability measure, and then assess whether sustainability-based hedge portfolios can generate abnormal returns for investors. In addition, I examine the importance of sustainability as a subcomponent of the overall ESG composite measure and test if it either accentuates or attenuates corporate governance – firm value relationship.

In recent years, empirical research exploring the relationship between corporate social responsibility/ performance (CSR/CSP) and financial performance (CFP) has largely revealed unidirectional results, i.e. firms with better CSR ratings have better firm values than their low CSR counterparts, especially when accounting-based performance measures are used (see Van Beurden and Gössling, 2008; Fulton et al., 2012 for a detailed review). The same cannot be said, however, when market-based performance measure such as stock return is used (Derwall et al., 2011; Fulton et al., 2012). Most of these studies consider the ESG strengths and concerns in aggregation to construct a CSP measure[1]. There are some studies which have further explored ESG dimensions within the aggregated CSP ratings by focusing on environmental, social or governance aspects separately or by disaggregating them and looking at the sub-ratings and find similar results (e.g. Galema et al., 2008; Ng and Rezaee, 2015). However, each of these dimensions of ESG themselves include a heterogeneous set of strengths and concerns indicators which are commonly combined together using a "kitchen sink" or "all-in" approach to either measure individual ESG dimensions or the composite ESG scores. Do each of these ESG indicators necessarily warrant a presence in the ESG ratings? Which of the ESG subcomponents (both strengths and concerns) largely contribute towards the observed CSR and CFP relationship? These questions are central to the research objectives of this paper.

[1] In different streams of literature, this measure is given different names such as stakeholder welfare (Jiao, 2010), stakeholder-relations index (Borgers et al., 2013) or simply CSR/CSP (Kempf and Osthoff, 2007; El-Ghoul et al., 2011; Humphrey et al., 2012; Becchetti et al., 2013, 2015; Lins et al., 2017).

Another reason for dismissing the commonly applied kitchen sink approach is that there is no theoretical argument for assuming that all of the ESG indicators are essential as contributors towards better CSR firms outperforming their poor CSR counterparts in terms of both accounting-based and market-based performances. The positive correlation between CSR and CFP may be driven by some dominant ESG indicators whence possibly there are others that diminish the value or are irrelevant. Managers' need to balance amongst stakeholders demands may, additionally, suppress the influence of certain important ESG components or indicators (Bouslah et al., 2013). I aim to shed light on these finer yet vital aspects of ESG data by focusing on those indicators that are important for firms' *sustainability* and then ascertaining that these sustainability indicators really matter when aggregated measures of CSP are used in relation to CFP (i.e. both accounting-based Tobin's Q and market-based shareholder returns).

Just like individuals, firms do not exist in isolation. As legal entities, they are a part of the society and ecology to which they belong. Does this mean that they have additional social responsibilities along with their fiduciary responsibility towards shareholders? This is the central question in the CSR literature. In economics and finance, the attention towards CSR view has grown in recent years with increasing emphasis on social accounting and sustainability reports by large corporations. The Volkswagen scandal and its fallout highlights the relevance of ESG accountability and codes for both the firms and its investors. Sustainability and Triple Bottom Line (TBL) have become the new buzz words.

In finance, there are two broad contrasting views with respect to corporate social expenditures. While one stream of literature treats stakeholder and social welfare maximization complementary to shareholder wealth maximization (e.g. Edmans, 2011), the other stream builds on Friedman (1970) argument that CSR is an avoidable cost for firms that comes at the expense of shareholders. This debate is ongoing with recent evidences supporting both views. I aim to contribute to this debate by focusing on investment strategies employing ESG data to assess if corporate social response and sum total of sustainability initiatives are value enhancing for shareholders. Taking the investors perspective will also allow for understanding the real outcomes of CSP and the economic impact it has in terms of shareholder wealth generation.

Using either of the two contrasting views stated above, in theory, the association between stock returns and sustainability or CSP could be accordingly positive or negative. Firm's CSR objectives may be in sync with its wealth maximization objective, or it may have additional costs that contradicts the said objective (Ferrell et al., 2016). Empirical evidences are seen to support either of these views depending on the type of CSR-related costs and corresponding firm outcomes studied. Hillman and Keim (2001), for example, show that while CSP and stakeholder management focusing on primary stakeholders can increase shareholder value, strict social screens that exclude alcohol, tobacco or other controversial industries may be detrimental to the shareholders. Since my analysis focuses on qualitative indicators affecting primary stakeholders and does not include exclusionary screens, I hypothesize that shareholders will reap benefits from CSP, and more so from sustainability. By further exploring the sustainability strengths and concerns separately, I seek to identify how each of these drive the shareholders value.

In this paper, thus, I review MSCI ESG data to identify a subset of available CSR strengths and concerns that is relevant to corporate sustainability. ESG data, using all-in approach, has been extensively used to measure proxies for several concepts such as the social capital (Jha and Cox, 2015; Lins et al., 2017), stakeholder relations (Borgers et al., 2013) and CSP/ CSR (Humphrey et al., 2012; Kim et al., 2014). But, this is the first time a selective approach is being used to identify a few ESG indicators from all the ESG dimensions to construct a more latent sustainability measure. Sustainability, in this context, is defined as the firm's ability to meet current goals, i.e. shareholders wealth maximization, without comprising the societal goals and the needs of future generations or other stakeholders (WCED, 1987; Van Marrewijk, 2003). Or, in other words, the ability to balance between profits, people and planet (Kaptein and Wempe, 2002). Essentially, sustainability captures a firm's moral obligation towards future generations (Solow, 1993) and therein lies the big bone of contention, whether these so-called moral obligations do create value for the firm and its shareholders, or merely cause value diminution.

My initial hypothesis is that, out of about 140 available ESG factors, only a subset of the ESG strengths and concerns are relevant to firms' sustainability objective and would be most influential in contributing towards the well-documented CSP – firm value correlation. From the sustainability literature, I identify indicators that managers should be most attentive towards. This subset of ESG indicators is also seen to be significantly different in the way their popularity has grown over the years as they draw more attention through United Nations (UN) sponsored programs and initiatives.

The initial part of analysis reveals that only 32 strengths and 20 concerns from the total 140 MSCI ESG indicators are relevant to sustainability. Bebchuk et al. (2009) follow similar identification strategy to show that only 6 entrenchment variables of the total 24 used in Gompers et al. (2003) Governance Index (G-Index) capture most of the variations seen in the aggregated all-in G-Index. Using this identified subset of ESG indicators, I introduce sustainability index (SUS-Index or simply, SUS). Each firm in the MSCI ESG database is assigned SUS-Index scores using their ESG strengths (+) and concerns (–) reflected by these 52 select-few sustainability indicators. Next, I assess if the identified components are significantly associated with firm values' proxy Tobin's Q. The results using both aggregated measure (SUS) and its subcomponent strengths (SUSstr) and concerns (SUScon) show significant correlations with firm values even after controlling for important firm characteristics and the remaining ESG indicators. The sustainability index has a monotonic and significantly positive association with Tobin's Q, while the aggregate remnant ESG score does not show significant relationship with the same. Even when it comes to strength and concern subcomponents, as expected, the SUSstr has a positive association with firm values and SUScon is negatively related to it. On comparing these results with those of corresponding all-in approach based CSP measure, I find that SUS-Index and its subcomponents capture most of the CSP – firm value relationship.

These findings remain robust even with cross-sectional panel estimation or with dynamic models that control for simultaneity. I further employ a cleaner identification to get causal estimates using instrumental variables (IV) approach and simultaneous equations model (SEM).

Both the IV and SEM results indicate the existence of a causal relationship between all the sustainability measures (SUS, SUSstr and SUScon) and the firm values.

To disentangle the effect of sustainability and agency problems related to corporate governance on the firm values, I additionally examine the relationship between sustainability, managerial entrenchment and Tobin's Q. The results indicate that while sustainability is compatible with good governance, the valuation benefits of additional sustainable initiatives is lowered for firms that experience increased entrenchment. In fact, poor corporate governance is detrimental to firm values even in the presence of better sustainability scores.

Better sustainability scores resulting in superior firm values need not necessarily imply that an investment strategy using sustainability index should generate abnormal stock returns, as we expect market participants to understand the differences between the more and less sustainable firms such that the market prices correct for them. However, I find that there is a monotonic and increasing relationship between sustainability and abnormal returns in my sample period. As mentioned earlier, much of the empirical evidences on the ESG based measures and abnormal returns have been mixed (Derwall et al., 2011; Fulton et al., 2012). Hence, a positive significant relationship using the selective sustainability index, may be indicative of drawbacks accompanying the use of composite indices or scores applying kitchen sink approach whence investors do not ascertain the importance of individual components within these composites. Using the three sub-dimensions within ESG (i.e. taking the disaggregated view composed of environmental, social and governance dimensions separately), some papers have highlighted the same (Kempf and Osthoff, 2007; Galema et al., 2008). However, this is the first paper that provides deeper and much finer insights on individual ESG indicators than the coarser three-dimensional approach followed in prior literature.

A long high sustainability – short low sustainability hedge using the SUS-Index generates economically and statistically significant abnormal returns of about 3.6% per annum. To elaborate the importance of sustainability index, a similar investment hedge using the rest of ESG components did not show any significant correlations with abnormal returns in the analyzed sample period. The existence of possible abnormal returns in my findings does not necessarily indicate considerable market inefficiency nor guarantees that similar trend can be expected in the coming years. However, by comparing the hedging strategies that use sustainability index and the other components index, I show that the outcome of investment strategies that focus on relevant parts of a composite index can be much different from that of the one that applies all-in pooled index. This may just be due to the fact that sustainability index is less noisy than a comparable ESG-composite CSP/ CSR score.

The rest of this paper is organized as follows. Section 2 provides the background for measuring sustainability. Section 3 presents the data and SUS-Index along with some preliminary analysis. Next, sections 4 and 5 elaborate the empirical approaches / results for firm values and the additional corporate governance characteristics respectively in relation with sustainability. Section 6 assesses sustainability-based investment portfolios and their abnormal returns. Finally, Section 7 discusses the main findings and concludes.

2. ESG and sustainability

2.1. Need for a sustainability measure

The MSCI ESG data (previously the Kinder, Lydenberg, and Domini Research & Analytics, Inc. or RiskMetrics-KLD) has about 140 ESG related strengths and concerns categorized under eight different dimensions: community, controversial business, governance, diversity, employee relations, environment, human rights, and product-related aspects. Over the years, some indicators get added to each dimension while others are dropped as and when they seem to influence or become irrelevant to each of these dimensions. There are also instances when some of the ESG components were moved from one dimension to another (e.g. indigenous people relations was moved in 2002 from community to human rights). This lays credence to my argument that the ESG landscape is evolving with time and not all components in ESG database are value enhancing or diminishing. However, since the aim of this paper is to measure sustainability, which is a long-term focused measure, all components that affect the firms sustainability should necessarily be expected to have a long-lasting impact and have value enhancing relevance.

I hypothesize that all indicators that matter in the long-run will essentially contribute to the firm's sustainability. These sustainability indicators should be the ones that firms' decision makers largely consider when balancing between various stakeholders to maximize their triple bottom line. It is important to note that, in my definition of stakeholders, I also include shareholders although the ESG database only covers a small part of shareholders' and management's interest-aligning governance mechanisms.[2] Balancing between different stakeholders while ensuring shareholder wealth maximization may be beneficial for the managers (Cheng et al., 2014). Assuming that market forces and firms' internal corporate governance mechanisms function well too, such adverse effects may be minimized to eventually benefit the firms and increase its valuation (Ferrell et al., 2016).

Sustainability and the balancing of triple bottom line can not only align the interests of shareholders with other stakeholders, but can also benefit the firm through positive externalities which indirectly influence its reputation, goodwill and in turn, its value (Gregory et al., 2016). With the sustainability viewed through long-term lens, stakeholders can also benefit by reducing the threat of short-termism and consequential managerial myopia (Louche, 2009). These arguments have been used in literature to hypothesize the benefits of sustainability to the firms in terms of increased subsequent valuations. However, alternatively, the Friedman (1970) view that sustainability is merely a cost cannot be ignored in theory. When the managers pay attention to other stakeholders needs, shareholders may be negatively affected as there will be some decisions undertaken that are detrimental to shareholder wealth maximization especially in the short-run. Nevertheless, as we define sustainability and identify its indicators through long-term lens, all stakeholders including the shareholders should reap the benefits of superior sustainability in comparison to other firms.

[2] For this reason, in section 5, I further explore another dimension of corporate governance (i.e. managerial entrenchment) to assess agency problems that arise out of better firm sustainability or get mitigated thereof.

In light of the aforementioned argument highlighting the benefits of sustainability, I next identify the ESG components that should contribute to firms sustainability positively (i.e. the strengths) or negatively (i.e. the concerns) and then run empirical tests to assess if these hypothesized components are truly reflective of the sustainable firms or not.

2.2. Relationship with Stock Returns

The multidimensionality of ESG-based measures such as CSP, along with underlying country-factors and cultural influences, makes it difficult to capture abnormal returns using investment strategies based on CSP measures. In terms of country-based influence, for example, a firm's sustainability ranking is seen to be associated with its home country's legal origins (Liang and Renneboog, 2017). In terms of CSP multidimensionality, each of the dimensions within sustainability measure may have contradictory effects on returns leading to confounding results (Galema et al., 2008). While this does explain the mixed evidences seen in the literature, there is no explanation available yet as to why investors continue to be attracted to the firm's sustainability ratings. Furthermore, CSR in firms is related to future stock price crash risk (Kim et al., 2014) and also book-to-market ratios that can increase resultant portfolio sensitivities to the Fama-French HML risk-factor (Galema et al., 2008). This would accentuate difficulties encountered in capturing the stock returns – sustainability association as the sustainability itself is measured as a subcomponent of CSR/CSP.

Despite the challenges mentioned above, the market for commercial ESG-based ratings is booming with institutional investors being their main target customers. So, numerous studies have tried to assess whether there are actual benefits for investors arising out of socially responsible investments or SRIs Galema et al. (2008); Derwall et al. (2011). It has further been shown that there is a considerable effect of CSP on returns when markets are undergoing a crisis and investor trust is running low (Lins et al., 2017). But, what should investors expect during otherwise stable market conditions? I hypothesize that when sustainable aspects of CSP are considered, markets do not completely correct for the differences in firm sustainability. The long-term perspective of sustainability makes it difficult for the investors and markets to completely understand the benefits of sustainability for the stock prices to immediately adjust accordingly. Alternatively, nonexistence of abnormal returns for sustainability-based investment hedges would suggest that markets have already learnt to correct for firm sustainability so as to override any possible mispricing (Borgers et al., 2013).

2.3. Identification of the ESG components relevant to Sustainability Index

To identify the indicators of firm sustainability, I follow a four step process. In the first step, since my definition of sustainability focuses at long term benefits, I examine each of the available 140 ESG components to trace the number of years for which their data was gathered. This provided me with possible indicators that have lost relevance with time or were short-lived ESG indicators that do not matter in the long-run and may not represent sustainability and triple bottom line objective.

In the second step, I reviewed the sustainability literature across the finance, ethics, operations and strategic management perspectives to assess which components from the identified subset of long-lasting indicators should be theoretically relevant. Using over 1800 indicators from 20 different ESG datasets, Rahdari and Rostamy (2015) extract 30 common sustainability constructs. I examined each of the 140 MSCI ESG components and their definitions to check if it is directly associated with any of these identified constructs.

In step three, I further assessed the theoretically relevant indicators in terms of how well they fit in 2015 United Nations (UN) Global Compact Guide to Corporate Sustainability. This benchmark was selected for three reasons. Firstly, the very definition of corporate sustainability by UN Global Compact (UNGC) initiative in terms of "well-being of workers, communities and planets .. [along with] .. health of the business" is in sync with the way I want to measure it. Secondly, this initiative is worlds largest sustainability project with almost 12000 for-profit and non-profit participants worldwide[3]. This shows the wide acceptance of the UNGC guide across the globe and allows me to use a set of sustainability constructs that have industry-wide relevance. Thirdly, being a UN initiative, assuming a well-researched plan, the identified constructs can be expected to be the most powerful indicators of sustainability. In this UNGC guide, the UN expands ten principles related to human rights, labor, environment and anti-corruption that are fundamental to corporate sustainability. The ESG components shortlisted from step two were cross-verified and further filtered using these principles. Additionally, to check the robustness of the identified ESG components, the United Nations Principles for Responsible Investment (UNPRI) and United Nations Conference on Trade and Developments (UNCTAD) 2011 Investor and Enterprise Responsibility Review and the 2015 Investment Policy Framework for Sustainable Development were referred to reaffirm the filtered indicators.

Lastly, in step four, I run confirmatory test to check the relevance of these identified sustainability indicators in terms of the way they have recently reflected in media articles and Google Trends in comparison to rest of the ESG indicators. The idea here is to ascertain that the relevant sustainability indicators are those that have commonly impacted firms across businesses, industries and countries through their "popularity". This test confirms the degree to which issues relating to these indicators draw significant attention in comparison to other less relevant or irrelevant indicators.

2.4. An Overview of the sustainability indicators

Using the aforementioned filtering steps, I identified the ESG strengths and concerns that essentially matter for firm sustainability. These indicators reflect the preference and importance that ESG rating agencies, the United Nations and media assign to these over the rest of the ESG components. My hypothesis that these indicators are the ones that matter, comes from an objective assessment of what shapes managerial response to the investors and other stakeholders' demands regarding ESG factors.

[3] The UNGC initiative is followed across companies and other participants spread over 160 countries.

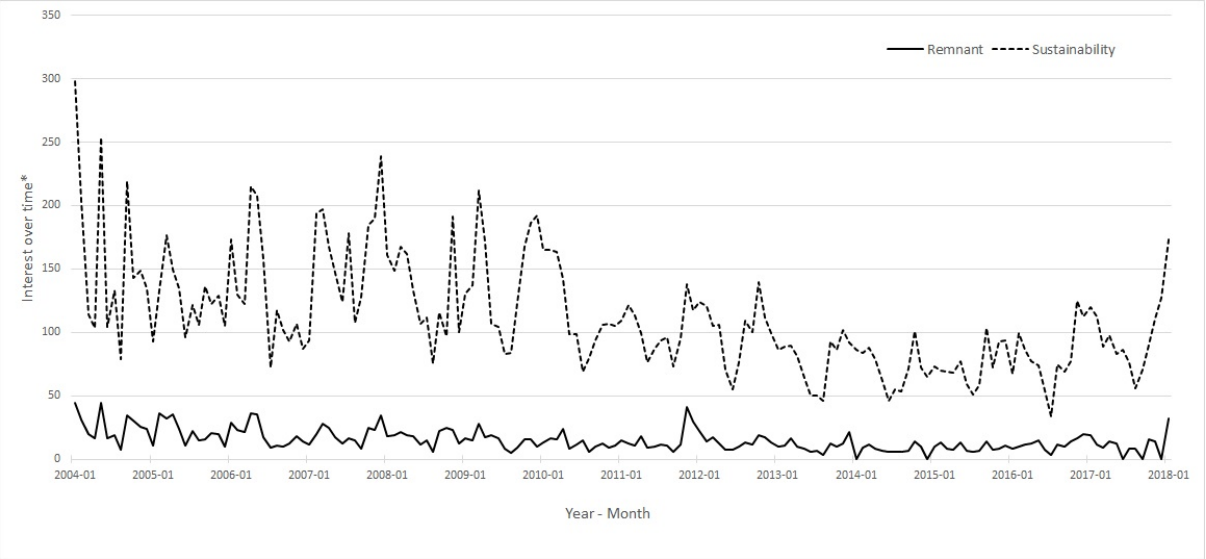
Table I: List of Sustainability Indicators Identified from MSCI ESG Data

A summary list of all indicators included in the sustainability index (SUS) and its corresponding strengths (SUSstr) and concerns (SUScon) subcomponents. For definitions and other ESG indicators, see Appendix I. The selection criteria that were met for each of these indicators are accordingly shown by †, ‡ and ⁕ for Rahdari and Rostamy (2015)'s 30 sustainability constructs, UNGC Guide to Corporate Sustainability and UNCTAD's 2015 Framework for Sustainable Development respectively.

Community	
Strengths:	*Concerns:*
Support for Housing†‡	Tax Disputes†‡
Support for Education†‡	Other Community Concerns†‡
Non-US Charitable Giving†‡	
Community Engagement†‡	
Diversity	
Strengths:	*Concerns:*
CEO Diversity‡	Board of Directors - Gender Diversity†‡
Board of Directors - Gender Diversity†‡	
Work-Life Balance/ Family Benefits†‡	
Women & Minority Contracting†‡	
Employment of the Disabled†‡	
Progressive Gay/ Lesbian Policies‡	
Employment of Underrepresented Groups†‡	
Employees	
Strengths:	*Concerns:*
Employee Involvement† ‡ ⁕	Health & Safety Concern/ Safety Controversies† ‡ ⁕
Strong Retirement Benefits†	Workforce Reductions†
Employee Health & Safety† ‡ ⁕	Child Labor† ‡ ⁕
Supply Chain Labor Standards† ‡ ⁕	Labor Rights & Supply Chain - Other Concerns/ Labor-Management Relations† ‡ ⁕
Compensation & Benefits†‡	
Human Capital Management/ Developments‡	
Human Capital - Other Strengths† ‡ ⁕	
Environment	
Strengths:	*Concerns:*
Beneficial Products & Services/ Env. Opportunities†	Hazardous Waste† ‡ ⁕
Pollution Prevention/ Waste Management† ‡ ⁕	Regulatory Compliance† ‡ ⁕
Climate Change/ Alternative Fuels/ Clean Energy† ‡ ⁕	Ozone Depleting Chemicals† ‡ ⁕
Environmental Management Systems† ‡ ⁕	Toxic Spills & Releases/ Substantial Emissions† ‡ ⁕
Natural Resource Use‡⁕	Agricultural Chemicals† ‡ ⁕
Governance	
Strengths:	*Concerns:*
Limited Compensation†⁕	Accounting Concern† ‡ ⁕
Ownership Strength† ‡ ⁕	Reporting Quality/ Transparency Concern † ‡ ⁕
Transparency/ Reporting Quality Strength† ‡ ⁕	Other Governance Concerns†⁕
Political Accountability Strength†‡	
Human Rights	
Strengths:	*Concerns:*
Labor Rights Strength† ‡ ⁕	Support for Controversial Regimes⁕
	Labor Rights Concern† ‡ ⁕
	Operations in Sudan⁕
Product	
Strengths:	*Concerns:*
Product Safety & Quality†‡	Advertising & Marketing / Contracting Controversy†
R & D/ Innovation†‡	Antitrust & Anticompetitive Practices†‡
Social Opportunities - Access to Communications†‡	
Social Opportunities - Nutrition and Health†‡	

Figure I: Google Trends' Interest Scores for Sustainability vs Remnant ESG Indicators

This figure shows the plots of average Google Trends' interest over time measures for each month from January 2004 to December 2017. All searches are normalized with respect to the keyword "Charitable Giving" that represents one of the sustainability indicators. For the complete list of keywords used for each of the ESG indicators, see Appendix IV. The indicators whose respective keywords do not appear in Google Trends are omitted from these averages.



* relative to the 'Charitable Giving' keyword.

The list of identified sustainability indicators from ESG dataset is provided in Table I. For the list of all other remaining ESG indicators, refer Appendix I.[4]

Over 80% of the identified sustainability indicators fit in at least two of the three main objective references used to conceptualize the sustainability measurement i.e. a) Rahdari and Rostamy (2015)'s 30 broad construct list (indicated by † in Table I), b) UNGC Guide to corporate sustainability (‡), c) UNCTAD's 2015 Framework for Sustainable Development (⁕). These are accordingly shown in Table I.[5]

2.5. Sustainability versus remnant ESG indicators: The trend

While the criteria employed to demarcate sustainability indicators from the remnant ESG component were carefully chosen to ensure that the selection remains objective, there may be questions about its effectiveness. To mitigate these concerns, I next evaluate these two sets of indicators in terms of their popularity shown in Google search. Ideally, the sustainability-related issues should draw relatively more attention –not only amongst the media but also by people at large– than the other ESG parameters, hence, increasing their relevance to the firms.

[4] For definitions of each of these ESG indicators, refer MSCI ESG KLD STATS: 1991-2014 Data Sets Methodology guide, version: June 2015.

[5] Some of the more recently introduced ESG indicators such as freedom of expression, privacy and data security, biodiversity and different dimensions of climate change such as carbon footprint, energy efficiency etc. were also found to pass these criteria. However, since all these new indicators were only introduced after 2012 and had too many missing values they were dropped from the final list.

The time series of average interest scores of all sustainability indicators is shown against the remnant ESG indicators in Figure I. While 75% of all sustainability indicators had their respective keywords covered by Google Trends, only about 25% of the remnant ESG ones appeared in the same (see Appendix IV for details). As seen in the figure, sustainability issues are almost ten times more popular than other CSR issues across the years on an average. In fact, if the non-appearing indicators (i.e. those whose keywords do not show on the Google Trends) are set to zero, the sustainability interest scores are seen to be 25 times that of remnant ESG averages. This lays credence to my argument that relevance of sustainability issues within the ESG dataset cannot be ignored.

3. Data and methodology

3.1. Empirical approach

The empirical strategy applied to achieve this paper's research objectives is as follows. In the first stage, I identify a robust measure of sustainability using ESG data. This is done using the two-step methodology proposed in Bebchuk et al. (2009). First identifying those indicators which are relevant to sustainability from within the available ESG factors in MSCI dataset (as shown in previous section), and then assessing if the sustainability measure SUS-Index itself is relatively more important subcomponent within the all-in CSP measure. Although there is a considerable amount of literature which has disaggregated broad CSP measures based on ESG dimensions and its underlying strengths and concerns (e.g. Bouslah et al., 2013), the idea of selecting a subset of indicators from the whole lot of available ESG data is largely ignored in the literature. While the influence of sustainability itself is subject to reverse causality, simultaneity and endogeneity, my objective in the first part of analysis is to capture the variability in correlations before drawing inferences on causality. Subsequently, in the second stage, I establish causal relationship between sustainability and firm values using an identification strategy that alleviates any possible endogeneity concerns. In stage three, I run empirical tests to establish the role of corporate governance in the sustainability – performance relationship using the approach suggested in Ferrell et al. (2016) for CSR. In the last stage, I evaluate investment strategies using the developed sustainability measure SUS-Index to capture risk-adjusted returns. Several alternative portfolios and asset pricing models are considered to test the robustness of findings.

3.2. ESG data

In this paper, the sustainability measure and other aspects of corporate social performance are obtained using MSCI (formerly KLD) ESG dataset. My entire sample consists of firm-level data spanning from 1991 to 2015. The sample size covered by MSCI-KLD for the ESG data has expanded from about 650 U.S. companies in 1991 to about 3000 companies in the year 2015. MSCI evaluates these companies on multiple indicators covered under several categories: community, diversity, employees, environment, human rights, governance and product. For

each of these categories, a number of characteristics (i.e. indicators) reflecting the strengths or concerns under each category are represented for their presence (1) or absence (0).[6]

Almost all prior ESG based studies, measure the total number of strengths minus total number of concerns as the CSP measure. I use the same CSP measure as a benchmark to compare the sustainability measure SUS. Some recent papers in ESG literature (e.g. Ng and Rezaee, 2015), measure specific ESG dimensions, i.e. environmental, social and governance, by taking only their respective strengths and concerns to compute individual difference scores for each. However, such sub-division is not preferred here as my objective is not to explore specific ESG dimensions, but instead to identify sustainability measure as a significant component of all-in CSP measure. My final sample consisted of almost 36,000 firm year observations of the CSP and other ESG-based measures.

3.3. The sustainability index and the remnant ESG components index

To compute the sustainability index SUS for each year, I use an approach similar to that used in prior literature employing MSCI ESG data (e.g. Jiao, 2010; Borgers et al., 2013) i.e. taking an aggregate of all the strengths (+) and concerns (–), but using only the sustainability indicators identified in previous section. Additional subcomponents for this index are captured by summing up only the strengths ($SUSstr$) or only the concerns ($SUScon$). In other words, the SUS-Index score is the difference between $SUSstr$ and $SUScon$. This measure is expected to capture the net sustainability improvement (if $SUS > 0$) or deterioration ($SUS < 0$) experienced by a firm in a given year in terms of how it balances all important stakeholders' needs to achieve its triple bottom line objective. For the comparable CSP measure as well, respective strength and concerns subcomponents (i.e. $CSPstr$ and $CSPcon$) are calculated by following all-in approach and including all the ESG indicators.

Since SUS-Index is constructed using a subset of indicators from those used in constructing the CSP measure, I additionally include all the leftover indicators (i.e. those that do not contribute to sustainability), using similar aggregation procedure as before, to create the remnant CSP index score (remCSP). Essentially remCSP is the difference between the net CSP score and the SUS-Index score. If variations in SUS measure captures much of the variations of CSP, the corresponding coefficient for remCSP in my analysis will be expected to largely remain statistically insignificant. This focal criteria forms the base for construct validity tests that I run subsequently. Key attributes of the sustainability measures, CSP measures and remnant CSP are all summarized in Table II Panel A.

3.4. Performance, governance and returns data

The performance variables and firm-level controls are taken from COMPUSTAT annual data, and the monthly stock prices and corresponding returns are provided by Center for Re-

[6] Only the qualitative indicators were used to construct ESG measures. The exclusionary screens that identify controversial business areas such as alcohol, gambling, firearms, military, nuclear power and tobacco are excluded as they are mainly concerns which conceptually do not contribute to CSP or sustainability (Hillman and Keim, 2001).

Table II: Descriptive Statistics for Annual Firm-specific Variables, ESG-based Measures, and Instruments

This table presents the mean, median, standard deviation (SD), extreme values and the total number of observations (N) for all variables used in firm values on ESG regressions. Panel A covers all ESG Based measures. Panel B summarizes key aspects of independent variables and main controls, whereas Panel C shows the main instruments. These variables are computed from MSCI ESG, ISS Governance and COMPUSTAT data. For details on the composition of these variables, see Appendix II.

Panel A: ESG based measures and dimensions

Variables	Mean	SD	Minimum	Median	Maximum	N
SUS	0.280	1.661	-7.00	0.00	13.00	35891
SUSstr	0.965	1.647	0.00	0.00	16.00	35891
SUScon	0.685	1.077	0.00	0.00	10.00	35891
CSP	-0.122	2.407	-11.00	0.00	19.00	35891
CSPstr	1.482	2.307	0.00	1.00	22.00	35891
CSPcon	1.604	1.801	0.00	1.00	18.00	35891
remCSP	-0.401	1.304	-9.00	0.00	8.00	35891
Environment	0.061	0.801	-5.00	0.00	6.00	35891
Social	0.000	1.913	-9.00	0.00	14.00	35891
1. Community	0.085	0.501	-2.00	0.00	4.00	35891
2. Diversity	-0.005	1.235	-3.00	0.00	7.00	35891
3. Employee	0.050	0.953	-4.00	0.00	8.00	35891
4. Human Rights	-0.023	0.272	-3.00	0.00	2.00	35021
5. Product	-0.106	0.587	-4.00	0.00	3.00	35891
Governance	-0.180	0.666	-4.00	0.00	3.00	35891

Panel B: Main Regressors

Variables	Mean	SD	Minimum	Median	Maximum	N
Tobin's Q	2.407	4.279	-23.25	1.89	690.82	35915
SIC Industry Adjusted Tobin's Q	0.429	4.206	-25.81	0.02	688.26	35915
FF48 Industry Adjusted Tobin's Q	0.432	4.194	-26.37	0.02	687.93	35915
E-Index	3.092	1.446	0.00	3.00	6.00	19728
E-Index Dummy	0.677		0.00	1.00	1.00	19728
ROA	0.100	1.769	-120.96	0.11	226.31	36074
Size (Log of Total Assets)	7.512	1.802	-3.82	7.45	14.76	35971
Leverage	0.194	0.210	0.00	0.14	3.68	36074
Volume	18.470	1.616	8.97	18.48	25.67	36061
CAPEX/Total Assets	-3.739	1.454	-12.75	-3.47	-0.19	33129
R&D Expense/Total Sales	-1.170	1.826	-11.42	0.00	10.15	36074
Sales Growth (2 Years)	1.983	44.889	-34.95	1.16	7344.91	35485
Log of Age	5.033	1.039	0.00	5.23	6.48	35870
Delaware Dummy	0.585	0.493	0.00	1.00	1.00	35891

Panel C: Instruments

Variables	Mean	SD	Minimum	Median	Maximum	N
Past Negative Earnings Dummy	0.118	0.322	0.00	0.00	1.00	35891
Industry Average SUS	0.280	0.619	-4.00	0.38	4.00	35891
Industry Average SUSstr	0.965	0.494	0.00	0.91	6.50	35891
Industry Average SUScon	0.685	0.551	0.00	0.53	7.00	35891
Industry Average Tobin's Q	2.828	9.650	-662.24	2.24	139.84	35891
Industry Average E-Index	3.080	0.878	0.00	2.94	5.50	19728

search in Security Prices (CRSP) as available on WRDS. Additional governance data, mainly the Bebchuk et al. (2009) entrenchment index (E-Index), was taken from ISS-Riskmetrics database to assess governance–sustainability–performance relationship, while the Fama-French four factors, five factors (Fama and French, 2016) and Pástor and Stambaugh (2003) liquidity factor were included for analysis concerning abnormal returns.

For first part of analysis, the two datasets i.e. MSCI ESG and COMPUSTAT data were merged together to pool them together into a master unbalanced yearly panel. In subsequent analysis, E-Index was also added from the ISS governance data. For computing monthly portfolio returns and to assess corresponding abnormal returns, the CRSP data was appended to this master panel such that the ESG and performance data remained same in each fiscal year for any given firm. Table II Panels B and C summarize all the independent and control variables (yearly frequency) and the instruments. Correlations matrix for all the main variables is reported in Appendix V.

4. Sustainability and firm values

Numerous studies have demonstrated that ESG-based measures are associated with firm-based performance measures such as Tobin's Q (e.g. Gregory et al., 2016). What I aim to show in this section is that sustainability or SUS explains much of the cross-sectional relationship between firm values and broader measures of corporate social performance such as CSP. Since McGuire et al. (1988), there have been numerous studies that have examined the corporate social performance (CSP) and corporate financial perfomance (CFP) nexus. In recent years, operating performance measures such as return on assets (ROA) and return on equity (ROE) (Wu and Shen, 2013) and firm value proxy Tobin's Q (Jiao, 2010) have been commonly used as a representation for financial performance.

All regression models in this section use Tobin's Q (adjusted for the median 2-digit SIC or Standard Industry Classification Tobin's Q values) as the dependent variable.[7] The main empirical models are either of the following specifications:

$$Q_{j,t} = \alpha_1 + \beta_1 * CSP_{j,t} + \gamma_1 * X_{j,t} + \epsilon_{j,t} \tag{1}$$

or

$$Q_{j,t} = \alpha_2 + \beta_2 * SUS_{j,t} + \delta_2 * remCSP_{j,t} + \gamma_2 * X_{j,t} + \epsilon_{j,t} \tag{2}$$

where $Q_{j,t}$ is the firm j's Tobin's Q value in year t and $X_{j,t}$ are all firm-specific control variables. $CSP_{i,t}$ is the broader kitchen-sink all-inclusive corporate social performance measure that sums up all the ESG strengths (+) and concerns (–) and $SUS_{i,t}$ is the firm j's sustainability index measure constructed by only adding the sustainability-specific strengths (+) and concerns (–) as identified in section 2. When sustainability measures are used, accordingly the leftover

[7] In additional unreported analysis, I run Fama and French (1997) 48 industry adjusted Tobin's Q and do not find any standout differences in any of the results.

ESG strengths and concerns are taken as the remnant CSP score $remCSP_{j,t}$. In other words, equation 2 separates the sustainability component from the overall CSP score used in equation 1, while also controlling for the remaining ESG indicators in $remCSP_{j,t}$. Certain variations of these models break down the $CSP_{i,t}$ and $SUS_{i,t}$ into its constituent strengths (i.e $SUSstr_{i,t}$ and $CSPstr_{i,t}$) and concerns (i.e $SUScon_{i,t}$ and $CSPcon_{i,t}$) to provide additional insights.

Tobin's Q is defined as in Gompers et al. (2003), Bebchuk et al. (2009) and Jiao (2010) among others. Definitions and operationalization of this and other variables is provided in Apendix II. Using empirical evidences and theoretical arguments from prior literature (Bebchuk and Cohen, 2005; Jiao, 2010), the control variables $X_{j,t}$ included the operating performance (using ROA as proxy), firm size (proxied by log of firm's total assets), leverage, liquidity (volume of shares traded), log of capital expenditures/total assets ratio (CAPEXTA), research and development expense ratio (R&D/total sales), log of firm age (in months), 2 year sales growth and Delaware incorporation dummy. One more control variable, insider ownership level and its square (Morck et al., 1988) was also considered but left out from the main results as the Execucomp data on executive ownership has gaps and leads to considerable loss of sample size. However, note that the use of insider ownership produces similar results, albeit much smaller number of observations.

4.1. Corporate social performance versus sustainability

Is much of the association between corporate social performance (CSP) and firm values explained by the sustainability component of the CSP? This is the main question focused in this part of analysis. Multiple variations of equations 1 and 2 are used in CSR and sustainability literature to reflect the cross-sectional variations in Tobin's Q of good ESG score firms versus the poor ESG score firms. I apply ordinary least squares (OLS) and the dynamic OLS as the preliminary models and then two additional variants of the OLS estimation. First, as suggested in Gompers et al. (2003) and Bebchuk et al. (2009), I run annual cross-sectional regressions and then show time-series averages using Fama and MacBeth (1973) method. Second, I run panel regressions to examine how the CSP and SUS-Index truly have an impact on Tobin's Q cross-sectionally (using between-effects estimation) and within firms' across time (using fixed-effects estimation). However, note that the within-firm ESG indicators vary very little over time leading to fixed effects panel estimates being statistically insignificant. In all panel regressions, year and industry dummies are included when required to control for the time trends and industry characteristics.

The OLS and dynamic OLS estimations for Tobin's Q on ESG aggregate scores and the segregated strengths and concerns components are show in Tables III-A and III-B respectively. A significant association is seen with Tobin's Q for both the all-in CSP measure and the newly introduced sustainability score. The sign and magnitude of CSP coefficients are similar to those reported in Jiao (2010) for a smaller sample period between 1992 and 2003. As expected, CSP is seen to have a positive and significant influence on firm values. However, sustainability index seems to be the main driver of this result when CSP is divided into SUS-Index and Remnant

Table III-A: OLS and Dynamic OLS Regressions for Tobin's Q on ESG Aggregated Measures

This table gives the results of running variations of OLS estimation for Tobin's Q on the CSP score and sustainability score (SUS-Index) for the whole sample. When SUS-Index is used as the regressor, additional control for remaining CSP indicators ($remCSP$) is included. Model (1) shows Tobin's Q with the two ESG measures with all the main controls. For details on each of the variables see Appendix II. Models (2) and (3) improve on Model (1) by including additional controls for year fixed effects and industry fixed effects. Model (4) includes the past two years Tobin's Q as regressors in a dynamic OLS for Model (3). Dependent variable is the industry-adjusted Tobin's Q taken as Tobin's Q minus the median Tobin's Q for that industry using SIC 2-digit classification. Coefficients for the constant, year dummies and industry dummies are omitted. Significance levels are represented by *, **, and *** for 10%, 5%, and 1% respectively.

	Model (1)		Model (2)		Model (3)		Model (4)	
CSP	0.0516***		0.0400***		0.0330***		0.0134***	
	(0.004)		(0.004)		(0.004)		(0.003)	
SUS		0.0703***		0.0756***		0.0726***		0.0270***
		(0.006)		(0.006)		(0.006)		(0.005)
Remnant CSP		0.0259***		-0.0127**		-0.0252***		-0.0064
		(0.006)		(0.006)		(0.006)		(0.005)
ROA	-0.0537	-0.0536	-0.0519	-0.0470	-0.0103	-0.0069	-0.6253	-0.6232
	(0.927)	(0.926)	(0.929)	(0.929)	(1.018)	(1.017)	(0.785)	(0.786)
Size	-0.3478***	-0.3499***	-0.3821***	-0.3881***	-0.4703***	-0.4789***	-0.1377***	-0.1412***
	(0.015)	(0.015)	(0.015)	(0.015)	(0.014)	(0.014)	(0.026)	(0.027)
Leverage	-1.0200***	-1.0095***	-1.0076***	-0.9917***	-0.9885***	-0.9684***	-0.3223**	-0.3162**
	(0.132)	(0.132)	(0.133)	(0.133)	(0.146)	(0.146)	(0.150)	(0.149)
Volume	0.3008***	0.2982***	0.3287***	0.3254***	0.3982***	0.3958***	0.0977***	0.0973***
	(0.013)	(0.013)	(0.014)	(0.014)	(0.013)	(0.013)	(0.023)	(0.023)
CAPEX / Assets	0.0174	0.0165	-0.0118	-0.0141	0.1184***	0.1168***	0.0498**	0.0493**
	(0.027)	(0.027)	(0.027)	(0.027)	(0.029)	(0.029)	(0.020)	(0.020)
R & D / Sales	0.0509***	0.0519***	0.0555***	0.0577***	-0.0049	-0.0037	-0.0096	-0.0091
	(0.011)	(0.011)	(0.011)	(0.011)	(0.016)	(0.016)	(0.012)	(0.012)
Sales Growth	0.0003*	0.0003*	0.0003*	0.0003*	0.0003*	0.0003*	0.0001**	0.0001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log of Age	-0.1116***	-0.1126***	-0.1184***	-0.1225***	-0.0850***	-0.0893***	0.0441***	0.0423**
	(0.011)	(0.011)	(0.011)	(0.011)	(0.014)	(0.014)	(0.013)	(0.013)
Delaware Dummy	-0.0284	-0.0273	-0.0403*	-0.0414*	0.0258	0.0248	0.0235	0.0231
	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.019)	(0.019)
Lag 1 Tobin's Q							0.5790***	0.5783***
							(0.070)	(0.070)
Lag 2 Tobin's Q							0.0587**	0.0585**
							(0.028)	(0.028)
Year FE	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	No	No	No	Yes	Yes	Yes	Yes
No. of observations	32569	32569	32569	32569	32569	32569	30827	30827
R-Squared	0.149	0.150	0.162	0.164	0.209	0.211	0.550	0.550

Table III-B: OLS and Dynamic OLS Regressions for Tobin's Q on ESG Strengths and Concerns

This table replicates the results of running variations of OLS estimation shown in Table III-A with the CSP and sustainability strengths and concerns taken separately, instead of the aggregated CSP score and sustainability score (SUS-Index) as the main regressor. When SUS-Index is used as the regressor, additional control for remaining CSP indicators ($remCSP$) is included. All regression models used are the same as those in Table III-A (i.e. 1. Simple OLS, 2. OLS with year fixed effects, 3. OLS with year and industry fixed effects and 4. Dynamic OLS). Dependent variable is the industry-adjusted Tobin's Q taken as Tobin's Q minus the median Tobin's Q for that industry using SIC 2-digit classification. Coefficients for the constant, year dummies and industry dummies are omitted. Significance levels are shown using *, **, and *** for 10%, 5%, and 1% respectively.

	Model (1)		Model (2)		Model (3)		Model (4)	
CSPstr	0.0549***		0.0533***		0.0552***		0.0198***	
	(0.004)		(0.004)		(0.005)		(0.003)	
CSPcon	-0.0467***		-0.0153**		0.0097*		-0.0020	
	(0.005)		(0.007)		(0.006)		(0.004)	
SUSstr		0.0692***		0.0827***		0.0902***		0.0297***
		(0.006)		(0.006)		(0.007)		(0.005)
SUScon		-0.0729***		-0.0552***		-0.0225**		-0.0128*
		(0.009)		(0.010)		(0.008)		(0.007)
Remnant CSP		0.0256***		-0.0112*		-0.0223***		-0.0030
		(0.006)		(0.006)		(0.006)		(0.005)
ROA	-0.0505	-0.0546	-0.0318	-0.0379	0.0151	0.0080	-0.5948	-0.5967
	(0.928)	(0.927)	(0.932)	(0.931)	(1.020)	(1.018)	(0.724)	(0.723)
Size	-0.3510***	-0.3491***	-0.3982***	-0.3946***	-0.5026***	-0.4982***	-0.1037***	-0.1024***
	(0.016)	(0.016)	(0.017)	(0.017)	(0.016)	(0.016)	(0.023)	(0.023)
Leverage	-1.0150***	-1.0107***	-0.9901***	-0.9851***	-0.9452***	-0.9440***	-0.2708**	-0.2700**
	(0.132)	(0.132)	(0.133)	(0.133)	(0.147)	(0.147)	(0.137)	(0.137)
Volume	0.2989***	0.2987***	0.3209***	0.3223***	0.3895***	0.3910***	0.0611**	0.0620**
	(0.013)	(0.013)	(0.013)	(0.013)	(0.012)	(0.012)	(0.019)	(0.019)
CAPEX / Assets	0.0162	0.0168	-0.0181	-0.0164	0.1148***	0.1150***	0.0105	0.0113
	(0.028)	(0.028)	(0.028)	(0.027)	(0.029)	(0.029)	(0.021)	(0.021)
R & D / Sales	0.0516***	0.0517***	0.0588***	0.0592***	-0.0013	-0.0015	0.0146	0.0148
	(0.011)	(0.011)	(0.012)	(0.012)	(0.017)	(0.016)	(0.010)	(0.010)
Sales Growth	0.0003*	0.0003*	0.0003*	0.0003*	0.0003*	0.0003*	0.0001**	0.0001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Age	-0.1126***	-0.1123***	-0.1231***	-0.1245***	-0.0906***	-0.0924***	0.0247**	0.0242**
	(0.011)	(0.011)	(0.011)	(0.011)	(0.014)	(0.014)	(0.010)	(0.010)
Delaware Dummy	-0.0286	-0.0272	-0.0429*	-0.0424*	0.0240	0.0245	0.0016	0.0018
	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.016)	(0.016)
Lag 1 Tobin's Q							0.5940***	0.5937***
							(0.069)	(0.069)
Lag 2 Tobin's Q							0.0629**	0.0627**
							(0.029)	(0.029)
Year FE	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	No	No	No	Yes	Yes	Yes	Yes
No. of observations	32569	32569	32569	32569	32569	32569	30827	30827
R-Squared	0.149	0.150	0.163	0.164	0.211	0.212	0.550	0.550

CSP components with the Models (2) and (3) that introduce year and industry fixed effects incrementally, showing that the coefficients for sustainability are almost twice in magnitude as the CSP coefficients. Remnant CSP scores in these specifications, in fact, contribute negatively to Tobin's Q. Almost all the control variables show expected signs and statistical significance with the dependent variable.

Firm performance proxies are known to be sticky, with past performances associated with current and subsequent performance (Wintoki et al., 2012). To counter this, I introduce a dynamic OLS (Model 4) with past two years Tobin's Q values included as controls. Interestingly, the introduction of dynamism in the OLS estimation takes away the statistical significance of remnant CSP score (constituting indicators that are leftover after sustainability indicators are identified), leaving only the sustainability component contributing significantly to variations in Tobin's Q amongst the ESG sample firms. Additionally, the magnitude of selective SUS-Index remains almost double that of the all-in CSP score as seen in previous models.

Next, I ran tests to assess how the segregated ESG strengths and concerns within these two ESG-based measures get influenced with sustainability indicators identified. As shown before, intuitively and expectedly, ESG-based strengths should positively influence the firm values whereas the ESG concerns will have a negative impact on the same. In table III-B, using the same estimation models as that in table III-A, the coefficients and standard errors for all main regressors are reported. In Models 1 and 2, both the all-in CSP and SUS-Index subcomponents (i.e. strengths and concerns) are shown to reflect statistically significant contributions to Tobin's Q and with expected signs. However, when industry heterogeneity is controlled for in Model 3, the CSP concerns variable shows a positive coefficient. Sustainability measure remains robust for both components nevertheless. In my full model which allows for dynamism, both of the sustainability subcomponents are statistically significant. The all-in CSP concerns subcomponent shows no association with firm values. Also, once again, the dynamic OLS model indicates that remnant CSP indicators are not related to Tobin's Q.

Since antitakeover provisions based corporate governance measures such as the Bebchuk et al. (2009) E-Index that is indicative of managerial entrenchment are not covered in the ESG data used for CSP measures, I subsequently ran robustness tests by including the E-Index as an extra control variable. Matching firms with their E-Index values further reduced the sample size, but the results remain same with minimal changes in coefficients' magnitudes for all the ESG based measures (These results are shown in Appendix V). This shows that the importance of sustainability indicators remains over the other remnant CSP indicators even when governance characteristics are controlled for. All these preliminary tests provide credence against the use of all-in approaches for CSP that sum up all available ESG indicators. The selected sustainability indicators are seen to better reflect the variations in ESG data when studying firm-level outcomes such as Tobin's Q.

Table IV-A: Annual Regressions and Time-Series Averages for Tobin's Q on ESG Aggregated Measures

This table summarizes yearly and time-series average regressions for Tobin's Q on the CSP score and sustainability score (SUS-Index) for the whole sample. When SUS-Index is used as the regressor (Model 2 based on equation 2), additional control for remaining CSP indicators ($remCSP$) is shown. All other control variables are the same as those used in Table III-A. Two industry-adjusted Tobin's Q variations are reported. Main estimation used SIC 2-Digit industry classification to obtain industry-adjusted Tobin's Q calculated as Tobin's Q minus the median Tobin's Q for that industry. As a robustness check, I use industry segregation using Fama and French (1997) 48 industry classification). For each year, only the main regressors coefficients and robust standard errors are shown. Time-series average coefficients and standard errors (using Fama and MacBeth, 1973 methodology) are given at the bottom. *, **, and *** are significance levels for 10%, 5%, and 1% respectively.

Year	# Observations	SIC 2-Digit Industry Adjusted Q			FF 48 Industry Adjusted Q		
		(1)	(2)		(1)	(2)	
		CSP	SUS	$remCSP$	CSP	SUS	$remCSP$
1991	260	0.0320	0.0504	0.0084	0.0174	0.0309	0.0002
		(0.027)	(0.045)	(0.048)	(0.052)	(0.033)	(0.026)
1992	267	-0.0028	0.0162	-0.0296	-0.0013	-0.0139	0.0165
		(0.021)	(0.037)	(0.043)	(0.046)	(0.033)	(0.021)
1993	274	-0.0176	-0.0360	0.0060	-0.0240	-0.0313	-0.0146
		(0.019)	(0.028)	(0.038)	(0.042)	(0.029)	(0.020)
1994	281	-0.0015	0.0121	-0.0181	0.0006	0.0235	-0.0274
		(0.015)	(0.022)	(0.025)	(0.028)	(0.025)	(0.016)
1995	289	0.0156	0.0596**	-0.0417	0.0255	0.0641**	-0.0249
		(0.020)	(0.029)	(0.035)	(0.037)	(0.033)	(0.023)
1996	301	0.0150	0.0799**	-0.0859**	0.0263	0.0753*	-0.0498
		(0.024)	(0.036)	(0.043)	(0.047)	(0.039)	(0.026)
1997	319	0.0446*	0.0775**	-0.0040	0.0509**	0.0684*	0.0252
		(0.025)	(0.035)	(0.045)	(0.044)	(0.035)	(0.025)
1998	326	0.0188	0.0390	-0.0124	0.0116	0.0307	-0.0179
		(0.025)	(0.040)	(0.048)	(0.045)	(0.037)	(0.024)
1999	349	-0.0063	0.0945*	-0.1740**	-0.0197	0.0693	-0.1677**
		(0.038)	(0.051)	(0.071)	(0.069)	(0.053)	(0.038)
2000	377	0.0184	0.0696*	-0.0613	0.0119	0.0540*	-0.0536
		(0.027)	(0.038)	(0.048)	(0.047)	(0.030)	(0.026)
2001	673	0.0155	0.0818***	-0.1033**	0.0101	0.0671**	-0.0920**
		(0.017)	(0.024)	(0.034)	(0.032)	(0.023)	(0.016)
2002	704	0.0055	0.0507***	-0.0808***	0.0030	0.0419**	-0.0712**
		(0.011)	(0.014)	(0.023)	(0.024)	(0.014)	(0.011)
2003	1722	0.0292*	0.1361***	-0.1204***	0.0210	0.1252***	-0.1249***
		(0.015)	(0.023)	(0.029)	(0.029)	(0.023)	(0.015)
2004	2071	0.0616***	0.1499***	-0.0562**	0.0528**	0.1347***	-0.0564**
		(0.018)	(0.024)	(0.028)	(0.027)	(0.024)	(0.018)
2005	2085	0.0494***	0.0992***	-0.0113	0.0435***	0.0895***	-0.0125
		(0.013)	(0.020)	(0.022)	(0.022)	(0.020)	(0.012)
2006	2123	0.0630***	0.0808***	0.0382*	0.0618***	0.0762***	0.0419**
		(0.012)	(0.018)	(0.021)	(0.021)	(0.018)	(0.012)
2007	2145	0.0524***	0.0777***	0.0138	0.0526***	0.0741***	0.0197
		(0.011)	(0.016)	(0.024)	(0.023)	(0.015)	(0.011)
2008	2263	0.0352***	0.0295**	0.0439**	0.0343***	0.0288**	0.0429**
		(0.009)	(0.013)	(0.019)	(0.019)	(0.013)	(0.009)
2009	2304	0.0367***	0.0440***	0.0252	0.0369***	0.0422***	0.0285*
		(0.008)	(0.011)	(0.017)	(0.016)	(0.011)	(0.008)
2010	2383	0.0233**	0.0432***	-0.0065	0.0225**	0.0494***	-0.0179
		(0.008)	(0.013)	(0.018)	(0.018)	(0.013)	(0.008)
2011	2288	0.0299***	0.0435***	0.0058	0.0292***	0.0476***	-0.0034
		(0.007)	(0.012)	(0.018)	(0.018)	(0.012)	(0.007)
2012	2333	0.0589***	0.0861***	0.0137	0.0549***	0.0812***	0.0110
		(0.014)	(0.018)	(0.027)	(0.027)	(0.018)	(0.014)
2013	2133	0.0278**	0.0581**	-0.0052	0.0260**	0.0513**	-0.0015
		(0.012)	(0.022)	(0.025)	(0.024)	(0.022)	(0.012)
2014	2213	0.0667**	0.1412***	-0.0362	0.0598**	0.1347***	-0.0437
		(0.023)	(0.034)	(0.036)	(0.036)	(0.034)	(0.023)
2015	2086	0.1154***	0.1471***	0.0694**	0.0978***	0.1414***	0.0347
		(0.020)	(0.030)	(0.034)	(0.033)	(0.030)	(0.020)
Fama-MacBeth	32569	0.0315***	0.0693***	-0.0249**	0.0282***	0.0623***	-0.0224**
		(0.006)	(0.009)	(0.011)	(0.005)	(0.008)	(0.010)

Table IV-B: Annual Regressions and Time-Series Averages for Tobin's Q on ESG Strengths and Concerns

This table replicates the results of running annual and time-series average regressions shown in Table IV-A with the CSP and sustainability strengths and concerns taken separately, instead of the aggregated CSP score and sustainability score (SUS-Index) as the main regressor. Model 1 based on equation 1 has CSP as main regressor. With SUS-Index as the regressor (Model 2 based on equation 2), additional control for remaining CSP indicators ($remCSP$) is applied. All other control variables are same as before. Similar to Table IV-A, two industry-adjusted Tobin's Q variations are reported (one using SIC 2-Digit industry classification and other using Fama and French (1997) 48 industry classification). For each year, only the main regressors coefficients and robust standard errors are shown. Time-series average coefficients and standard errors (using Fama and MacBeth, 1973 methodology) are given at the bottom. *, **, and *** show the significance levels at 10%, 5%, and 1% respectively.

Year	# Observations	SIC 2-Digit Industry Adjusted Q				FF 48 Industry Adjusted Q			
		(1)		(2)		(1)		(2)	
		$CSPstr$	$CSPcon$	$SUSstr$	$SUScon$	$CSPstr$	$CSPcon$	$SUSstr$	$SUSCon$
1991	260	-0.0252	-0.1024**	-0.0336	-0.1252**	-0.0117	-0.0533	0.0065	-0.0526
		(0.042)	(0.048)	(0.065)	(0.061)	(0.044)	(0.043)	(0.064)	(0.047)
1992	267	-0.0379	-0.0456	-0.0842*	-0.1121**	-0.0364	-0.0469	-0.0969*	-0.0652
		(0.029)	(0.038)	(0.051)	(0.051)	(0.033)	(0.040)	(0.052)	(0.052)
1993	274	-0.0095	0.0292	-0.0567	0.0171	-0.0181	0.0323	-0.0441	0.0197
		(0.035)	(0.044)	(0.058)	(0.048)	(0.037)	(0.046)	(0.054)	(0.048)
1994	281	0.0187	0.0388	0.0294	0.0091	0.0130	0.0221	0.0356	-0.0088
		(0.020)	(0.030)	(0.031)	(0.034)	(0.022)	(0.038)	(0.037)	(0.036)
1995	289	0.0323	0.0185	0.0665*	-0.0465	0.0323	-0.0114	0.0687	-0.0554
		(0.027)	(0.044)	(0.040)	(0.053)	(0.032)	(0.050)	(0.048)	(0.057)
1996	301	0.0170	-0.0104	0.0691	-0.0982**	0.0292	-0.0196	0.0724	-0.0801*
		(0.029)	(0.038)	(0.045)	(0.042)	(0.031)	(0.039)	(0.049)	(0.041)
1997	319	0.0548*	-0.0269	0.0804*	-0.0727	0.0599*	-0.0354	0.0745*	-0.0582
		(0.032)	(0.030)	(0.043)	(0.044)	(0.032)	(0.026)	(0.044)	(0.037)
1998	326	0.0040	-0.0418	0.0092	-0.0957*	-0.0025	-0.0335	0.0106	-0.0691
		(0.032)	(0.032)	(0.048)	(0.049)	(0.031)	(0.029)	(0.045)	(0.044)
1999	349	-0.0041	0.0093	0.0664	-0.1455**	-0.0149	0.0262	0.0534	-0.0983
		(0.047)	(0.061)	(0.066)	(0.070)	(0.047)	(0.058)	(0.068)	(0.069)
2000	377	-0.0158	-0.0618*	0.0169	-0.1977***	-0.0198	-0.0522*	0.0133	-0.1532**
		(0.039)	(0.034)	(0.049)	(0.055)	(0.038)	(0.031)	(0.046)	(0.052)
2001	673	0.0289	0.0026	0.0774**	-0.0931**	0.0279	0.0137	0.0713**	-0.0562*
		(0.023)	(0.023)	(0.030)	(0.036)	(0.022)	(0.020)	(0.029)	(0.032)
2002	704	0.0115	0.0032	0.0448**	-0.0661**	0.0100	0.0070	0.0400**	-0.0470**
		(0.013)	(0.014)	(0.016)	(0.022)	(0.013)	(0.013)	(0.016)	(0.022)
2003	1722	0.0950***	0.0344*	0.1583***	-0.0802**	0.0863***	0.0421**	0.1524***	-0.0571**
		(0.021)	(0.020)	(0.028)	(0.030)	(0.021)	(0.018)	(0.028)	(0.028)
2004	2071	0.1054***	-0.0129	0.1522***	-0.1438***	0.0988***	-0.0016	0.1457***	-0.1055***
		(0.027)	(0.018)	(0.030)	(0.029)	(0.027)	(0.018)	(0.030)	(0.028)
2005	2085	0.0744***	-0.0159	0.1117***	-0.0608**	0.0715***	-0.0061	0.1066***	-0.0367
		(0.016)	(0.017)	(0.022)	(0.027)	(0.016)	(0.015)	(0.023)	(0.025)
2006	2123	0.0909***	-0.0225	0.1051***	0.0094	0.0890***	-0.0224	0.1011***	0.0164
		(0.016)	(0.015)	(0.021)	(0.024)	(0.016)	(0.014)	(0.021)	(0.023)
2007	2145	0.0731***	-0.0217	0.0995***	-0.0156	0.0734***	-0.0218	0.0974***	-0.0080
		(0.013)	(0.017)	(0.017)	(0.024)	(0.012)	(0.017)	(0.017)	(0.023)
2008	2263	0.0402***	-0.0284**	0.0360**	-0.0119	0.0398***	-0.0269**	0.0368**	-0.0070
		(0.011)	(0.013)	(0.015)	(0.021)	(0.011)	(0.013)	(0.015)	(0.021)
2009	2304	0.0447***	-0.0261**	0.0494***	-0.0293*	0.0443***	-0.0271**	0.0483***	-0.0258
		(0.010)	(0.010)	(0.012)	(0.017)	(0.010)	(0.010)	(0.012)	(0.017)
2010	2383	0.0389***	0.0161	0.0531***	0.0124	0.0367***	0.0134	0.0569***	-0.0075
		(0.009)	(0.013)	(0.013)	(0.025)	(0.010)	(0.013)	(0.014)	(0.026)
2011	2288	0.0404***	0.0034	0.0496***	-0.0136	0.0378***	-0.0020	0.0499***	-0.0361
		(0.009)	(0.015)	(0.014)	(0.025)	(0.009)	(0.014)	(0.014)	(0.025)
2012	2333	0.0726***	0.0167	0.1121***	0.0285	0.0669***	0.0117	0.1037***	0.0179
		(0.014)	(0.031)	(0.020)	(0.045)	(0.014)	(0.032)	(0.020)	(0.045)
2013	2133	0.0397**	0.0355	0.0716**	0.0012	0.0380**	0.0373	0.0667**	0.0164
		(0.013)	(0.027)	(0.023)	(0.052)	(0.013)	(0.026)	(0.023)	(0.051)
2014	2213	0.0823***	-0.0076	0.1504***	-0.0513	0.0746**	-0.0037	0.1459***	-0.0267
		(0.025)	(0.032)	(0.035)	(0.071)	(0.025)	(0.032)	(0.035)	(0.068)
2015	2086	0.1337***	-0.0335	0.1617***	-0.0750	0.1103***	-0.0418	0.1478***	-0.1096*
		(0.022)	(0.031)	(0.032)	(0.063)	(0.022)	(0.031)	(0.032)	(0.062)
Fama-MacBeth	32569	0.0402***	-0.0100	0.0639***	-0.0583***	0.0374***	-0.0080	0.0626***	-0.0437***
		(0.009)	(0.007)	(0.013)	(0.012)	(0.008)	(0.006)	(0.012)	(0.009)

4.1.1. Annual regressions

The summary of coefficients obtained using equations 1 (CSP) and 2 (SUS and $remCSP$) for each year are given in Tables VI-A and VI-B for Tobin's Q on ESG aggregate scores, and the segregated strengths and concerns components respectively. For each measure, their corresponding Fama and MacBeth (1973) time-series averages are also reported. Though the time-series averages are statistically significant for both the all-in CSP aggregate score and the selective SUS-Index, the magnitude for sustainability score is roughly twice that of the CSP score with the coefficient for remnant CSP indicators reflecting a possible attenuation effect in CSP. This result is essentially similar to that seen in OLS and dynamic OLS regressions. However, an inspection of yearly cross-sectional coefficients shows that the statistical significance of the remnant CSP indicators' aggregate is largely driven by only 8 of the 25 years within the sample period. In other words, as seen earlier with the dynamic OLS regression model, most of the contribution towards aggregated CSP's association with Tobin's Q is through sustainability indicators, with the remnant indicators showing frequent statistical insignificance. Also, while the aggregate CSP score is significantly related to Tobin's Q for only about half of the sample years, the sustainability score shows significant association with Tobin's Q for 20 of the 25 years in the sample period.

For the ESG strengths and concerns subcomponents in Table IV-B, the Fama-Macbeth average coefficients are similar to the OLS ones, and both the strengths and concerns using sustainability indicators are significantly associated with Tobin's Q. The all-in CSP based subcomponents, meanwhile, shows statistical significance only for the strengths. Moreover, the signs for strengths (+) and concerns (–) are as expected when it comes to sustainability indicators based subcomponents ($SUSstr$ and $SUScon$). Annual regression show similar outcomes as in Table IV-A seen earlier with the sustainability subcomponents accordingly seen to have more years with significant and monotonic (+ for strengths and – for concerns) relationship with firm values than the all-in ESG indicators based CSP subcomponents.

Overall, the results for OLS, dynamic OLS and annual regressions show that most of the variations in all-in CSP scores that drives its relationship with firm values is powered by the sustainability indicators. Even after controlling for time trends, unobserved industry characteristics and past performances, only the sustainability indicators within SUS-Index shows significant and monotonic positive association with Tobin's Q. The leftover indicators and remnant CSP score is not related to firm values and in some model specifications attenuates the CSP – firm values relationship.

4.1.2. Between and within panel estimations

As mentioned before, ESG based aggregated measures exhibit little time series (within firm) variations and as such have relatively lower power to detect a statistically significant relationship using fixed effects estimations. Nevertheless, I run fixed effects regression to see whether the strengths and concerns subcomponents for ESG measures have significant within-firm impacts on Tobin's Q. Table V summarizes the results from both between-firm and within-firm panel

Table V: Between and Fixed Effects Regressions for Tobin's Q on ESG Measures

This table shows the coefficients for between (cross-sectional) effects and fixed effects (within-firm) estimations of equations 1 and 2 by first considering the aggregated measures CSP and SUS and then its respective strengths and concerns subcomponents. Expected signs for the ESG subcomponent variables are shown in parenthesis alongside. All controls are same as used before in tables III and IV. With SUS-Index as the regressor, additional control representing leftover CSP indicators is included. Each column with between and fixed effects models as applied are denoted by BE and FE accordingly. All regressions use industry-adjusted Tobin's Q calculated as Tobin's Q minus the median Tobin's Q for that SIC 2-digit industry. The coefficients for controls variables, constants, year dummies and industry dummies are omitted. Significance levels at *, **, and *** are indicative of 10%, 5%, and 1% respectively.

	BE	FE	BE	FE	BE	FE	BE	FE
CSP	0.0793***	-0.0040						
	(0.016)	(0.005)						
SUS			**0.1650*** **	**0.0069**				
			(0.027)	**(0.008)**				
CSPstr (+)					0.1081***	-0.0092		
					(0.019)	(0.007)		
CSPcon (–)					-0.0270	-0.0045		
					(0.024)	(0.008)		
SUSstr (+)							**0.1750*** **	**0.0004**
							(0.028)	**(0.010)**
SUScon (–)							**-0.1273** **	**-0.0258** **
							(0.045)	**(0.011)**
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	Yes	No	Yes	No	Yes	No	Yes
# Observations	32569	32569	32569	32569	32569	32569	32569	32581
R-Squared	0.223	0.110	0.226	0.110	0.224	0.110	0.226	0.104
# Groups	4071	4071	4071	4071	4071	4071	4071	4073

regressions using the aggregated ESG scores i.e. all-in CSP score and the selective SUS-Index, and the segregated strengths and concerns subcomponents for each of these.

The between effects panel regression coefficients show the effect of independent variables as they change between the sample firms, while the fixed effects coefficients reflects the changes on outcome variable when the independent variable changes within the firm. In previous analysis, I use pooled OLS regressions that effectively combines the between and within variations. If the coefficients of OLS estimates are similar in magnitude to the between estimators and the estimation for fixed effects gives considerably lower or statistically insignificant values, it would indicate that most of the variation in Tobin's Q is driven by cross-sectional variance. By comparing Tables V and III-A for the coefficients of ESG aggregated measures i.e. CSP and SUS-Index Regressions, it is seen that between-firm estimates are much larger than the simple OLS estimates. The results are identical for each of the two strengths and concerns subcomponents as well. With sustainability indicators, however, the fixed effects estimator does pick

some significant downside effect on Tobin's Q for sustainability concerns. It is seen that with firm-specific heterogeneous characteristics controlled for, sustainability concerns can negatively influence an average firm's value over time. The same cannot be said for sustainability strengths or the overall SUS-Index.

4.2. Exploring causality

While the previous inferences do indicate that sustainability and its subcomponents are more powerful part of CSP when it comes to explaining the CSP – firm values relationship, all of the reported analysis so far is hounded by severe endogeneity problems. To overcome these endogeneity concerns and draw causal inferences, in this section, I run additional analysis first using instrumental variables, and then applying simultaneous equations approach.[8]

4.2.1. Instrumental variables

Using instrumental variables that are solely related to sustainability measures and are largely exogenous to firm values, I aim to show that causal inferences can be drawn for the sustainability – firm values relationship. Some studies in CSR literature employ variables such as the firm age as an instrument for ESG based measures (Jo and Harjoto, 2011). However, it has been shown that growth opportunities and firm values decline as firms grow older (Loderer and Waelchli, 2010) and the same is observed with firm age included as control variable in previous results.

Using inputs from Jiao (2010) and El-Ghoul et al. (2011), I identify two instruments for sustainability.[9] As the first instrument, I introduce the industry average SUS-Index score using the SIC 2-digit industry classification. Prior literature has extensively used the average scores and measures based on close industry peers as instrumental variables (IVs) for ESG based measures (El-Ghoul et al., 2011; Cheng et al., 2014; Jha and Cox, 2015; Ferrell et al., 2016). While the firm's CSR and sustainability initiatives do get affected by the same-industry peer, there is no reason to expect industry initiatives and policies to directly influence individual firm's value. The second instrument is in the form of a dummy variable that indicates if the firm made losses last year (or its reported earnings were negative). Relevance and exogeneity for past negative earnings as an instrument can be established by the fact that a loss-making firm is less likely to take up additional sustainability initiatives in the very next year, and yet there is no rationale to believe that a past negative earning should directly influence the firm's current value or Tobin's Q.

As shown in Table VI-A the F-stats for first-stage of two-stage least squares (2SLS) estimation are much greater than the Stock and Yogo (2005) recommended cutoff of 10 indicating that instruments are not weak. For both SUS-Index and its strengths and concerns subcomponents, the hypothesis for joint validity of the used instruments (i.e. Hansen-Sargan test) is

[8] By using common IVs identified from prior literature, relevance and exogeneity requirements are ensured.

[9] Note that both Jiao (2010) and El-Ghoul et al. (2011) use the instruments for aggregate CSP measures. But, since the SUS-Index is just a subcomponent of overall CSP, I assume and reason that same instruments must be valid in current setting.

Table VI-A: Instrumental Variable Regressions for Tobin's Q on Sustainability Measures

This table gives the results for two-stage least-squares (2SLS) IV regressions using the SIC 2-digit Industry average sustainability score and last year negative earnings dummy as instruments. The estimations of equations 1 and 2 are done separately as shown by first considering the aggregated measure SUS with firm's corresponding industry mean SUS as IV and then its respective strengths and concerns subcomponents with respective industry mean strengths and concerns as the IVs. Expected signs for the ESG subcomponent variables are shown in parenthesis alongside. All controls are as before along with a control representing remnant CSP indicators. Dependent variables are shown on top to indicate first/second stage of the 2SLS estimations. Tobin's Q is industry adjusted as Tobin's Q minus the median Tobin's Q for that SIC 2-digit industry. Standard errors reported in parenthesis are clustered by firms. The coefficients for constants are omitted. Additional test statistics for IV estimation is given at the bottom of the table. Significance levels at *, **, and *** are indicative of 10%, 5%, and 1% respectively.

	Sustainability Aggregate		Sustainability Subcomponents		
	DV=SUS	DV=Tobin's Q	DV=SUSstr	DV=SUScon	DV=Tobin's Q
SUS		**0.1491*** (0.023)**			
Industry Avg. SUS	0.8891*** (0.026)				
Past Negative Earnings	-0.0678* (0.036)		0.0959** (0.036)	0.1589*** (0.022)	
SUSstr (+)					**0.1808** (0.060)**
SUScon (−)					**-0.1312*** (0.032)**
Industry Avg. SUSstr			0.7368*** (0.041)	-0.1223*** (0.024)	
Industry Avg. SUScon			-0.0101 (0.024)	0.9004*** (0.022)	
Remnant CSP	0.3392*** (0.019)	-0.0045 (0.012)	0.2034*** (0.021)	-0.1340*** (0.012)	-0.0073 (0.015)
ROA	0.2085** (0.097)	-0.0677 (0.973)	0.1254 (0.100)	-0.0742* (0.042)	-0.0573 (0.985)
Size	0.1161*** (0.016)	-0.3612*** (0.020)	0.2958*** (0.018)	0.1775*** (0.011)	-0.3745*** (0.033)
Leverage	-0.5801*** (0.081)	-0.9531*** (0.186)	-0.7630*** (0.088)	-0.1819*** (0.044)	-0.9251*** (0.180)
Volume	0.1508*** (0.017)	0.2876*** (0.017)	0.2176*** (0.018)	0.0670*** (0.008)	0.2792*** (0.019)
CAPEX / Assets	0.0335** (0.011)	0.0149 (0.026)	0.0527*** (0.012)	0.0162** (0.007)	0.0110 (0.031)
R & D / Sales	-0.0061 (0.012)	0.0545*** (0.013)	-0.0497*** (0.011)	-0.0422*** (0.008)	0.0578*** (0.017)
Sales Growth	0.0000 (0.000)	0.0003* (0.000)	-0.0001 (0.000)	-0.0001** (0.000)	0.0003* (0.000)
Age	0.0807*** (0.017)	-0.1180*** (0.019)	0.1119*** (0.016)	0.0294** (0.010)	-0.1234*** (0.023)
Delaware Dummy	-0.0708 (0.047)	-0.0182 (0.044)	-0.0282 (0.049)	0.0438* (0.027)	-0.0175 (0.044)
# Observations	32569	32569	32569	32569	32569
R-Squared	0.271	0.196	0.343	0.389	0.193
First stage F-stat	164.33		65.09	158.54	
Cragg-Donald F-statistic		2263.38			707.76
Sargan-Hansen test (p-value)		0.3783			0.3310

not rejected and all the reported Cragg-Donald F-test stats are well greater than the critical values supporting the IVs' relevance. All inferences from IV estimations support the results seen previously using the OLS, dynamic OLS and between-effects models. In fact, the magnitudes for both SUS-Index and its strength and concerns components following 2SLS estimation is very similar to the between-effect estimates seen earlier. The corresponding signs for strengths (+) and concerns (–) are also as expected. Additionally, the causal estimates from 2SLS, once again, show that the remaining CSP indicators ($remCSP$) do not contribute to the firm values.

4.2.2. Simultaneous equations

While relevance of the IVs used in the previous section were tested, it is difficult to establish whether the exclusion restriction is met (Roberts and Whited, 2012). Besides, the role that managers play in balancing the stakeholders' and shareholders interests to further the firm's sustainability objectives, cannot be ignored. Hence, to further test the robustness of the causal inferences drawn above, I include additional managerial entrenchment variable (E-Index) as endogenous factor to apply a system of three simultaneous equations (see Bhagat and Bolton, 2008 for methodological details) specified as follows:

$$Firm\,Values = f_1(Sustainability, Entrenchment, X_1, \epsilon_1) \tag{3a}$$

$$Entrenchment = f_2(Sustainability, Firm\,Values, X_2, \epsilon_2) \tag{3b}$$

$$Sustainability = f_3(Entrenchment, Firm\,Values, X_3, \epsilon_3) \tag{3c}$$

where X_i represents control variables vector and all instruments that are related to each of the endogenous variables. The error terms for each equation is given by ϵ_i that covers all exogenous firm characteristics that effect each of the dependent variables.

I run this simultaneous equations model (SEM) using both 2SLS and three-stage least squares (3SLS) estimations to explore endogeneity and causality. For equations 3a and 3b, all the firm-specific controls remain the same as before. For equation 3c, the remnant CSP scores are dropped as there is no dependency expected of it on the sustainability measure SUS-Index. For the SEM analysis used to test sustainability subcomponents $SUSstr$ and $SUScon$, equation 3c is divided into two separate sub-equations with each representing the strengths and concerns.

Results for these simultaneous equations are given in Table VI-B. As in case of IV estimation, Stock and Yogo (2005) test confirms that the instruments are not weak. The Hausman test statistics differ for SUS-Index based model from that seen for its subcomponents. While there is no difference in the 2SLS and 3SLS estimates for the aggregate sustainability measure, Hausman test shows that 3SLS estimates should be prefered for sustainability strengths and concerns. Much of the inferences remain the same as seen in IV regressions. Change in sustainability component of CSP causes the changes in Tobin's Q while remaining CSP indicators are not relevant, and both sustainability strengths (+) and concerns (–) are important causal factors influencing Tobin's Q.

Table VI-B: Simultaneous Equation Modeling for Tobin's Q on Sustainability Measures

This table gives the results for both two-stage (2SLS) and three-stage (3SLS) least squares for simultaneous equations 3a, 3b and 3c where the endogenous variables SUS-Index, Tobin's Q and E-Index are instrumented using their respective SIC 2-digit Industry averages. For the sustainability subcomponents equations, the equation 3c is divided into two sub-equations. For simplicity, all controls used for Tobin's Q regressions as before are retained in all the three main simultaneous equations. The control variable representing remnant CSP indicators is dropped when sustainability measure (aggregate or its subcomponents) is the dependent variable. Model used i.e. 2SLS or 3SLS are shown on top. Tobin's Q is industry adjusted as Tobin's Q minus the median Tobin's Q for that SIC 2-digit industry. Standard errors are reported in parenthesis. The coefficients for constants and all additional controls are omitted. All requisite 2SLS vs 3SLS statistics are given at the bottom of table. Significance at 10%, 5%, and 1% are indicated by *, **, and *** respectively.

	Sustainability Aggregate		Sustainability Subcomponents	
	2SLS	3SLS	2SLS	3SLS
SUS	.0814***	.0794***		
	(0.015)	(0.000)		
SUSstr (+)			.1798***	.1652***
			(0.015)	(0.015)
SUScon (–)			-.0272	-.2380***
			(0.017)	(0.015)
Remnant CSP	-0.0064	0.0000	0.0000	0.0000
	(0.008)	(0.000)	(0.000)	(0.000)
E-Index	-.0405***	-.0505***	-0.0300***	-.0456***
	(0.009)	(0.000)	(0.009)	(0.000)
# Observations	18428	18428	18428	18428
R-Squared	0.307	0.307	0.266	0.264
Min. first stage F-stat	550.30	550.30	586.13	586.13
Hausman 2SLS vs 3SLS stat	1.83	p = 0.999	291.91	p = 0.000

4.3. Individual ESG components: The sustainability indicators

While the overall sustainability score is seen to significantly influence firm values, each of the sustainability indicators by themselves may not necessarily be contributing to this relationship. To explore this, I run additional regressions to study the association between each of the 52 sustainability indicators and Tobin's Q.[10] My focus is on ensuring that each sustainability indicator is not considered in isolation, so as to see whether it impacts firm values even after controlling for other ESG indicators. The regression model employed here is a simple alteration of equation 2, with each sustainability indicator replacing SUS variable and the remaining CSP composite score (excluding that focal indicator) replacing the $remCSP$ variable. All the control variables X remain the same, with additional year fixed effects included to isolate any time-trends.

Table VII summarizes the relationship between each of the 52 sustainability indicators and Tobin's Q. Panel A covers all the 32 sustainability strength indicators which ideally should have a positive effect on Tobin's Q as they represent the sustainability-related initiatives undertaken in the sample firms. Panel B, on other hand, has all 20 sustainability concerns which are expected

[10] These regressions follow the approach shown in Bebchuk et al. (2009) where the contributions of individual entrenchment provisions were isolated after controlling for other antitakeover provisions.

Table VII: Sustainability Indicators and Tobin's Q

This table summarizes coefficients and corresponding robust standard errors (given in parenthesis) when each of the individual sustainability indicators are regressed with Tobin's Q. All standard controls are retained. Additionally, the sum total of all remaining strengths (+) and concerns (–) is included to control for remaining ESG characteristics. Tobin's Q is industry adjusted as Tobin's Q minus the median Tobin's Q for that SIC 2-digit industry. Year fixed effects were included to control for time-trends. For each indicator, whence the coefficients have expected signs i.e. (+) strengths and (–) concerns, they are highlighted in bold. Significance levels 10%, 5%, and 1% are indicated by *, **, and *** respectively.

Panel A: Sustainability Strength Indicators

Community	Support for Housing	Support for Education	Non-US Charitable Giving	Community Engagement			
	0.2974* **	**0.2609*** **	**0.2395*** **	**0.1117* **			
	(0.051)	**(0.065)**	**(0.087)**	**(0.071)**			
Diversity	CEO Diversity	Board of Directors - Gender Diversity	Work-Life/ Family Benefits	Women & Minority Contracting	Employment of the Disabled	Progressive Gay/Lesbian Policies	Employment of Under-reperesented Groups
	-0.1503***	**0.0752* **	**0.0790* **	**0.0976** **	**0.1398* **	**0.0472 **	**0.1216** **
	(0.051)	**(0.041)**	**(0.046)**	**(0.041)**	**(0.085)**	**(0.033)**	**(0.061)**
Employees	Employee Involvement	Strong Retirement Benefits	Employee Health & Safety	Supply Chain Labor Standards	Compensation & Benefits	Human Capital Management/ Developments	Other Employees Strength
	0.1376* **	**0.0553* **	-0.0874***	**0.0571 **	**0.1711** **	**0.3353*** **	**0.0986** **
	(0.035)	**(0.032)**	(0.029)	**(0.077)**	**(0.069)**	**(0.092)**	**(0.043)**
Environment	Beneficial Products & Services	Pollution Prevention/ Waste Management	Climate Change/ Alternative Fuels/ Clean Energy	Environmental Management Systems	Natural Resource Use		
	-0.1428***	-0.17966***	**0.0407* **	-0.2417***	**0.5732** **		
	(0.040)	(0.035)	**(0.029)**	(0.033)	**(0.291)**		
Governance / Human Rights	Limited Compensation	Ownership Strength	Transparency/ Reporting Quality Strength	Political Accountability Strength			Labor Rights Strength
	0.1912* **	**0.4690*** **	-0.0706*	**0..2447*** **			-0.5351***
	(0.033)	**(0.247)**	(0.040)	**(0.117)**			(0.126)
Product	Product Quality & Safety	R&D / Innovation	Social Opp. Access to Communications	Social Opp. Nutrition & Health			
	0.0761 **	**0.4241*** **	**1.0071*** **	**0.0009 **			
	(0.037)	**(0.090)**	**(0.356)**	**(0.229)**			

Panel B: Sustainability Concern Indicators

Community	Tax Disputes	Other Community Concerns					
	0.1230**	0.3065***					
	(0.051)	(0.064)					
Governance / Diversity	Accounting Concern	Reporting Quality/ Transparency Concern	Other Governance Concerns				Board Diversity - Gender
	-0.1819* **	0.0074	**-0.1235*** **				**-0.0788** **
	(0.047)	(0.050)	**(0.032)**				**(0.035)**
Employees	Health & Safety Concern	Workforce Reductions	Child Labor	Other Concerns/ Labor-Management Relations			
	**-0.0171 **	**-0.6513*** **	0.5987***	**-0.1087*** **			
	(0.021)	**(0.097)**	(0.243)	**(0.031)**			
Environment	Hazardous Waste	Regulatory Compliance	Ozone Depleting Chemicals	Toxic Spills Emissions	Agricultural Chemicals		
	-0.2203* **	**-0.0477* **	**-0.7861*** **	**-0.0755*** **	**-0.4768*** **		
	(0.056)	**(0.033)**	**(0.104)**	**(0.031)**	**(0.085)**		
Human Rights	Support for Controversial Regimes	Labor Rights Concern	Operations in Sudan (2010 - 2011)				
	0.4998***	**-0.1316** **	1.2106***				
	(0.095)	**(0.056)**	(0.243)				
Product	Advertising & Marketing/ Contracting Controversy	Antitrust & Anticompetitive Practices					
	0.0564*	0.1348***					
	(0.035)	(0.035)					

to have negative association with firm values. Out of the 52 sustainability indicators, it is seen that only 5 indicators have no statistically significant relationship with Tobin's Q at 10% level. Of these, three are strengths and the remaining two concerns. This result is important because it shows that management cannot take for granted that all sustainability initiatives or controversies may be value-impacting. While, the overall sustainability performance (SUS) itself and its two strength and concern components do influence the firm values, there are some component indicators that have no value enhancing or diminishing effect.

Furthermore, while more than 75% of the strength indicators have positive influence on firm values, only 60% of the concerns seem to be negatively associated with the same. This finding, however, has to be interpreted with caution. Although, in general, sustainability strengths and concerns are expected to have positive and negative associations respectively with firm values, the presence of opposite association may still be influential. For example, if most of the sustainability strengths as well as concerns under community category were negative, there would still be a net positive influence of the community dimension of sustainability on the firm values, as long as the negative impact of concerns is lower than that of the strengths (so that the differential effect remains).

5. Sustainability, corporate governance and firm values

The effect of CSR on governance – firm value relationship has been explored in the extant literature through numerous empirical works (e.g. Jo and Harjoto, 2011). In a recent study, Ferrell et al. (2016) show that the negative association between managerial entrenchment and Tobin's Q gets attenauted with more CSR initiatives. With the sustainability measure introduced as a subset of CSP, there is a need to see if similar attenuation is seen in present setting. Thus, in this section, I explore similar triadic relationship, but using sustainability and its subcomponents in place of CSR to see how they affect the entrenchment - firm value relationship.

The models applied here are an extension of equations 1 and 2 used earlier, but with E-index (Bebchuk et al., 2009) included as an additional control.[11] To test robustness of the entrenchment measure itself, I also consider an E-Index dummy that represents high entrenchment when E-Index is greater than or equal to the median E-Index value of 3 (Model 2). For understanding the moderating role that sustainability may play in the corporate governance – firm value relationship, an interaction term for each of the sustainability aggregate measure and its respective subcomponents is included in the regressions. All control variables are the same as those used earlier.

In Table VIII, the coefficients for both the raw E-Index (scale 0 to 6) and the E-Index dummy representing highly entrenched firms are negative regardless of whether the composite SUS-Index or its subcomponents along with the corresponding interactions are used. This shows that managerial entrenchment is associated with lower firm values. This result supports previous

[11] The E-Index was not introduced in previous results as the data for E-Index is limited, which would have almost halved the sample size. However, inclusion of E-Index does not change any of the reported results.

Table VIII: Sustainability, Managerial Entrenchment and Tobin's Q

This table shows the results for both SUS-Index and separate sustainability strengths and concerns when they are interacted with the E-Index (Bebchuk et al., 2009). All control variables along with remnant CSP scores are the same as used in initial Table III specifications. Model (1) uses raw E-Index scores (scale of 0 to 6), while Model (2) segregates E-Index using a dummy coded as 1 for high entrenchment firms with E-Index greater than or equal to 3. Tobin's Q is industry adjusted as Tobin's Q minus the median Tobin's Q for that SIC 2-digit industry. Standard errors are given in parenthesis for each coefficient. The coefficients for constants and all control variables are left out. Significance at 10%, 5%, and 1% are shown with *, **, and *** respectively.

	Sustainability Aggregate		Sustainability Subcomponents	
	Model (1)	Model (2)	Model (1)	Model (2)
SUS	0.0544***	0.0478***		
	(0.009)	(0.007)		
E-Index	-0.0608***	-0.1587***	-0.0653***	-0.1703***
	(0.006)	(0.017)	(0.007)	(0.022)
SUS * E-Index	-0.0057**	-0.0143*		
	(0.003)	(0.008)		
SUSstr			0.0515***	0.0470***
			(0.009)	(0.007)
SUScon			-0.0660***	-0.0531***
			(0.013)	(0.010)
SUSstr * E-Index			-0.0048*	-0.0122
			(0.003)	(0.008)
SUScon * E-Index			0.0093**	0.0242**
			(0.004)	(0.011)
# Observations	18428	18428	18428	18428
R-Squared	0.407	0.407	0.407	0.407

literature that has studied similar relationship (Bebchuk et al., 2009; Bebchuk and Cohen, 2005; Ferrell et al., 2016). Sustainability is seen to positively influence firm values, consistent with previous results, and the respective sustainability strengths and concerns have expectedly positive and negative effects on Tobin's Q even after controlling for managerial entrenchment.

Additionally, sustainability seems to be a value-enhancing factor for low entrenchment firms. This result is opposite to that shown in Ferrell et al. (2016) for CSR. The coefficient for interaction terms using both E-Index and its dummy are negative and statistically significant. This results is not puzzling because it essentially shows that sustainability does not compete with good governance and the introduction of sustainability initiatives within highly entrenched firms would merely reduce the firm values further. This result is also important because it signifies the potential agency problems that sustainability policies may drive within a focal firm that is already highly entrenched. However, these coefficients need to be interpreted with caution as the simple OLS model with interaction terms employed here is subject to endogeneity problems. With difficulties in identifying instruments for interaction terms or potential exogenous shocks to alleviate the same, causality remains elusive in such settings.

6. Sustainability and stock returns

Despite the superior explanatory power for sustainability component over the all-in CSP measure captured from ESG data, the big question remains: can investors benefit from such sustainability measures? Do sustainable firms have potential to create superior abnormal returns for socially responsible investors? This potential would essentially exist if market participants fail to learn the difference between the more sustainable firms and the less sustainable ones (Galema et al., 2008; Borgers et al., 2013). Similar reasoning is echoed for portfolios that bet on differences in firm's corporate governance as well (Bebchuk et al., 2013).

Several studies exploring the relationship between abnormal returns and ESG based measures have used the Carhart (1997) four-factor model to compute risk-adjusted returns (Galema et al., 2008; Humphrey et al., 2012; Borgers et al., 2013). I used the same four factors, but replace the Carhart (1997) momentum factor by the Fama-French momentum factor. The ESG based measures are known to be related to corporate governance measures (Jo and Harjoto, 2012) and the same is seen for sustainability part of ESG as well using E-Index in the previous section. Governance, meanwhile, has been examined for its impact on stock market liquidity (e.g. Chung et al., 2010). For this reason, I additionally include Pástor and Stambaugh (2003) liquidity factor in the asset pricing model specification to compute risk-adjusted returns:

$$R_t = \alpha + \beta_1 * RMRF_t + \beta_2 * SMB_t + \beta_3 * HML_t + \beta_4 * MOM_t + \beta_5 * LIQ_t + \epsilon \qquad (4)$$

where α measures the abnormal returns or risk-adjusted returns. The excess returns over risk-free rate for each portfolio in month t is given by R_t. $RMRF_t$, SMB_t, HML_t along with MOM_t represents the three standard Fama and French (1993) factors measuring excess market returns, size, book-to-market, and additional momentum factor respectively for each month t. LIQ_t is the Pástor and Stambaugh (2003) value-weighted traded liquidity factor for same month.[12]

Borgers et al. (2013) show using an all-in ESG measure called *stakeholder index* that the positive risk-adjusted returns for such an index-based hedge existed only from 1992 to 2004, with the subsequent years showing that such abnormal or risk-adjusted returns have disappeared.[13] Nevertheless, the ESG criteria and ESG-based screens have been increasingly employed by institutional investors even in recent years. These investors largely rely on third party ESG composite ratings or specific social, environmental or other ratings. I aim to show that investors can benefit by using more focused and conceptually rich measures derived from ESG than the commonly used ESG aggregate measures such as CSP shown before. Using indicators that were identified by UN introduced sustainable investment programs (through UNPRI, UNCTAD and other related agencies), the SUS-Index should potentially have profitable investment opportunities that are otherwise neglected.

[12] The recent Fama and French (2016) five-factor model with investment and profitability factors was not applied for main results because, the use of these additional factors merely makes the book-to-market factor HML_t redundant.

[13] Borgers et al. (2013) show the disappearing abnormal returns only for the subsequent 4 years after 2004.

Sustainability portfolios: To test if investment strategies can be made using sustainability measure, I created portfolios using the extreme SUS-Index scores. This was done by first dividing the sample each year in unequal-sized pentiles based on their sustainability scores. Similar portfolio construction has been used in prior literature for measuring abnormal returns on hypothetical hedge portfolios for various CSR based measures (Galema et al., 2008; Humphrey et al., 2012; Borgers et al., 2013) as well as for corporate governance based ones (Gompers et al., 2003; Bebchuk et al., 2009; Giroud and Mueller, 2011). Using the nomenclature shown in Bouslah et al. (2013), I name the first 'Pentile 1' portfolio as "Toxic" portfolio made up of unsustainable firms and last 'Pentile 5' as "Green" portfolio that includes all highly sustainable firms as indicated by high SUS-Index scores.

To understand how such portfolios work, similar investment strategy may be replicated for real-time application as follows. For each year, MSCI releases the ESG data for sample firms. Based on this data, using the sustainability indicators, investors identify the SUS-Index scores for each firm in that year. Accordingly, the stocks of these firms are ranked as per their sustainability performance. Investors then go long on the high sustainability firms and short sell the stocks of low sustainability firms in the beginning of the year. Holding period is assumed to be one year. At the end of this year, MSCI releases new ESG data and the same is used to generate new SUS-Index scores and accordingly re-balance the hedge portfolio.

After sorting the firms according to their SUS-Index scores for each year, the Toxic firms were grouped as those which have SUS-Index scores less than or equal to -2. On the other hand, firms with SUS-Index scores more than or equal to +2 were classified as Green firms. Firms corresponding to the scores of -1, 0 and +1 formed the remaining three pentiles. While the cross-sectional distribution of the sustainability scores does vary over time, the extreme portfolios criteria is largely seen to be consistent. For this reason, the cutoffs are held constant throughout the sample period.

Alternative portfolios: As a means of robustness test, I use portfolio selection criteria used in Galema et al. (2008) where strength screening is taken as a separate group from the concern screened stocks. This is done by creating three unequal-sized portfolio terciles that represent a) Green stocks that have more sustainability strengths than concerns (SUS-Index$\geq$+1), b) Toxic stocks that have more sustainability concerns than strenths (SUS-Index$\leq$-1) and c) neutral stocks (SUS-Index=0).

Results. Table IX shows the outcomes when the asset pricing model given in equation 4 is run for the two extreme portfolios' and the long Green - short Toxic hedge portfolio's monthly excess returns. Panel A applies the pentile portfolio classification while Panel B uses terciles. As seen in the table, equal-weighted portfolios for both these portfolio classifications allow for sustainability based risk-neutral hedge. With equal-weighted monthly portfolio returns, Green stocks consistently outperform the markets (positive and significant α) represented using the five factors whereas Toxic stock portfolio does not beat the market as abnormal returns are not statistically significant or different from zero. In contrast, the value-weighted portfolios using

Table IX: Abnormal Returns Using Extreme Sustainability Portfolios

The results for a five-factor regression using Fama and French (1993) factors capturing market ($RMRF$), size (SMB) and book-to-market (HML) along with the Fama-French momentum factor (MOM) and Pástor and Stambaugh (2003) liquidity factor (LIQ) are shown in this table. Panel A uses pentile portfolio classification with $SUS - Index \leq -2$ (Toxic) and $SUS - Index \geq +2$ (Green) forming the two extreme portfolios. Tercile portfolios use $SUS - Index \leq -1$ (Toxic) and $SUS - Index \geq +1$ (Green) as cutoffs. The alphas and other factor coefficients are shown for both equal-weighted and value-weighted portfolios. Portfolios are rebalanced in the beginning of each year. White (1980) robust standard errors are shown in parenthesis. For each set of extreme portfolios, the corresponding differential hedge portfolio (long Green – short Toxic) is also shown. Significance at 10%, 5%, and 1% are indicated by *, ** and *** respectively.

Panel A: Pentile Portfolios							
Portfolios	α	$RMRF_t$	SMB_t	HML_t	MOM_t	LIQ_t	R^2
Equal-weighted							
Green	0.0027***	0.9797***	0.1803***	0.3564***	-0.1605***	-0.0021	0.931
	(0.001)	(0.021)	(0.033)	(0.029)	(0.027)	(0.018)	
Toxic	-0.0003	1.0321***	0.1536**	0.6472***	-0.1499**	0.1075**	0.784
	(0.002)	(0.048)	(0.063)	(0.075)	(0.061)	(0.047)	
Green – Toxic Hedge	**0.0030****	-0.0524	0.0267	-0.2908***	-0.0105	-0.1096**	0.101
	(0.002)	(0.048)	(0.058)	(0.070)	(0.052)	(0.045)	
Value-weighted							
Green	0.0069***	0.9715***	-0.1966***	-0.1055**	-0.0651**	-0.0371	0.893
	(0.001)	(0.024)	(0.044)	(0.039)	(0.023)	(0.024)	
Toxic	0.0067**	0.9228***	-0.1997***	0.3417**	-0.0202	-0.0031	0.447
	(0.003)	(0.061)	(0.059)	(0.156)	(0.064)	(0.121)	
Green – Toxic Hedge	0.0002	0.0487	0.0031	-0.4473**	-0.0449	-0.0340	0.070
	(0.003)	(0.069)	(0.080)	(0.164)	(0.071)	(0.126)	
Panel B: Alternative Tercile Portfolios							
Portfolios	α	$RMRF_t$	SMB_t	HML_t	MOM_t	LIQ_t	R^2
Equal-weighted							
Green	0.0022**	0.9918***	0.2127***	0.4056***	-0.1591***	0.0256	0.932
	(0.001)	(0.020)	(0.038)	(0.031)	(0.026)	(0.017)	
Toxic	-0.0003	1.0136***	0.2625***	0.6660***	-0.1981***	0.0982**	0.850
	(0.001)	(0.038)	(0.055)	(0.066)	(0.054)	(0.038)	
Green – Toxic Hedge	**0.0026****	-0.0218	-0.0498	-0.2604***	0.0390	-0.0726**	0.159
	(0.001)	(0.033)	(0.044)	(0.053)	(0.038)	(0.033)	
Value-weighted							
Green	0.0069***	0.9775***	-0.1887***	-0.0325	-0.0449**	-0.0245	0.932
	(0.001)	(0.019)	(0.036)	(0.032)	(0.021)	(0.018)	
Toxic	0.0067***	0.9182***	-0.1222**	0.3611**	-0.0502	0.0082	0.637
	(0.002)	(0.043)	(0.042)	(0.112)	(0.046)	(0.083)	
Green – Toxic Hedge	0.0001	0.0593	-0.0665	-0.3937***	0.0053	-0.0327	0.109
	(0.002)	(0.048)	(0.063)	(0.117)	(0.053)	(0.087)	

Table X: Monotonic Relationship between Sustainability and Returns for Equal-Weighted Porfolios

The alphas and mean excess returns are shown using equal-weighted pentile and tercile portfolios in this table. The portfolios get rebalance with new data availability in the beginning of each year. Monthly portfolio returns are loaded on five factors capturing market (RMRF), size (SMB), book-to-market (HML), momentum (MOM) and liquidity (LIQ). All estimations use White (1980) robust standard errors which are given for alphas in the parenthesis. Pentile portfolios have $SUS-Index \leq -2$ (Toxic) and $SUS-Index \geq +2$ (Green) as the two extreme portfolios along with additional three mid portfolios having $SUS-Index$ scores of -1, 0 and 1 respectively. Tercile portfolios use $SUS-Index \leq -1$ (Toxic) and $SUS-Index \geq +1$ (Green) as cutoffs with the mid portfolio have a neutral (0) $SUS-Index$ value. The factor loadings are omitted and significance levels for alpha reported at 10%, 5%, and 1% using *, ** and *** respectively.

Pentile Portfolios			**Tercile Portfolios**		
Portfolios	Alpha	Excess Returns	Portfolios	Alpha	Excess Returns
Green – Toxic Hedge	0.0030**	0.006	Green – Toxic Hedge	0.0026**	0.0011
	(0.002)			(0.001)	
Pentile 1 (Green)	0.0027***	0.0093	Tercile 1 (Green)	0.0022**	0.0093
	(0.001)			(0.001)	
Pentile 2	0.0018*	0.0093			
	(0.001)				
Pentile 3 (Neutral)	0.0011	0.0091	Tercile 2 (Neutral)	0.0011	0.0092
	(0.001)			(0.001)	
Pentile 4	-0.0002	0.0080			
	(0.001)				
Pentile 5 (Toxic)	-0.0003	0.0087	Tercile 3 (Toxic)	-0.0003	0.0082
	(0.002)			(0.001)	

both pentiles and terciles do not show a potential for risk-neutral hedge as both the Green and Toxic portfolios seem to consistently outperform the markets. Much of the recent literature that applies value-weighted portfolios has shown similar results with no difference in abnormal returns between the extreme portfolios (Galema et al., 2008; Humphrey et al., 2012). However, all the abnormal returns αs and the coefficients for book-to-market factor HML for value-weighted portfolios do confirm the findings in Galema et al. (2008) that CSR based hedges "impact ... stock returns by lowering the book-to-market ratio and not by generating positive alphas".[14]

For the equal-weighted hedge, it is seen that much of the outperformance of Green portfolio over the Toxic one is driven by positive abnormal returns for the Green stocks. I further find that there is a monotonic decrease not only in abnormal returns as the sustainability scores decline from Green to Toxic portfolios, but also in mean excess returns. This is summarized in Table X for both pentile and tercile portfolio constructions.

For the sustainability hedge portfolio, α is roughly 3.6% per annum (or 0.30% per month) when pentile portfolios are constructed and about 3.0% per annum (i.e. 26 basis points per month) using tercile portfolio classification. These hedged positions are statistically significant at 5% level and have considerable economic significance considering that the MSCI ESG sample firms include most of the large cap stocks along with a large number of mid-cap firms. This

[14] Galema et al. (2008) reports this finding only for the value-weighted socially responsible investments.

result extends the findings in Borgers et al. (2013), Flammer (2015) and Krüger (2015) by showing that using a subcomponent of ESG characteristics that measures sustainability, investors can potentially make risk-neutral returns. The disappearance of stock returns to ESG based measures (Borgers et al., 2013) is seen to be restricted to only value-weighted portfolios. While ESG engagements and proposals do create value for shareholder in the short-run (Flammer, 2015; Krüger, 2015), I show that a sum total of sustainability based initiatives can significantly explain the cross-sectional differences in shareholder value creating abilities of sustainable stocks vis-á-vis less sustainable firms even for longer holding periods of one year.

Robustness checks. With the equal-weighted hedge portfolio showing potential for positive risk-adjusted returns, I run further tests to examine if the results are driven by industry-membership of sustainability firms or time-specific trends (Table XI: panel A), or by the five-factor model selected for generating abnormal returns (Table XI: panel B). Consistently significant or insignificant alphas across all the alternate factor models shows that results are not biased by the chosen asset pricing model.

When industry adjusted monthly returns are used for each portfolio instead of unadjusted returns, the magnitudes of alpha reduce affecting the economic significance of potential risk-adjusted returns from hedge portfolios (especially equal-weighted) but statistical significance remains.[15]

With the subsample periods considered, some of the evidence seem to weakly support the conclusions drawn in Borgers et al. (2013) that, over the years, attention towards ESG issues has diminished the chances of ESG-centric mispricing. However, interestingly, when it comes to equal-weighted hedge portfolios, the observed mispricing seems to have reappeared in recent years, especially when the sample period is broken down into three parts. This essentially extends the findings in Borgers et al. (2013) as the recent 8 years (from 2008 to 2015) were largely not included in that sample. The magnitude of alphas are largely similar to those reported in prior literature, which uses all-in CSP measures for portfolio construction. However, consistent positive alphas for sustainability hedge does indicate the importance of selecting conceptually grounded indicators of ESG instead of summing up all the available indicators.

Can similar hedge portfolios using the other ESG indicators (or $remCSP$ scores) generate abnormal returns as well? I test this by constructing similar extreme portfolios using the remnant CSP score and constructing a long – short hedge (last row in Table XI: Panel B). Neither equal-weighted nor value-weighted portfolios show potential abnormal returns, confirming the robustness of the benefits of sustainability measurement.

With respect to alternative factor models (Table XI: Panel B), the alpha values with the chosen five factor model (equation 4) does not seem to be influenced by the selected factors. For robustness testing, I include the Fama and French (1993) three-factor model, the Fama and French (2016) five-factor model and the variations of these Fama-French (FF) models with the

[15] Monthly returns for each firm were adjusted by deducting the industry median returns using Fama and French (1997) 48 industry classification.

Table XI: Robustness Checks for Abnormal Returns Generated using Sustainability Measure

This table gives result when industry-adjusted returns are used, alternative sample periods are employed (Panel A) or when alternate asset pricing models are used (Panel B). Abnormal returns using long Green – short Toxic hedge for both value-weighted (shown by VW) and equal-weighted (EW) are reported along with corresponding robust standard errors. The first row in each panel shows the result for baseline model using excess hedge portfolio returns as reported in Table IX for comparison. Panel A reports abnormal industry-adjusted returns followed by abnormal returns when sample period is divided into two equal 12 year periods or 3 equal 8 year periods. Panel B reports α for combinations of Fama and French (1993) three factor model and Fama and French (2016) five factor model along with momentum and the Pástor and Stambaugh (2003) liquidity factors. Significance levels for 10%, 5%, and 1% is shown by *, ** and *** respectively.

Panel A: Alternative Portfolio Characteristics

Portfolios	**Pentile Portfolios**		**Tercile Portfolios**	
	EW	**VW**	**EW**	**VW**
Green – Toxic Hedge	0.0030**	0.0002	0.0026**	0.0001
	(0.002)	(0.003)	(0.001)	(0.002)
Industry adjusted	0.0016*	-0.0010	0.0013*	-0.0009
	(0.001)	(0.003)	(0.001)	(0.002)
First 12 years	0.0055**	0.0036	0.0042**	0.0041**
	(0.002)	(0.002)	(0.001)	(0.002)
Last 12 years	0.0019	-0.0027	0.0017*	-0.0030
	(0.002)	(0.006)	(0.001)	(0.004)
First 8 years	0.0033	0.0053**	0.0027*	0.0041**
	(0.001)	(0.002)	(0.001)	(0.002)
Mid 8 years	0.0016	0.0008	0.0013	0.0003
	(0.001)	(0.003)	(0.002)	(0.002)
Last 8 years	0.0054*	-0.0032	0.0034*	-0.0034
	(0.001)	(0.009)	(0.001)	(0.006)
remCSP-based Hedge	0.0001	-0.0020	0.0003	-0.0006
	(0.001)	(0.004)	(0.001)	(0.003)

Panel B: Alternative Factor Models

Asset Pricing Models	**Pentile Portfolios**		**Tercile Portfolios**	
	EW	**VW**	**EW**	**VW**
FF four factors + liquidity	0.0030**	0.0002	0.0026**	0.0001
	(0.002)	(0.003)	(0.001)	(0.002)
FF three factors	0.0019	0.0003	0.0025**	0.0000
	(0.001)	(0.002)	(0.001)	(0.002)
FF three factors + liquidity	0.0029*	-0.0001	0.0029**	0.0002
	(0.002)	(0.003)	(0.001)	(0.002)
FF four factors	0.0019*	0.0007	0.0021**	0.0000
	(0.001)	(0.002)	(0.001)	(0.002)
FF five factors	0.0027*	0.0006	0.0033**	0.0006
	(0.002)	-0.003	(0.001)	(0.002)
FF five factors + liquidity	0.0037***	-0.0003	0.0037***	0.0006
	(0.002)	(0.004)	(0.001)	(0.002)

Pástor and Stambaugh (2003) liquidity factor added. For the equal-weighted hedge portfolio, the risk-neutral returns vary from 37 basis points (bps) a month to 19bps a month for the pentile portfolios (significant at 1% for most models) and monthly 37 bps to 21 bps with tercile based hedge portfolios (significant at 5% levels). The FF four factors + liquidity factor alphas seem to lie in the middle of alphas' range seen across various asset pricing models. With value-weighted hedge, as before, all alphas remain statistically insignificant.

Overall, the main results shown in Tables IX and X for the relationship between sustainability and stock returns seem to be robust to several sample period selections and factor model specifications. Most of the drawn inferences remain consistent through all of these robustness tests. While there has been some degree of learning by investors regarding ESG characteristics, there is enough evidence indicating possible sustainability based hedging strategies that could generate consistent abnormal returns in long run.

7. Discussion and Conclusions

This paper introduces a corporate sustainability measure *SUS-Index* that represents the attention (+) or lack of attention (–) firms reportedly show towards practices and policies that can influence their triple bottom line. Subsequently, it is found that the highly sustainable firms are associated with superior firm values. In fact, it is this sustainability component from within the broader CSR/CSP measure that completely explains its well-documented relationship with firm values. Even with dynamic OLS model that includes past firm performances to disentangle simultaneity or with panel between-effect regressions, same result is observed. Sustainability measure and its two subcomponents seem to capture most of the variations seen in the CSP – firm value relationships for the MSCI sample firms. This result is consistent with the recent theoretical model proposed in Fatemi et al. (2015). Those CSR activities that are central to firm's long-term survival (or, in other words, contribute towards its sustainability), are shown to have positive valuation effects.

The initial evidences merely support that the individual sustainability indicators, its composite index and the two subcomponents have significant correlations with firm values but does not indicate causation. Does the firms attention towards sustainability cause them to be valued higher than the less sustainable firms? I answer this by first using instrumental variables and then simultaneous equations model, to show that changes in sustainability scores for a firm can indeed cause changes in its valuation as measured by Tobin's Q. Using regression discontinuity design, Flammer (2015) show that passing of CSR engagement proposals can increase firm values in the adopted as well as subsequent years. However, the impact of sustainability initiatives is much higher on Tobin's Q than these broad ESG engagements as shown by the magnitudes of coefficients for SUS-Index in the results.

Additionally, I provide insights on how poor corporate governance and especially managerial entrenchment further worsens the firm value when such firms undertake additional sustainability initiatives. While the same is not true for broader CSR initiatives, as they could potentially

attenuate the negative effects of managerial entrenchment on firm value (Ferrell et al., 2016), sustainability seems to be associated with greater costs for the highly entrenched firms. My findings are consistent with Krüger (2015), which shows that when there is a CSR related good news in a firm with lower agency problems, investors tend to gain. When more sustainability initiatives are undertaken in low entrenchment firms, I show that they have a greater tendency to show positive valuation effect.

Lastly, I provide evidence that sustainability and SUS-Index can generate abnormal returns for investors if appropriate investment strategies are employed. While it is difficult to establish at firm level if its ESG performance is correctly priced by the stock markets, some recent studies (e.g. Flammer, 2015) show that CSR engagements do result in a positive reaction in stock markets resulting in abnormal returns for investors. Krüger (2015), however, indicate that the market reaction can change based on the intensity of the CSR news itself. Since I look at sustainability-based portfolios instead of individual firms, and the sustainability measure itself is aggregation of multiple initiatives, impact of individual CSR engagement related firm news and its confounding effects is avoided. It is seen that the SUS-Index based hedge portfolios could have potentially generated a risk-adjusted return of over 3% per year in my sample period.

This paper also has regulatory and managerial implications as it identifies a subset of ESG strengths and concerns that are most relevant to firm's long-term survival, which is shown to impact firm performance and shareholders' wealth. Even on individual factor level, it is found that more than 90% of the identified sustainability indicators have significant association with firm values. This association remains robust even after controlling for all other ESG indicators. So the value-driving characteristic of sustainability is not merely seen on aggregate level, but even individual strength and concern indicators have value-impacting properties. Thus, if regulators introduce policies and directives that target these specific sustainability indicators, they are more likely to influence the overall firm sustainability and its subsequent performance. Similar reasoning also applies for managers and other decision makers who seek to improve firm sustainability, or for institutional investors who seek a sustainable investment portfolio.

By showing that the correlation between CSP and CFP is driven largely by a concentrated subset of ESG components, this paper also has an implication for commercial ESG rating agencies such as MSCI and others. For ESG rankings, the more is not the merrier, i.e. increasing the number of ESG indicators will not necessarily enrich the ESG rankings. What matters essentially is whether the included indicators are actually relevant or not.

References

Bebchuk, L., Cohen, A., 2005. The costs of entrenched boards. Journal of Financial Economics 78 (2), 409–433.

Bebchuk, L., Cohen, A., Ferrell, A., 2009. What matters in corporate governance? Review of Financial Studies 22 (2), 783–827.

Bebchuk, L., Cohen, A., Wang, C. C., 2013. Learning and the disappearing association between governance and returns. Journal of Financial Economics 108 (2), 323–348.

Becchetti, L., Ciciretti, R., Giovannelli, A., 2013. Corporate social responsibility and earnings forecasting unbiasedness. Journal of Banking and Finance 37 (9), 3654–3668.

Becchetti, L., Ciciretti, R., Hasan, I., 2015. Corporate social responsibility, stakeholder risk, and idiosyncratic volatility. Journal of Corporate Finance 35, 297–309.

Bhagat, S., Bolton, B., 2008. Corporate governance and firm performance. Journal of Corporate Finance 14 (3), 257–273.

Borgers, A., Derwall, J., Koedijk, K., Ter Horst, J., 2013. Stakeholder relations and stock returns: On errors in investors' expectations and learning. Journal of Empirical Finance 22, 159–175.

Bouslah, K., Kryzanowski, L., M'Zali, B., 2013. The impact of the dimensions of social performance on firm risk. Journal of Banking and Finance 37 (4), 1258–1273.

Carhart, M. M., 1997. On persistence in mutual fund performance. Journal of Finance 52 (1), 57–82.

Cheng, B., Ioannou, I., Serafeim, G., 2014. Corporate social responsibility and access to finance. Strategic Management Journal 35 (1), 1–23.

Chung, K. H., Elder, J., Kim, J.-C., 2010. Corporate governance and liquidity. Journal of Financial and Quantitative Analysis 45 (2), 265–291.

Derwall, J., Koedijk, K., Ter Horst, J., 2011. A tale of values-driven and profit-seeking social investors. Journal of Banking and Finance 35 (8), 2137–2147.

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

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

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

Fama, E. F., French, K. R., 1997. Industry costs of equity. Journal of Financial Economics 43 (2), 153–193.

Fama, E. F., French, K. R., 2016. Dissecting anomalies with a five-factor model. Review of Financial Studies 29 (1), 69–103.

Fama, E. F., MacBeth, J. D., 1973. Risk, return, and equilibrium: Empirical tests. Journal of Political Economy 81 (3), 607–636.

Fatemi, A., Fooladi, I., Tehranian, H., 2015. Valuation effects of corporate social responsibility. Journal of Banking and Finance 59, 182–192.

Ferrell, A., Liang, H., Renneboog, L., 2016. Socially responsible firms. Journal of Financial Economics 122 (3), 585–606.

Flammer, C., 2015. Does corporate social responsibility lead to superior financial performance? A regression discontinuity approach. Management Science 61 (11), 2549–2568.

Friedman, M., 1970. The social responsibility of business is to increase its profits. New York Times Magazine: 13th September.

Fulton, M., Kahn, B. M., Sharples, C., 2012. Sustainable investing: Establishing long-term value and performance. Unpublished working paper, `http://ssrn.com/abstract=2222740`.

Galema, R., Plantinga, A., Scholtens, B., 2008. The stocks at stake: Return and risk in socially responsible investment. Journal of Banking and Finance 32 (12), 2646–2654.

Giroud, X., Mueller, H. M., 2011. Corporate governance, product market competition, and equity prices. Journal of Finance 66 (2), 563–600.

Gompers, P. A., Ishii, J. L., Metrick, A., 2003. Corporate governance and equity prices. Quarterly Journal of Economics 118 (1), 107–155.

Gregory, A., Whittaker, J., Yan, X., 2016. Corporate social performance, competitive advantage, earnings persistence and firm value. Journal of Business Finance & Accounting 43 (1-2), 3–30.

Hillman, A. J., Keim, G. D., 2001. Shareholder value, stakeholder management, and social issues: What's the bottom line? Strategic Management Journal, 125–139.

Humphrey, J. E., Lee, D. D., Shen, Y., 2012. Does it cost to be sustainable? Journal of Corporate Finance 18 (3), 626–639.

Jha, A., Cox, J., 2015. Corporate social responsibility and social capital. Journal of Banking and Finance 60, 252–270.

Jiao, Y., 2010. Stakeholder welfare and firm value. Journal of Banking and Finance 34 (10), 2549–2561.
Jo, H., Harjoto, M. A., 2011. Corporate governance and firm value: The impact of corporate social responsibility. Journal of Business Ethics 103 (3), 351–383.
Jo, H., Harjoto, M. A., 2012. The causal effect of corporate governance on corporate social responsibility. Journal of Business Ethics 106 (1), 53–72.
Kaptein, M., Wempe, J. F. D. B., 2002. The balanced company: A theory of corporate integrity. Oxford University Press, USA.
Kempf, A., Osthoff, P., 2007. The effect of socially responsible investing on portfolio performance. European Financial Management 13 (5), 908–922.
Kim, Y., Li, H., Li, S., 2014. Corporate social responsibility and stock price crash risk. Journal of Banking and Finance 43, 1–13.
Krüger, P., 2015. Corporate goodness and shareholder wealth. Journal of Financial Economics 115 (2), 304–329.
Liang, H., Renneboog, L., 2017. On the foundations of corporate social responsibility. Journal of Finance 72 (2), 853–910.
Lins, K. V., Servaes, H., Tamayo, A., 2017. Social capital, trust, and firm performance: The value of corporate social responsibility during the financial crisis. Journal of Finance.
Loderer, C. F., Waelchli, U., 2010. Firm age and performance. Unpublished working paper, http://ssrn.com/abstract=1342248.
Louche, C., 2009. Corporate social responsibility: The investors perspective. In: Professionals' Perspectives of Corporate Social Responsibility. Springer, pp. 211–231.
McGuire, J. B., Sundgren, A., Schneeweis, T., 1988. Corporate social responsibility and firm financial performance. Academy of Management Journal 31 (4), 854–872.
Morck, R., Shleifer, A., Vishny, R. W., 1988. Management ownership and market valuation: An empirical analysis. Journal of Financial Economics 20, 293–315.
Ng, A. C., Rezaee, Z., 2015. Business sustainability performance and cost of equity capital. Journal of Corporate Finance 34, 128–149.
Pástor, L., Stambaugh, R. F., 2003. Liquidity risk and expected stock returns. Journal of Political Economy 111 (3), 642–685.
Rahdari, A. H., Rostamy, A. A. A., 2015. Designing a general set of sustainability indicators at the corporate level. Journal of Cleaner Production 108, 757–771.
Roberts, M. R., Whited, T. M., 2012. Endogeneity in empirical corporate finance. Unpublished working paper, http://ssrn.com/abstract=1748604.
Solow, R., 1993. An almost practical step toward sustainability. Resources Policy 19 (3), 162–172.
Stock, J. H., Yogo, M., 2005. Testing for weak instruments in linear IV regression. In: Andrews, D. W., Stock, J. H. (Eds.), Identification and inference for econometric models: Essays in honor of Thomas Rothenberg. Cambridge University Press, pp. 80–108.
Van Beurden, P., Gössling, T., 2008. The worth of values–a literature review on the relation between corporate social and financial performance. Journal of Business Ethics 82 (2), 407–424.
Van Marrewijk, M., 2003. Concepts and definitions of CSR and corporate sustainability: Between agency and communion. Journal of Business Ethics 44 (2), 95–105.
WCED, 1987. Our common future. United Nations World Commission on Environment and Development, Oxford University Press.
White, H., 1980. A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. Econometrica: Journal of the Econometric Society, 817–838.
Wintoki, M. B., Linck, J. S., Netter, J. M., 2012. Endogeneity and the dynamics of internal corporate governance. Journal of Financial Economics 105 (3), 581–606.
Wu, M.-W., Shen, C.-H., 2013. Corporate social responsibility in the banking industry: Motives and financial performance. Journal of Banking and Finance 37 (9), 3529–3547.

Appendix I: List of all the MSCI ESG Indicators

Community	
Strengths	*Concerns*
Generous Giving	Investment Controversies
Innovative Giving	Negative Economic / Community Impact
Support for Housing	**Indigenous Peoples Relations Concern**
Support for Education (added in 1994)	**Tax Disputes (moved from Governance in 2005)**
Indigenous Peoples Relations Strength	Other Concern
Non-US Charitable Giving	
Volunteer Programs Strength	
Community Engagement	
Other Strength	
Diversity	
Strengths	*Concerns*
CEO Diversity	Employee Discrimination
Promotion	Non-Representation (1993 - 2011)
Board of Directors - Gender Diversity	Board Diversity - Gender
Work-Life / Family Benefits	Board of Directors - Minorities
Women and Minority Contracting	Other Concern
Employment of the Disabled	
Progressive Gay / Lesbian Policies	
Employment of Underreperesented Groups	
Other Strength	
Employees	
Strengths	*Concerns*
Union Relations Strength	Union Relations Concern
No Layoff Policy (to 1993)	Health and Safety Concern
Cash Profit Sharing	Workforce Reductions
Employee Involvement	Pension/ Retirement Benefits Concern (1992 - 2009)
Strong Retirement Benefits (1991 - 2009)	Supply Chain Controversies
Employee Health and Safety (added in 2003)	Child Labor
Supply Chain Labor Standards	Other Concern / Labor-Management Relations
Compensation and Benefits	
Employee Relations	
Professional Development	
Human Capital Management/ Developments	
Labor Management	
Controversial Sourcing	
Other Strength	
Environment	
Strengths	*Concerns*
Beneficial Products & Services/ Env. Opportunities	Hazardous Waste
Pollution Prevention / Waste Management	Regulatory Compliance
Recycling / Packaging Materials and Waste	Ozone Depleting Chemicals
Climate Change/ Alternative Fuels/ Clean Energy	Toxic Spills and Releases Substantial Emissions
Property, Plant, and Equipment (through 1995)	Agricultural Chemicals
Environmental Management Systems	Climate Change (added in 1999)
Water Stress	Negative Impact of Products (from 2010)
Biodiversity and Land Use	Land Use and Biodiversity (from 2010)
Raw Material Sourcing	Non-Carbon Releases Operational Waste (from 2010)
Natural Resource Use	Supply Chain Management (from 2012)
Green Buildings	Water Management (from 2012)
Renewable Energy	Other Concern
Waste Management - Electronic Waste	
Climate Change - Energy Efficiency	
Climate Change - Carbon Footprint	
Climate Change - Insuring CC Risk	
Other Strength	

Governance	
Strengths	*Concerns*
Limited Compensation	High Compensation
Ownership Strength	**Tax Disputes (moved to Community 2005)**
Transparency Reporting Quality Strength	Ownership Concern
Political Accountability Strength	Accounting Concern
Public Policy Strength	Reporting Quality Transparency Concern
Corruption and Political Instability	Political Accountability Concern
Financial System Instability	Public Policy Concern
Other Strength	Governance Structure Controversies
	Controversial Investments
	Business Ethics
	Other Concern
Human Rights	
Strengths	*Concerns*
Positive Operations in South Africa (19941995)	South Africa Concern (through 1994)
Indigenous Peoples Relations (moved in 2002)	Northern Ireland Concern (through 1994)
Labor Rights Strength	Support for Controversial Regimes
Other Strength	Mexico (19952002)
	International Labor Rights Concern
	Indigenous Peoples Relations (moved in 2002)
	Operations in Sudan (2010 - 2011)
	Freedom of Expression
	Human Rights Violations
	Other Concern
Product	
Strengths	*Concerns*
Quality	Product Quality and Safety
R & D / Innovation	Advertising and Marketing/Contracting Controversy
Benefits to Economically Disadvantaged	Antitrust and Anticompetitive Practices
Access to Capital	Customer Relations
Social Opportunities - Access to Communications	Privacy and Data Security
Social Opportunities - Nutrition and Health	Other Concern
Product Safety - Chemical	
Product Safety - Financial	
Product Safety - Privacy and Data	
Product Safety - Responsible Investment	
Product Safety - Insuring Health & Demographics	
Other Strength	

Note that those indicators which have moved from one category to another are shown in bold.
For definitions / explanations of these indicators, check MSCI ESG KLD Stats Methodology guide.

Appendix II: Definitions of Variables and Controls used in Tobin's Q Regressions

CSPstr: Measures strengths related to corporate social performance. It is constructed as El-Ghoul et al. (2011); Jha and Cox (2015). It is the sum of all ESG strengths available in MSCI dataset (sum total of all strengths given in Appendix I). High value indicates high CSR engagements and initiatives for the firm.

CSPcon: Measures concerns related to corporate social performance. It is constructed as El-Ghoul et al. (2011); Jha and Cox (2015) as the sumtotal of all ESG concerns available in MSCI dataset, or in other words, sum total of all concerns given in Appendix I. High value indicates firm is embroiled in CSR controversies.

CSP: Measures the net corporate social performance of the firm in a given year. It is calculated as the difference between ESG strengths and concerns (i.e. $CSP = CSPstr - CSPcon$).

SUSstr: Measures sustainability related strengths for a firm. It is constructed using similar summation as CSPstr but, only the sustainability indicators are included (refer Table I). High value indicates proactiveness for sustainability initiatives in the firm.

SUScon: Measures sustainability related concerns in a firm. It is constructed using similar summation as CSPcon but, only the sustainability indicators are included (refer Table I). High value indicates a disregard for sustainability and triple bottom line by the firm.

SUS: Measures the firm's sustainability score in a given year. It is calculated as the difference between sustainability strengths and concerns (i.e. $SUS = SUSstr - SUScon$).

remCSP: Measures the remnant CSP score after separating the sustainability-related parameters. It is calculated as the difference between the overall net CSP score and the sustainability score (i.e. $remCSP = CSP - SUS$).

Tobin's Q: Calculated as in Bebchuk et al. (2009) as market value of assets divided by book value of assets (Compustat data item 6) with the market value of assets calculated as: (book value of assets + market value of common stock) – (book value of common stock + deferred taxes). Corresponding industry-adjusted (either Fama French 48 or SIC 2-digit) values are obtained by taking the difference of Tobin's Q and the corresponding industry median Toboin's Q values.

ROA: The control used as proxy for operating performance, Return on Assets (ROA) computed as the operating income divided by end of year total assets (Compustat data item 6). Operating income before depreciation (Compustat data item 13) is used as given in Bhagat and Bolton (2008).

Size: Log transformation of Total Assets (Compustat data item 6).

Leverage: As described in Bhagat and Bolton (2008): Long term debt (Compustat data item 9) / Total Assets (Compustat data item 6). Alternative measure of leverage i.e. Debt/Equity ratio was also used as a means of robustness check.

Volume: Measures liquidity using the volume of trade for the firm's common equity recorded in the fiscal year (in logs).

CAPEX/Total Assets: is the log transformation of the ratio of Capital Expenditures (Compustat data item 31) to Total Assets.

R&D Expense/Total Sales: is the log transformation of the ratio of Research & Development expenses (Compustat data item 47) to Total Revenues.

Sales Growth: The ratio of Total Revenues for current year to that of the year t – 2.

Age: Log transformation of firm's age measured in months at the end of each calendar year with reference being the listing month.

Delaware Dummy: Dummy variable indicating whether a firm is incorporated in Delaware or not (coded 1 and 0).

Appendix III: Instrumental Variables

Past Negative Earnings Dummy: Dummy variable indicating whether a firm had reported negative earnings (i.e. EBIT or earnings before interest and tax) in the year t – 1.

Industry Average Tobin's Q / E-Index / SUS: The SIC 2-Digit Industry based average values corresponding to the subject variables. This instrument reflects the industry based average scores that has some impact on individual firm's scores but assumes that the industry-wide score is exogenous to other individual firm characteristics.

Appendix IV: Keywords List Used for Google Trends

For each MSCI ESG variable, the related keywords were identified from their respective definitions as given in the MSCI methodology guide. Only those keywords that appeared in Google Trends data are listed below.

Sustainability Indicators:

"Charitable giving", "community engagement", "education support", "housing support", "gender diversity", "retirement benefits", "employee involvement", "employee safety", "Employment for disabled", "climate change", "alternative fuels", "employee health", "clean energy", "labor rights", "product quality", "product safety", "R & D", "social opportunities", "environmental management system", "tax disputes", "political accountability", "oil spills", "child labor", "regulatory compliance", "hazardous waste", "ozone depletion", "labor relations", "agricultural chemicals", "natural resource", "family benefits", "work-life balance", "LGBT rights", "gay and lesbian rights", "pollution prevention", "waste management", "antitrust", "human capital management", "accounting quality", "underrepresented groups", "board compensation", "CSR report"

Remnant ESG Indicators:

"Generous giving", "non-representation", "volunteer programs", "employee discrimination", "indigenous people rights", "supply chain issues", "labor management", "water stress", "consumer fraud", "privacy and data security", "data theft", "access to finance", "freedom of expression", "Internet censorship", "human rights violations", "political instability", "community reinvestment act", "green buildings", "public policy issues", "product carbon footprint", "protect biodiversity", "corporate bribery", "business fraud"

Appendix V: Supplementary Results

Table A-I: Correlations Between the Main Variables

Table A-II: Tobin's Q Regressions on ESG Measures (E-Index as Additional Control)

Table A-I: Correlations Between the Main Variables

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]	[17]	[18]
CSP [1]	1																	
SUS [2]	0.857***	1																
remCSP [3]	0.755***	0.308***	1															
CSPstr [4]	0.709***	0.747***	0.358***	1														
CSPcon [5]	-0.428***	-0.189***	-0.550***	0.334***	1													
SUSstr [6]	0.635***	0.788***	0.169***	0.945***	0.362***	1												
SUScon [7]	-0.350***	-0.337***	-0.217***	0.293***	0.844***	0.314***	1											
Tobin's Q [8]	0.041***	0.038***	0.026***	-0.022***	-0.083***	-0.019***	-0.088***	1										
E-Index [9]	0.044***	-0.047***	0.144***	-0.055***	-0.129***	-0.081***	-0.055***	-0.076***	1									
ROA [10]	0.009	0.006	0.009	0.012*	0.004	0.010*	0.007	0.815***	-0.033***	1								
Size [11]	0.203***	0.248***	0.059***	0.480***	0.343***	0.452***	0.310***	0.016***	0.059***	0.004	1							
Leverage [12]	-0.047***	-0.052***	-0.022***	-0.012*	0.049***	-0.020***	0.050***	-0.008*	0.013*	-0.003	0.190***	1						
Volume [13]	0.144***	0.200***	0.010*	0.416***	0.341***	0.398***	0.300***	0.021***	0.100***	0.009**	0.576***	0.141***	1					
CAPEX/TA [14]	-0.013*	0.009	-0.037***	0.074***	0.113***	0.066***	0.086***	0.049***	-0.086***	0.185***	-0.110***	0.122***	0.060***	1				
R&D/Sales [15]	-0.017**	-0.047***	0.028***	-0.112***	-0.121***	-0.125***	-0.118***	0.000	-0.031***	-0.023***	-0.010**	0.0376***	-0.0917***	-0.133***	1			
Sales Growth [16]	-0.002	-0.004	0.001	-0.009	-0.009	-0.008	-0.007	0.003	0.003	-0.003	-0.015***	0.005	0.002	0.009*	0.009*	1		
Age [17]	0.103***	0.129***	0.026***	0.235***	0.163***	0.232***	0.156***	-0.014***	0.104***	0.022***	0.311***	0.040***	0.191***	-0.002	-0.126***	-0.042***	1	
Delaware [18]	-0.046***	-0.037***	-0.037***	-0.005	0.055***	-0.007	0.047***	0.002	-0.049***	0.003	-0.073***	0.018***	0.181***	0.068***	-0.052***	0.007	-0.136***	1

$* \rightarrow p < 0.05$

$** \rightarrow p < 0.01$

$*** \rightarrow p < 0.001$

Table A-II: Tobin's Q Regressions on ESG Measures (E-Index as Control)

This table replicates results from III-A (Panel A) and III-B (Panel B) with E-Index included as additional control. Significance levels are represented by *, **, and *** for 10%, 5%, and 1% respectively.

Panel A: Aggregated ESG Measures

	Model (1)		Model (2)		Model (3)		Model (4)	
CSP	0.0253***		0.0159***		0.0140***		0.0058**	
	(0.003)		(0.003)		(0.003)		(0.002)	
SUS		0.0304***		0.0333***		0.0377***		0.0117***
		(0.004)		(0.004)		(0.004)		(0.003)
Remnant CSP		0.0182***		-0.0108**		-0.0222***		-0.0030
		(0.005)		(0.005)		(0.005)		(0.004)
E-Index	-0.0649***	-0.0636***	-0.0629***	-0.0606***	-0.0655***	-0.0626***	-0.0183***	-0.0176***
	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.005)
ROA	5.0438***	5.0431***	4.9729***	4.9622***	5.1093***	5.0930***	2.0059***	2.0052***
	(0.306)	(0.306)	(0.303)	(0.303)	(0.320)	(0.320)	(0.253)	(0.253)
Size	-0.2372***	-0.2379***	-0.2692***	-0.2740***	-0.3767***	-0.3852***	-0.1070***	-0.1095***
	(0.009)	(0.009)	(0.010)	(0.010)	(0.012)	(0.012)	(0.013)	(0.013)
Leverage	-0.9596***	-0.9567***	-0.9872***	-0.9766***	-1.0313***	-1.0148***	-0.3546***	-0.3512***
	(0.076)	(0.076)	(0.076)	(0.076)	(0.086)	(0.085)	(0.061)	(0.061)
Volume	0.2552***	0.2539***	0.2896***	0.2876***	0.3591***	0.3580***	0.0847***	0.0848***
	(0.010)	(0.010)	(0.012)	(0.012)	(0.013)	(0.013)	(0.011)	(0.011)
CAPEX / Assets	-0.0866***	-0.0868***	-0.1076***	-0.1091***	-0.0038	-0.0045	-0.0224**	-0.0226**
	(0.011)	(0.011)	(0.010)	(0.010)	(0.014)	(0.014)	(0.008)	(0.008)
R & D / Sales	0.0573***	0.0576***	0.0600***	0.0613***	0.0004	0.0012	-0.0004	-0.0002
	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)	(0.004)	(0.004)
Sales Growth	0.0003**	0.0003**	0.0003***	0.0003***	0.0003***	0.0003***	0.0002***	0.0002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Age	-0.0715***	-0.0722***	-0.0728***	-0.0757***	-0.0518***	-0.0551***	0.0147*	0.0139*
	(0.012)	(0.012)	(0.012)	(0.012)	(0.011)	(0.011)	(0.008)	(0.008)
Delaware Dummy	-0.0539***	-0.0534***	-0.0657***	-0.0661***	-0.0058	-0.0056	0.0065	0.0065
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.010)	(0.010)
Lag 1 Tobin's Q							0.5999***	0.5994***
							(0.064)	(0.064)
Lag 2 Tobin's Q							0.0432	0.0429
							(0.037)	(0.037)
Year Fixed Effects	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	No	No	No	No	Yes	Yes	Yes	Yes
Number of observations	18428	18428	18428	18428	18428	18428	18293	18293
R-Squared	0.312	0.312	0.327	0.328	0.406	0.407	0.699	0.700

Panel B: ESG Strengths and Concerns

	Model (1)		Model (2)		Model (3)		Model (4)	
CSPstr	0.0123***		0.0120***		0.0186***		0.0089***	
	(0.004)		(0.004)		(0.004)		(0.002)	
CSPcon	-0.0450***		-0.0228***		-0.0054		-0.0002	
	(0.004)		(0.004)		(0.004)		(0.003)	
SUSstr		0.0143**		0.0236***		0.0372***		0.0139***
		(0.005)		(0.005)		(0.005)		(0.004)
SUScon		-0.0717***		-0.0595***		-0.0390***		-0.0059*
		(0.007)		(0.007)		(0.006)		(0.004)
Remnant CSP		0.0137**		-0.0125**		-0.0222***		-0.0028
		(0.005)		(0.005)		(0.005)		(0.004)
E-Index	-0.0691***	-0.0660***	-0.0641***	-0.0625***	-0.0641***	-0.0627***	-0.0174***	-0.0172***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.005)
ROA	5.0469***	5.0473***	4.9746***	4.9645***	5.1066***	5.0933***	2.0046***	2.0038***
	(0.306)	(0.306)	(0.304)	(0.304)	(0.320)	(0.320)	(0.253)	(0.253)
Size	-0.2207***	-0.2208***	-0.2629***	-0.2619***	-0.3856***	-0.3845***	-0.1129***	-0.1126***
	(0.009)	(0.009)	(0.011)	(0.011)	(0.013)	(0.013)	(0.013)	(0.013)
Leverage	-0.9786***	-0.9742***	-0.9916***	-0.9838***	-1.0214***	-1.0156***	-0.3481***	-0.3478***
	(0.077)	(0.077)	(0.076)	(0.076)	(0.086)	(0.086)	(0.061)	(0.061)
Volume	0.2658***	0.2636***	0.2920***	0.2921***	0.3571***	0.3582***	0.0835***	0.0841***
	(0.010)	(0.010)	(0.012)	(0.012)	(0.013)	(0.013)	(0.011)	(0.011)
CAPEX / Assets	-0.0802***	-0.0805***	-0.1051***	-0.1046***	-0.0049	-0.0044	-0.0231**	-0.0229**
	(0.011)	(0.011)	(0.010)	(0.010)	(0.014)	(0.014)	(0.008)	(0.008)
R & D / Sales	0.0537***	0.0534***	0.0588***	0.0585***	0.0014	0.0011	0.0003	0.0002
	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)	(0.004)	(0.004)
Sales Growth	0.0003**	0.0003**	0.0003***	0.0003***	0.0003***	0.0003***	0.0002***	0.0002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Age	-0.0645***	-0.0643***	-0.0705***	-0.0708***	-0.0539***	-0.0549***	0.0133*	0.0131
	(0.012)	(0.012)	(0.012)	(0.012)	(0.011)	(0.011)	(0.008)	(0.008)
Delaware Dummy	-0.0518**	-0.0506**	-0.0645***	-0.0636***	-0.0063	-0.0056	0.0062	0.0064
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.010)	(0.010)
Lag 1 Tobin's Q							0.5998***	0.5995***
							(0.064)	(0.064)
Lag 2 Tobin's Q							0.0431	0.0429
							(0.037)	(0.037)
Year Fixed Effects	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	No	No	No	No	Yes	Yes	Yes	Yes
Number of observations	18428	18428	18428	18428	18428	18428	18293	18293
R-Squared	0.313	0.314	0.327	0.328	0.406	0.407	0.700	0.700