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Do Global Financial Markets Capitalise Sustainability? Evidence of a Quick Reversal

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Summary

This study investigates the growing importance of sustainability in equity markets by estimating whether company commitment to sustainability matters in corporate valuation. The spreading concern for social and environmental issues, and especially for the material risks of climate change, induces policy to encourage companies to prioritise sustainability in their decision making. There is growing evidence that points to a rationale for a profit-driven response to social and environmental problems, uncovering the role of sustainability in investors' decisions. Exploring a panel of 3,311 listed companies in 58 countries for the period 2010-2016, this study reveals that sustainability contributes to the creation of market value for listed companies, over the considered period. Furthermore, it investigates how this relationship changes according to environmental policy stringency and sector sensitivity to climate policies.

Keywords: Corporate Sustainability, Sustainable Investing, Climate-change, ESG Disclosures

JEL Classification: O16, Q54, Q56, G32

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1. Introduction

Global initiatives such as the Paris Agreement, the Agenda 2030, and the establishment of the Task-Force of Climate-related financial disclosure testify the increasing concern of policymakers for the environmental sustainability of current economic and business models. Against this explicit call for business and financial sectors' contribution to the transition towards a low-carbon and sustainable economy, there is little evidence on how global financial markets capitalise the information disclosed by companies about the sustainability of their businesses.

The Paris Agreement called for the contribution of the financial sector to make "finance flows consistent with a pathway towards low greenhouse gas emissions and climate resilient development" (FCCC/CP/2015/10/Add.1, 2015, p. 22). The launch of the European Commission's Action Plan to reform the financial system along with climate mitigation and sustainable development objectives (European Commission, 2018) represents the most recent step of a policy process that is reshaping the way firms and investors approach sustainability, and that has its evidence in the current expansion of sustainable investing in global financial markets (Global Sustainable Investment Alliance, 2016). Thus, after being long considered a market niche, sustainability seems now diffusely considered "the new normal"[1]. Until the late 2010s, in fact, responsible investors mostly evaluated the ethical and reputational dimensions of their activities, rather than consciously pursuing sustainable development objectives (Sparkes and Cowton, 2004) while asset pricing models did not take into adequate account the sustainability performance, causing undervaluation of socially responsible companies (Derwall et al., 2004; Edmans, 2016). Such an inadequate appreciation of firms' commitment to sustainability might have contributed to spreading the perception of a trade-off between sustainable investing and financial returns that represented an incentive for firms to limit their objectives to short-term financial value creation (Porter, 1992; Vitols, 2011).

The concept of sustainable investing has been changing since the 1960s and has taken different labels and definitions over time, such as ethical investing, socially responsible investing (SRI), Environmental Social and Governance investing (ESG) (Fulton et al., 2012; Renneboog et al., 2008a). The conceptualisation of sustainable investing used in this paper borrows from the definition of the Global Sustainable Investment Alliance: "an investing approach that takes account of ESG factors in portfolio selection and management" (Global Sustainable Investment Alliance, 2016, p. 3). This definition is broad and widely acknowledged, as it encompasses different investment strategies, stemming from negative screening (i.e. eliminating assets from the investment universe of the portfolio according to ESG criteria) to investing in assets specifically related to sustainability, such as clean energy and green technology.

Previous research relating the social and financial performance of companies provided so far clear evidence: many studies suggest the relationship between corporate social performance and financial returns to be positive (Fulton et al., 2012; Godfrey et al., 2009; Margolis et al., 2007; Orlitzky et al., 2003; Waddock and Graves, 1997). Scholars interpret such a relationship as the sign that firms realise material benefits from taking account of a broad set of stakeholders and society at large as recipients of their activities (Godfrey et al., 2009; Vitols, 2011). The channels through which such benefits materialise include the increased consumers' loyalty (Albuquerque et al., 2015), brand reputation (Cahan et al., 2015),

[1]https://www.mckinsey.com/industries/private-equity-and-principal-investors/our-insights/from-why-to-why-not-sustainable-investing-as-the-new-normal?cid=other-eml-alt-mip-mck-oth-1710

talent attraction (Greening and Turban, 2000), customers' satisfaction (Walsh and Bartikowski, 2013) and process efficiency (Porter and van der Linde, 1995). As regards the environmental sphere, in contrast, there is evidence of a negative impact of firms' commitment on financial performance (Brammer et al., 2006; Cheung, 2011; Hassel et al., 2005; Lee and Faff, 2009) and that markets do not react positively to companies' voluntary initiatives aimed at improving environmental standards and reducing carbon emissions (Doh et al., 2010; Eun-Hee Kim and Lyon, 2011; Fisher-Vanden and Thorburn, 2011). Furthermore, Luo et al. (2012) find evidence that institutional, social and economic pressure lead firms to undertake climate mitigation actions, whereas these seem not to be driven by investors' demand. Only more recent researches demonstrate that investors penalise firms that do not embrace sustainability and climate mitigation strategies (Baboukardos, 2017; Clarkson et al., 2015; Lourenço et al., 2012; Matsumura et al., 2014) and positively evaluate firms' sustainability commitment, measured by the inclusion in sustainability stock indexes or by Environmental Social and Governance (ESG) scores produced by data specialised providers (Bauer and Hann, 2010; Cheng et al., 2014; Delmas et al., 2015; Eccles et al., 2014a; Fatemi et al., 2017; Ghoul et al., 2014; Kaspereit and Lopatta, 2016a; Khan et al., 2016).

By using a sufficiently long panel of listed firms for which the environmental sustainability commitment can be measured by an emissions' reduction score in the Thomson Reuters Asset4 database, this paper analyses the relationship between firms' commitment to reduce emissions and their market valuation. The aim is to measure the changing behaviour of financial markets in considering the information about companies' environmental commitment into investment decisions. Since the financial crisis, a growing number of initiatives have been taking place at both national and international levels to restore the financial system's stability, promote sustainability targets and raise awareness about the material risks deriving from the transition towards a sustainable development model. The paper aims at understanding to what extent such initiatives are making financial markets recognise and appreciate companies' commitment to sustainability as a form of risk mitigation and future growth perspectives. Also, it explores if the relevance of sustainability in market valuations varies according to countries' environmental policy stringency and to sectors' sensisitvity to climate-mitigation policies. The research thus contributes to the existing empirical literature by demonstrating that the recent years marked a significant step in the market valuation of environmental sustainability. Specifically, while environmental commitment was found to penalise companies' financial performance at the beginning of this decade, information about environmental sustainability gained importance over time and now financial markets take it positively into consideration. This evidence should make managers and capital owners aware of the positive returns for companies of adopting sustainability strategies and push them in the direction of complete and standardised disclosures of non-financial information.

The remaining of the paper is organised as follows: Section 2 describes the process that lead firms and investors to evaluate sustainability as a source of risk-adjusted long-term value and motivates the hypothesis of the study; Section 3 describes the data and the model employed to test the hypothesis; Section 4 illustrates the results of the estimates and Section 5 presents an interpretation of the main findings.

2. Theory

2.1 Sustainability as a new business paradigm

In the aftermath of the financial crisis, a general feeling of distrust has spread among economists and markets actors, who have started calling into question the pillars of the capitalist economy (Dani Rodrik, 2015; Hein and Truger, 2010; Ioannou and Serafeim, 2017; Vitols, 2015). Economic distress at the global level, changing customer demand, terrorism, business scandals and regulatory actions created uncertainty and risks that now threaten the survival of organisations and impose improving organisational resilience (Burnard and Bhamra, 2011). In this context, environmental challenges contribute to worsening the systemic crisis, giving rise to further technological, social and economic concern, implying a "perfect storm of change" (Dunphy, 2011). These elements constitute what is commonly referred to a *transition* towards a sustainable economy that starts from the adoption of a low-carbon model of development and calls for an active role of the private sector to the lead of this process (European Commission, 2018; Garud and Gehman, 2012; Meadowcroft, 2011). However, high social expectations towards the business sector have often clashed with the perceived inertia of companies regarding deep social and political transformations that eventually has brought about a crisis of CSR (Googins, 2013; Kolk, 2016; Lo and Sheu, 2007). Indeed, while voluntary philanthropic activities have been considered for years a proper approach to defend the brand reputation and gain competitiveness, this is no longer the case (Nieuwenkamp, 2016; Schaltegger et al., 2016). Companies are expected to create the basic conditions of a sustainable development trajectory, and this has led international organisations to call for reconsidering their contribution in this process, starting from a change of approach to value creation (OECD, 2011; UNIDO, 2013; WBCSD, 2012).

Recent years have witnessed the spread of practical and academic business frameworks that share the common objective of achieving organisational value creation to reduce long-term risks and align the purpose of business with societal and environmental goals (Dunphy et al., 2014; Porter and Kramer, 2011; Schaltegger et al., 2016; Stubbs and Cocklin, 2008; Vitols, 2011). Overall, such frameworks conceive financial, reputational, regulatory and environmental risks as opportunities to be harnessed for firms to adopt a long time horizon in corporate governance, enhance competitiveness, and fully disclose financial and non-financial information. Overall, business sustainability is meant to reduce uncertainty, risk and vulnerability in a time of deep transformations and to take advantage of the current change of setting (Winnard et al., 2014). In one definition,

> "a business model for sustainability helps describing, analysing, managing, and communicating (i) a company's sustainable value proposition to its customers, and all other stakeholders, (ii) how it creates and delivers this value, (iii) and how it captures economic value while maintaining or regenerating natural, social, and economic capital beyond its organizational boundaries" (Schaltegger et al., 2016, p. 6).

Sustainability seems to constitute today a new paradigm for companies and anecdotal evidence confirms the existence of an economic rationale for firms to pursue social and environmental objectives (Dunphy et al., 2014; Whelan and Fink, 2016). In spite of this, it is not clear if sustainability has a positive or a negative impact on market value. The purpose of this paper is to investigate the role of the financial sector in the transition of the business towards a low-carbon and sustainable economic model. Although previous evidence supports that investors are reluctant to appreciate firms' sustainability commitment, as illustrated above, more recent findings and market evolutions suggest that this is no longer the case.

2.2 Sustainability to mitigate climate and environmental-related risks for investors

The adverse consequences of the excessive deregulation of the financial system have made policymakers recognise the urgency for regulatory responses to enhance the system's stability, to prioritise long-term growth over short-run profits and to improve financial risk management (Davis, 2011; Douglas W. and Raghuram G. Rajan, 2009; Hein and Truger, 2010). In this circumstance, supervisory and regulatory authorities have acknowledged that social and environmental considerations can constitute the chance to revise the financial system and ensure it "serves the transition to sustainable development" (UNEP, 2015, p. 1). Indeed, a "quiet revolution" is taking place, prompted by national and international initiatives, more or less binding, that aim to promote innovation, better management of risk and improve financial resilience through policies aligned with broad sustainable development targets[2] (UNEP, 2015). Regardless of their binding nature, these initiatives give clear policy signals, design frameworks and promote voluntary principles of investing that together contribute to the creation of a "momentum for sustainable finance" (G20 Green Finance Study Group, 2017). In this context, environmental challenges are a priority in global policymakers' agendas and a material concern for market actors. Especially since has been given scientific proof that human and industrial activities are the leading cause of global warming (Pachauri et al., 2014), climate change is at the centre of the public debate. The Paris Agreement in 2015 is the most explicit evidence that the policy regime on environmental issues is today focused on this topic and more "institutionalised" than in the past. Until ten years ago, it was weak and fragmented so that most market actors managed to oppose to climate change mitigation policies to preserve their assets and technologies from market and regulatory disruptions (Jones and Levy, 2007). However, today, the external conditions associated to the evolution of environmental issues are changing in a way that "influences the returns to firms' investments in mitigation" (Delmas et al., 2015, p. 375). Public and social concern for climate change is affecting investors' perception of ill environmental performance by firms (Bauer and Hann, 2010). Indeed, when some environmental risks increase public sensitivity, this reflects on shareholders' perception of firms' ability to produce future cash flows (Unerman and O'Dwyer, 2007). Furthermore, it is argued that, during the recovery from the financial crisis, equity investors have seen the opportunity of seeking new ways to generate value by embracing ESG issues (Boucly et al., 2011).

In contrast to previous evidence of a perceived trade-off between sustainability commitment and financial performance (Morgan Stanley, 2017; Renneboog et al., 2008b), recent research suggests that firms' sustainability is a signal of better corporate governance and, as such, a source of market value growth (Clark et al., 2015; Eccles et al., 2014a; Lourenço et al., 2012). Hence, it appears that, if formerly a minority of committed investors was concerned with non-financial dimensions of value mainly for ethical and reputational considerations, today sustainable investing is recognised as the best way to reduce risk and achieve long-term value (Crifo and Forget, 2013; Robins and Krosinsky, 2008; Sparkes and Cowton, 2004). Also, according to Eccles and Viviers (2011, p. 401), integrating ESG criteria into investment choices has "the primary purpose of delivering higher-risk-adjusted financial returns".

Climate change is perhaps the most evident example of how growing social and institutional concern leads firms and investors to pay more attention not only to the unconditional socially acceptable content of their assets, but also on the risks deriving from regulation and social pressure in the long-run (Harmes, 2011; Kauffmann et al., 2012; Mercer, 2015; Sullivan and Gouldson, 2012). On this matter, there is evidence that the financial sector is heavily exposed to risks deriving from climate mitigation policies that, limiting the amount of emissions, affect the value of assets and the profitability of firms operating in

[2] see Appendix A for an illustration of the most relevant initiatives for corporate and financial sustainability

most climate-sensitive industries. For instance, Weyzig et al. (2014) estimate in more than one trillion euros the exposure of European financial institutions to the depreciation of fossil reserves that have repercussions on the value of fossil fuel companies. Moreover, according to Battiston et al. (2017), the financial exposure of equity portfolios of the 50 largest European banks in the Euro Area to climate policy sensitive sectors[3] is around 40-54% of assets invested, and the interconnections among financial institutions are likely to amplify losses to the global financial system.

To sum up, literature seems to indicate that perception of environmental and climate risks, especially boosted by mitigation policies and frameworks promoting sustainable finance, are massively changing investment criteria. The prompt for a transition to a sustainable economic model is changing the approach of investors, who interpret companies' sustainability commitment as a proxy for the ability of the management to take account of current global transformations, thus acting to prevent risks to their profitability and seize growth opportunities. Based on this reasoning, this study is an empirical test of the following:

Hypothesis: Companies' commitment towards environmental sustainability is positively associated with increases in their market capitalisation and such association increases overtime.

3. Materials and methods

3.1 Sample and Data

The study employs a panel dataset retrieved from Thomson Reuters DataStream, containing information on financial and sustainability performance for listed firms worldwide, in the period 2010-2016. Data on sustainability are available from Thomson Reuters Asset4, a data provider commonly employed by both scholars and financial analysts to evaluate companies' ESG performance (Baboukardos, 2017; Cheng et al., 2014; Chollet and Sandwidi, 2018; Eccles et al., 2014b; Ghoul et al., 2014). Asset4 collects raw data on the yearly sustainability performance of companies listed in major stock indexes (S&P 500, MSCI World Index, Nasdaq, FTSE350, MSCI World Index etc.) through content research from publicly available information, including firms' reports or official websites. The database displays around 700 individual data points, corresponding to specific questions or items on the company's performance; these are then normalised and traced back to a 0-100 scale. This procedure allows to rank and to benchmark a firm's performance against all the firms in the dataset in any fiscal year and implies that the score has a substantial variability at the firm level, with a within standard deviation of 11.37. Notice that, in each point of time, the score is built upon the information available in the previous year, thus the variable is by construction lagged by one year. The z-scores are aggregated into 18 category scores, further classified into four performance pillars: economic, social, environmental and corporate governance. The overall equally-weighted aggregation of the scores in the four pillars constitutes a balanced ESG performance index. Since the latter covers a vast number of performance indicators, this study focuses the analysis on a stricter set of indicators, employing as the main variable of interest the category score within the environmental pillar of the Asset4 universe, namely "Emissions reduction", here labelled *Sust*. According to the data provider, the emissions reduction category score reflects *a company's commitment and effectiveness towards reducing environmental emission in the production and operational processes.*[4] This score is composed of the equally weighted sum of 23 indicators on firms' strategies to reduce emissions and their environmental

[3] See Section 4 for a definition of climate policy sensitive sectors

[4] https://financial.thomsonreuters.com/content/dam/openweb/documents/pdf/financial/esg-scores-methodology.pdf

impact. Since the information that constitutes the scores derives from public sources, it cannot be considered fully objective. Indeed, the score is influenced by firms' transparency and disclosures choices. Therefore, by construction, the variable *Sust* can be conceived as a measure of firms' disclosed commitment to reduce emissions and adopt sustainability policies. A high score means that the company has a good sustainability performance in comparison to the others and that this information is publicly available, whereas low scores do not necessarily imply the opposite. Put differently, a company could have a good sustainability performance, but score low in the *Sust* variable if its strategy is not publicly disclosed. Thus, the sample in this research is not representative of all listed firms at the global level; rather it includes all firms in major stock indexes that disclose sustainability information. Table 1 shows the description of the variables employed in the analysis.

Table 1. Description of variables

Name	Description
MVE	Total market value of a company (Market Price-Year End times the number of common shares outstanding), M€
BVE	Book value of the sum of Preferred Stock and Common Shareholders' Equity, M€
Income	Net income before extraordinary items and preferred and common dividends, M€
Sust	Sustainability commitment: category score "Emissions reduction" in Thomson Reuters Asset4, z-score (1-100)
Sales	Net Sales or revenues, M€
Capex	Funds used to acquire fixed assets other than those associated with acquisitions, M€
Leverage	Fraction of the total debt of the firm on the book value of equity (%)
ROA	Return on assets: fraction of the earnings before interests and taxes on total assets of the company (%)

The initial sample includes the 3,766 firms included in the Asset4 universe, which display an average market value of around 5.2 billion euros. The ample variability of main accounting variables reflects the heterogeneity of firms within the sample. To guarantee the analysis is not influenced by outliers, all observations of the dependent variable above the 95th percentile and below the 5th percentile are eliminated. Also, since the dependent variable (*MVE*) has a log-normal distribution, a logarithm transformation is applied to ensure it is normally distributed[5]. The model is thus transformed into a log-log by taking the natural logarithm of all covariates expressed in euros.

After eliminating missing values and outliers, the resulting sample contains 3,311 firms in 54 industries with domicile in 58 countries. The firms are unregularly observed through the period 2010-2016 and this implies the full database to be an unbalanced panel of 18,043 observations, with an average presence of a company within the panel of 6 years. Table 2 reports the summary statistics of the variables after the data cleaning process. Appendix B reports the distribution of firms by year, country and sector.

Table 2 Summary Statistics

	Mean	SD	Min	Max	Q1	Median	Q3
MVE	5259.10	5156.27	328.04	25071.87	1661.79	3325.84	6959.96
BVE	3297.74	4440.86	3.02	68398.83	913.92	1845.77	3879.17
Income	377.34	541.72	0.04	17808.04	94.53	202.00	445.62
Sust	53.54	31.72	0.00	96.07	18.76	56.42	86.31
Sales	5669.48	9562.53	0.02	140068.00	1083.27	2573.93	6173.14
Capex	349.41	724.17	0.00	15715.03	42.19	120.28	345.80
Leverage	1.15	8.32	0.00	960.44	0.25	0.58	1.12
ROA	0.09	0.09	-0.12	3.16	0.04	0.07	0.12
N	18043						

[5] The normal distribution of *MVE* is verified by plotting the Q-Q plot and by running the Chi-squared test for normal distribution

3.2 Empirical model

The empirical strategy employed to test the hypothesis builds upon the RIM - Residual Income Model (Ohlson, 1995), widely used in the literature on the relationship between corporate responsibility and market value (Clarkson et al., 2015; Hassel et al., 2005; Hughes, 2000; Kaspereit and Lopatta, 2016b; Lourenço et al., 2012; Matsumura et al., 2014). The RIM identifies companies' market value as a function of the book value of equity and of residual income, expressed by abnormal operating earnings[6], plus other value-relevant information. In the empirical literature, often net income is employed as a proxy for abnormal earnings (Hughes, 2000; Lourenço et al., 2012; Matsumura et al., 2014) and there is proof that results do not significantly differ in the two specifications of the model (Clarkson et al., 2015; Collins et al., 1997). Therefore, the model employed in this study takes the following form:

$$(1) \qquad MVE_{i,t} = u_i + \beta_1 BVE_{i,t} + \beta_2 Income_{i,t} + \beta_3 Sust_{i,t} + \Sigma\gamma \mathbf{X}_{i,t} + v_t + \varepsilon_{i,t}$$

Where, for each company *i* in year *t*, *MVE* is the total market value of equity, *BVE* is the book value equity, *Income* is the net income before extraordinary items, *Sust* is the sustainability commitment score provided by Asset4. **X** is a matrix of control variables, including capital expenditure (*Capex*), net Sales (*Sales*), financial leverage (*Leverage*) and return on assets (*ROA*). The model includes firms-specific and time invariant effects to control for companies' unobserved characteristics (u_i) and year fixed effects (v_t). The latter is particularly important since the period analysed follows the financial crisis that had strong repercussions on firms' valuations worldwide. The parameters β_1, β_2, β_3 and γ are estimated via OLS after applying the within transformation that wipes-out the company-level effects and the time effects are estimated including yearly dummy variables. Finally, the stochastic component of the model, ε, is assumed a white noise.

According to previous literature, an interesting predictor for economic performance to be included in the model is expenditure in R&D, which captures firms' intangible value and propensity to innovate (McWilliams and Siegel, 2000). However, due to the lack of R&D data for more than 800 firms in the sample, the model and the main results shown in the paper do not include this variable in order not to lose too many observations. To check this choice does not entail omitted variable bias, all the estimates presented below are run including R&D intensity as a control for the subsample of firms for which data is available. Despite the variable being significant, results show that its inclusion does not essentially modify the estimates and that it is not strongly correlated with *Sust*[7].

To examine the evolution of the sustainability – market value relationship over time, the paper introduces an alternative specification of the model that includes the interaction term between sustainability commitment (*Sust*) and year dummies (*Year*) from 2010 to 2016:

$$(2) \qquad MVE_{i,t} = u_i + \beta_1 BVE_{i,t} + \beta_2 Income_{i,t} + \sum_{t=2010}^{2016} \beta_t Year_t \cdot Sust_{i,t} + \Sigma\gamma \mathbf{X}_{i,t} + v_t + \varepsilon_{i,t}$$

The coefficients of the interaction terms β_t allow capturing the effect of a unit increase in *Sust* on *MVE* from year to year. Specifically, in the time interaction model, *Sust* represents the direct effect of a unit increase in sustainability commitment on *MVE* in 2010, while each coefficient of the interaction term

[6] In the original model (Ohlson, 1995), abnormal operating earnings are defined as net income minus opening book value of equity, multiplied by the required rate of return.

[7] Results are available upon request

between *Sust* and year dummies expresses the difference in this relationship with respect to 2010, other variables constant. According to the hypothesis of the study, these coefficients are expected to be positive, reflecting the growing attention to sustainability in financial markets along with the number of initiatives promoting sustainable development objectives.

In setting the empirical model, potential sources of concern are taken into account related to endogeneity issues that could lead to biased estimates. First, measurement error is likely to arise when using scores that could give an imprecise measure of the variable of interest. However, the score of sustainability here employed is a proxy for firms' commitment to address environmental issues. Hence, since a "true value" of *Sust*, potentially miscalculated, is not expected to be observed, this issue cannot be considered as a relevant source of concern. Second, given the nature of the data, problems of endogeneity originate from omitted variables and systematic differences in firm-specific characteristics that the covariates in the model fail to capture entirely. For example, quality of management, corporate strategy and governance effectiveness are not controlled but are correlated with the covariates, thus generating biased estimates. To deal with this issue, the study employs a fixed-effect estimator, which allows controlling for unobserved firm-specific characteristics. A third concern is caused by simultaneity, which arises when two variables reciprocally affect one another, making it impossible to interpret the estimates in a univocal causal direction. In the specific case of this study, if a firm' decision to undertake sustainability actions can enhance its market valuation, it could also be that mainly firms with a positive financial performance can afford to do so. A common approach to deal with simultaneity in market valuation studies is to replace endogenous variables with their lags or to use the latter as instrumental variables (Delmas et al., 2015; Hirunyawipada and Xiong, 2018; Lo and Sheu, 2007; Wagner, 2010). Recall that, by construction, variable *MVE* captures the market value of a company at the end of the fiscal year, whereas ESG data published in Asset4 in year *t* refers to information available in *t-1*. Hence, variable *Sust* is implicitly lagged by one year, which allows establishing a time order between sustainability and market value.

4. Results

4.1 Main results on the global sample

Table 3 shows the main findings of the research. The first column reports the results of the fixed effects estimates obtained with model (1). While all the main regressors and the control variables have coefficients estimates that are consistent with expectations, the negative and not statistically significant *Sust* coefficient does not allow concluding about a positive effect of environmental sustainability on financial performance. The second column (model (2)) shows the results including time interactions and the estimates overturn the previous evidence. Firstly, the *F*-test on the joint significant of all the sustainability related coefficients confirms that *Sust*, in fact, significantly impact the financial performance. Secondly, the estimated impact of *Sust* is negative and significant in 2010: on average, an increase in *Sust* by about 30 points (approximately one standard deviation) is associated to a decrease by 1.7% in companies' market value, other things being equal. The result is even worse for the year 2011, when the cumulative effect of a change in *Sust* by one standard deviation is a decrease in the market value by approximately 2.7%. However, this effect decreases in 2012-2013 until getting significantly positive in 2014-2015. In 2015, a standard deviation increase in *Sust* is associated to a +0.6% change in the market value. Therefore, the findings reported here seem to give evidence for a sign switch in the relationship between sustainability and market value of companies. This could be interpreted as evidence

that investors' perception of sustainability and of its impacts on firms' profitability has been changing overtime for the sample of firms and in the period analysed. Yet, the coefficient for 2016 is not significant and this appears to be a sudden interruption in what appears to be a clear trend that requires further investigation.

Table 3. Main results

	MVE_t All sample	MVE_t All sample
BVE	0.308***	0.311***
	(14.09)	(14.19)
Income	0.111***	0.112***
	(14.45)	(14.60)
Sust	-0.000301	-0.000505
	(-1.17)	(-1.56)
Sust × 2011		-0.000352*
		(-1.86)
Sust × 2012		0.0000389
		(0.17)
Sust × 2013		0.000491*
		(1.93)
Sust × 2014		0.000735***
		(2.68)
Sust × 2015		0.000709**
		(2.14)
Sust × 2016		0.0000775
		(0.22)
Capex	0.0500***	0.0501***
	(8.09)	(8.11)
Sales	0.153***	0.158***
	(5.90)	(5.94)
Leverage	0.00204***	0.00206***
	(2.98)	(2.98)
ROA	1.234***	1.225***
	(6.88)	(6.88)
Year fixed effects	Yes	Yes
Firm fixed effects	Yes	Yes
N	18043	18043
N_firms	3311	3311
r2_within	0.458	0.459
r2_overall adj	0.670	0.669
F test Sust	1.36	4.03
F test Sust (p-value)	0.24	0.000

t statistics in parentheses. Robust standard errors. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

4.2 Further results

In this section, the exercise illustrated in Table 3 is repeated reducing the sample of firms on a country base and an industry base respectively. This procedure allows capturing if the relationship between sustainability and firms' market value is linked to characteristics of specificic country and industry groups. Specifically, as described in Section 2, the role of policy initiatives in promoting a sustainability transition is pivotal in changing the relevance of sustainability strategies in market valuations. Hence, the severity of policies promoting environmental sustainability is expected to strengthen the relationship between sustainability commitment and market valuation and such an increase should be observed in

countries with high environmental policy stringency. Indeed, firms operating in these countries that exhibit a good sustainability performance are, in fact, more likely to meet future social and public expectations and this might be reflected on their market valuation. To test for this assumption, the sample is restricted to firms that have domicile in countries with a high level of the environmental policy stringency. The historical level of environmental policy stringency is used to approximate the likelihood that a country will be more prone to introduce initiatives to foster sustainability and climate mitigation targets. Data on the Environmental Policy Stringency Index by the OECD (Botta and Koźluk, 2014) helps to do so. The latter is a country-specific measure that allows comparing the strictness of environmental policy instruments, especially related to climate and air pollution. Stringency depends on the degree to which policies impose implicit or implicit prices on polluting activities[8]. Data is available for all OECD countries plus Brazil, China, India, Indonesia, Russia and South Africa enabling covering almost the entire sample in this study. To select the group of countries with high policy stringency, the average score for each country between 2005 and 2015 is computed, and then are considered all countries with an average score above the median.

As a second analysis, the paper focuses on firms in sectors more exposed to climate policies. Recalling that climate change is a leading cause for the growing social and institutional concern for sustainability, companies in certain categories of sectors should be more exposed to climate policies and to the risks of a sustainability transition. Accordingly, it could be that sustainability commitment plays a more important role for such companies than for others in signalling their willingness to take action to adapt in a changing context and this might be reflected in a stronger association between market value and sustainability. A way to check for this is to select a subset of firms that operate in climate-policy sensitive sectors (CSS), i.e. fossil fuel, utilities, energy-intensive, transport and housing. This selection derives from that of climate-relevant sectors identified by Battiston et al. (2017), building upon the European Commission's carbon leakage risk classification (2014/746/EU) that individuates companies most heavily affected by the introduction of carbon prices.

Table 4 shows the results obtained with the sample restrictions explained here. Columns 1 and 2 show the results obtained when the sample is reduced to companies operating in countries with "high" environmental policy stringency. In contrast to previous estimates, the association of *Sust* with *MVE* obtained with model (1) is positive and significant. Estimates with model (2) show that it is never significantly negative between 2010 and 2013 while in 2014-2015 it is positive, significant and with a magnitude more than three times higher with respect to the full sample. Hence, overall results suggest that investors are more prone to evaluate companies' commitment to sustainability for companies that might face stricter environmental constraints than for companies in countries with softer environmental policy stringency. Indeed, by undertaking actions to reduce their emissions, such companies are more likely to anticipate regulatory constraints and to meet the expectations of stakeholders more sensitive to sustainability issues. However, this result does not hold in the analysis on the sample of firms in climate-sensitive sectors, as hardly any evidence emerges on the relationship between *MVE* and *Sust*. Conversely, excluding such companies from the sample strengthens the results observed in Table 3. For the sake of simplicity, Table 4 reports only the estimates obtained in the latter case. Specifically, Columns 3 and 4 show that results are still consistent with those for the global sample, but in the time interaction model the sustainability-market value relationship appears positive and significant in the period 2013-2016. As shown in Column 5, these findings are much stronger for the subgroup of firms not operating in climate-

[8] For details, see http://www.oecd.org/eco/growth/Do-environmental-policies-matter-for-productivity-growth.htm

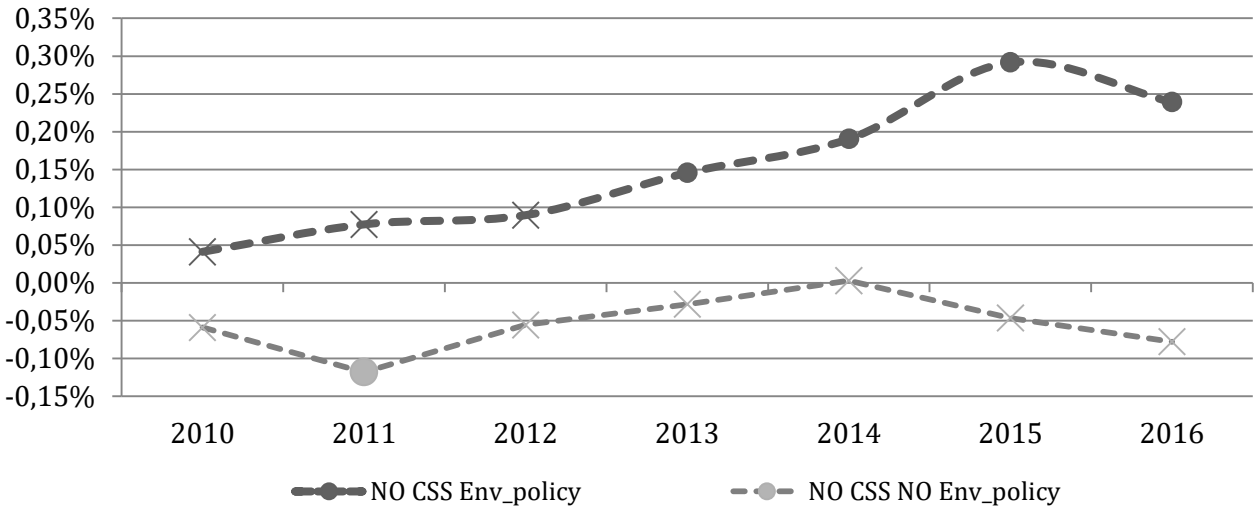
sensitive sectors, in countries with stricter environmental regulation. Specifically, in this case, there is no evidence of sign switch, rather *Sust* is always positively associated to *MVE*, and the relationship is statistically significant from 2013 to 2016. Figure 1 summarises these findings illustrating the difference between the estimate coefficients obtained for firms in climate-sensitive sectors in countries with high environmental policy stringency and for those in low environmental policy stringency.

Table 4. Estimates with country and industry restrictions

	MVE_t Env policy	MVE_t Env policy	MVE_t No CSS	MVE_t No CSS	MVE_t Env policy No CSS
BVE	0.346***	0.351***	0.253***	0.257***	0.318***
	(10.53)	(10.48)	(10.41)	(10.57)	(8.84)
Income	0.0881***	0.0876***	0.116***	0.116***	0.0892***
	(7.52)	(7.55)	(13.38)	(13.56)	(7.12)
Sust	0.00110**	0.000754	-0.000248	-0.000868**	0.000412
	(2.19)	(1.25)	(-0.86)	(-2.35)	(0.63)
Sust × 2011		-0.000480		-0.000266	0.000362
		(-1.37)		(-1.20)	(0.98)
Sust × 2012		-0.000332		0.000365	0.000485
		(-0.78)		(1.34)	(1.06)
Sust × 2013		0.000657		0.000988***	0.00104**
		(1.44)		(3.37)	(2.11)
Sust × 2014		0.00102**		0.00126***	0.00149***
		(2.03)		(4.02)	(2.81)
Sust × 2015		0.00229***		0.00136***	0.00250***
		(3.88)		(3.60)	(4.19)
Sust × 2016		0.00104		0.000866**	0.00198***
		(1.54)		(2.18)	(2.82)
Capex	0.0396***	0.0392***	0.0313***	0.0317***	0.0182**
	(4.10)	(4.07)	(5.29)	(5.36)	(2.12)
Sales	0.198***	0.206***	0.191***	0.202***	0.303***
	(4.86)	(5.01)	(6.44)	(6.59)	(6.33)
Leverage	0.0105***	0.0104***	0.00156***	0.00159***	0.00829***
	(4.05)	(3.68)	(3.18)	(3.20)	(4.49)
ROA	1.091***	1.090***	1.009***	0.989***	0.795***
	(4.21)	(4.31)	(5.34)	(5.36)	(3.83)
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes
N	5262	5262	12711	12711	3638
N_firms	1026	1026	2276	2276	672
r2_within	0.560	0.565	0.505	0.508	0.651
r2_overall adj	0.736	0.735	0.662	0.660	0.724
F test Sust	4.89	4.68	0.66	5.20	3.72
F test Sust (p value)	0.027	0.000	0.417	0.000	0.000

t statistics in parentheses. Robust standard errors. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Columns 1, 2, 5 show the estimate obtained in the sample of firms in country with stringent environmental policy: Australia, Austria, Canada, Czech Republic, Denmark, Finland, France, Germany, Hungary, Italy, Korea, Netherlands, Norway, Spain, Sweden, Switzerland, United Kingdom. In Columns 3, 4, 5, the sample does not include companies in the following industries: automobiles, chemicals, coal, construction, utilities (gas, water, multiline), metals&mining, oil&gas (and related equipment), transportation, renewable energy, transport infrastructure.

Figure 1. Yearly changes in *MVE* associated to unitary changes in *Sust*. CSS firms in high environmental policy stringency countries VS CSS firms in low environmental policy stringency countries



×: p-value of the coefficient>0.05. "High" environmental policy stringency is determined by values above the median of the average Environmental Policy Stringency Index, calculated between 2005 and 2015.

5. Discussion

At first, the finding that investors' appreciation of sustainability commitment is not emphasised for sectors more exposed to climate risks appear counter-intuitive. However, this may give additional suggestions regarding the link between sustainability commitment and market valuation. Indeed, this paper builds upon the idea that investors interpret companies' commitment to environmental sustainability as a signal that organisations recognise the need to undertake concrete actions to evolve their business models along with lines consistent with expected normative, market and social evolutions promoting sustainability. The higher the likelihood that new initiatives and regulations are introduced, here approximated by the historical environmental policy stringency at the country level, the stronger the association between sustainable conduct and market valuation. Nonetheless, the case of sectors more likely to suffer from the introduction of environmental policies and from a sustainability transition is different. Building on existing literature, it could be argued that, for companies in such sectors, reducing emissions and embracing a sustainable business model is a necessary condition to keep value in the future and endure radical transformations in their business environment (Burnard and Bhamra, 2011; Clark et al., 2015; Mercer, 2015). Hence, a possible interpretation of the findings is that investors already expect these companies to commit to sustainability and obtain a positive sustainability performance. Accordingly, firms in such sectors that do not signal their commitment are expected to lose, while those that succeed in increasing their sustainability are not expected to gain. On this matter, notice that the average sustainability score of the subgroup of climate sensitive is 11.8 points higher than that computed on the overall sample, *MVE* being equal. Specifically, the *t-test* for the difference in *Sust* between the two groups of firms is significant at 99%, while the difference in *MVE* is 0.027 and not significant. This is in accordance with the evidence that companies with higher emissions are more likely to adopt specific governance mechanisms and reporting on climate risks (Sullivan, 2009). To summarise, it could be argued that companies that undertake sustainability strategies while not being expected to do so, inform the market of their willingness to align their business model anticipating future evolutions in the market. Thus, investors interpret such behaviour as a signal that these companies are more prone to adapt to expected market changes and ready to seize opportunities emerging in a changing context.

Now, it is worth stressing that the growth of sustainability as an investment criterion strictly depends on companies' ability to credibly communicate their future strategies and the financial implications of their commitment. Indeed, previous research demonstrates that improvements in non-financial disclosures reduce the negative impacts of unexpected increases in regulatory severity (Blacconiere and Patten, 1994; Eun-Hee Kim and Lyon, 2011; Freedman and Patten, 2004). Also, it reduces the uncertainty on firms' future liabilities, which translates into higher market valuation (Barth and McNichols, 1994; Campbell et al., 2003). Until recent times, non-financial disclosures was mainly voluntary, and that has lead corporate reporting to lack credibility (Cho et al., 2012; Cho and Patten, 2007; Gray et al., 1995; Kuzey and Uyar, 2017; Ruhnke and Gabriel, 2013) and previous studies demonstrate that the quality of information voluntarily reported does not allow investors to evaluate firms' performance and their exposure to environmental, regulatory and market risks (Haigh et al., 2011; Kolk et al., 2008; Sullivan and Gouldson, 2012). However, latest years have witnessed a spread of standards for non-financial reporting and of mandatory disclosures worldwide[9] that are helping to translate the policy achievements on sustainable development into more concrete action. One of the most well-known initiatives in this regard is the EC Directive 2014/95/EU that requires European public-interest entities to add to their financial statements information on risks and policies regarding environmental, social and governance dimensions. According to the Carrots&Sticks Report 2016, the total number of mandatory and voluntary reporting instruments for ESG disclosure (standards, regulations, codes of conduct) in 71 countries has grown from 151 in 2010 to 180 in 2013 and 383 in 2016, and governments are the main issuers of these tools. Such diffusion in reporting improves the credibility of the information and helps investors distinguish which firms are effectively worth investing in to obtain returns in the future (Baboukardos, 2017; Ioannou and Serafeim, 2017; Sullivan and Gouldson, 2012). The growing attention and availability of non-financial information may play a significant role in explaining the findings presented in this study. Indeed, the implicit assumption in this paper is that investors observe companies' sustainability performance, either from the Asset4 scores or directly from companies' sources such as sustainability reports. As anticipated, the main limit of the sustainability score employed here is that it approximates firms' commitment based on available public sources. However, considering the growing importance of ESG dimensions in market valuations and disclosure instruments, it is likely that financial analysts evaluating companies' sustainability from Thomson Reuters pay more attention to the overall ESG score rather than a subgroup of indicators. In addition, a recent study demonstrates that social and governance dimensions matter more than the environmental one in reducing firms' exposure to financial risks (Chollet and Sandwidi, 2018). To check if this is the case, the main estimates of this study are repeated computing companies' sustainability with the overall ESG score, which reflects a balanced view of a company's performance in economic, environmental, social and corporate governance dimensions. Results (see Table C.1 in Appendix C) are consistent with those obtained with variable *Sust*, but, as expected, the relationship between ESG scores and companies' market value appears stronger in both magnitude and significance. Specifically, in 2015, a standard deviation (17.68) increase in the ESG score is associated to a market value change by more than 5%. Thus, there is confirm of a growing trend in the importance of sustainability, and more in general to ESG performance, as a factor that increases the perception of future growth of companies, especially for those not expected to undertake such actions.

[9] For an overview of mandatory laws on GHG reporting, see http://www.wri.org/blog/2015/05/global-look-mandatory-greenhouse-gas-reporting-programs

6. Conclusion

This paper investigates the relationship between companies' commitment to sustainability and their market capitalisation. The research is justified by the growing relevance of firms' pursuit of environmental, social and governance objectives, which, since the aftermath of the 2008 financial crisis, have entered the priorities of policy agendas. Specifically, the study focuses on companies' actions to mitigate the environmental impact of their activities and reduce emissions. The choice to focus on these aspects is led by the spread concern for climate change, become central especially since 2014 onwards. In this context, the growth of frameworks for sustainable business models and ESG investing suggests a massive overturning in the approach of financial markets to sustainability, in opposition with traditional established paradigms claiming a trade-off between environmental commitment and profitability of investments. This research aims to give evidence of a switch in investors' approach to sustainability that involves mainstream global markets and no longer a niche of committed investors. Using a panel dataset of more than 3,000 listed firms worldwide between 2010 and 2016, it provides a first evidence of a sign change in the relationship between firms' commitment to sustainability and their market value. Specifically, if such a relationship appears negative and not significant in the whole period under examination, the study reveals a trend of quick and significant reversal when focusing the analysis on a year-to-year basis. These results lead to argue that the increase in sustainability commitment is a source of market value growth, since it indicates firms' awareness and willingness to adapt to market and regulatory evolutions related to sustainable development. The evidence is stronger for firms located in countries with stricter environmental policy stringency, while there is no evidence of such a relationship for firms most exposed to climate risks. The latter result may indicate that only companies that engage in sustainability even though they are not expected to do so experience a positive market valuation change. Sustainability commitment, indeed, signals that the organisation is aware of future market transformation and willing to undertake actions to go beyond rule compliance and stakeholders' expectations. The empirical strategy and the data employed allow to mitigate concerns regarding reverse causality, although the nature of the data, i.e. all companies in main stock indexes for which Asset4 reports sustainability data, prevents from strong conclusions concerning the external validity of the relation. Despite its limits, this study has a valuable impact on policy and on the private sector. Indeed, the findings suggest that market forces are playing an active role in the transition towards a sustainable economic model, as global policymakers wished through the launch of initiatives such as the Sustainable Development Goals (Douma et al., 2017). Also, the research contributes to raising consciousness in investors and business practitioners of the direction that global markets are taking in the future to accelerate such a transition. Future research may refine the findings presented here, especially through a more detailed inquiry of how policies affect companies and investors' engagement in sustainability actions at the country level. Secondly, it may be oriented to individuate empirically the drivers of the rapid growth of sustainability investing among both professional asset owners and small savers. Moreover, further investigation is needed to understand the role of ESG disclosure improvements and the increasing release of reporting standards in affecting the relationship between companies' sustainability performance and their market valuation.

References

Albuquerque, R., Durnev, A., Koskinen, Y., 2015. Corporate Social Responsibility and Firm Risk: Theory and Empirical Evidence. (Working paper) Boston University.

Baboukardos, D., 2017. Market valuation of greenhouse gas emissions under a mandatory reporting regime: Evidence from the UK. Account. Forum. https://doi.org/10.1016/j.accfor.2017.02.003

Barth, M.E., McNichols, M.F., 1994. Estimation and Market Valuation of Environmental Liabilities Relating to Superfund Sites. J. Account. Res. 32, 177–209.

Battiston, S., Mandel, A., Monasterolo, I., Schütze, F., Visentin, G., 2017. A climate stress-test of the financial system. Nat. Clim. Change 7, 283–288. https://doi.org/10.1038/nclimate3255

Bauer, R., Hann, D., 2010. Corporate Environmental Management and Credit Risk (SSRN Scholarly Paper No. ID 1660470). Social Science Research Network, Rochester, NY.

Blacconiere, W.G., Patten, D.M., 1994. Environmental disclosures, regulatory costs, and changes in firm value. J. Account. Econ. 18, 357–377. https://doi.org/10.1016/0165-4101(94)90026-4

Botta, E., Koźluk, T., 2014. Measuring Environmental Policy Stringency in OECD Countries. https://doi.org/10.1787/5jxrjnc45gvg-en

Boucly, Q., Sraer, D.A., Thesmar, D., 2011. Growth LBOs (SSRN Scholarly Paper No. ID 1354087). Social Science Research Network, Rochester, NY.

Brammer, S., Brooks, C., Pavelin, S., 2006. Corporate Social Performance and Stock Returns: UK Evidence from Disaggregate Measures. Financ. Manag. 35, 97–116. https://doi.org/10.1111/j.1755-053X.2006.tb00149.x

Burnard, K., Bhamra, R., 2011. Organisational resilience: development of a conceptual framework for organisational responses. Int. J. Prod. Res. 49, 5581–5599. https://doi.org/10.1080/00207543.2011.563827

Cahan, S.F., Chen, C., Chen, L., Nguyen, N.H., 2015. Corporate social responsibility and media coverage. J. Bank. Finance 59, 409–422. https://doi.org/10.1016/j.jbankfin.2015.07.004

Campbell, K., Sefcik, S.E., Soderstrom, N.S., 2003. Disclosure of Private Information and Reduction of Uncertainty: Environmental Liabilities in the Chemical Industry. Rev. Quant. Finance Account. 21, 349–378. https://doi.org/10.1023/B:REQU.0000004783.24513.ea

Cheng, B., Ioannou, I., Serafeim, G., 2014. Corporate social responsibility and access to finance. Strateg. Manag. J. 35, 1–23.

Cheung, A.W.K., 2011. Do Stock Investors Value Corporate Sustainability? Evidence from an Event Study. J. Bus. Ethics 99, 145–165. https://doi.org/10.1007/s10551-010-0646-3

Cho, C.H., Freedman, M., Patten, D.M., 2012. Corporate disclosure of environmental capital expenditures: A test of alternative theories. Account. Audit. Account. J. 25, 486–507. https://doi.org/10.1108/09513571211209617

Cho, C.H., Patten, D.M., 2007. The role of environmental disclosures as tools of legitimacy: A research note. Account. Organ. Soc. 32, 639–647. https://doi.org/10.1016/j.aos.2006.09.009

Chollet, P., Sandwidi, B.W., 2018. CSR engagement and financial risk: A virtuous circle? International evidence. Glob. Finance J. https://doi.org/10.1016/j.gfj.2018.03.004

Clark, G.L., Feiner, A., Viehs, M., 2015. From the Stockholder to the Stakeholder: How Sustainability Can Drive Financial Outperformance.

Clarkson, P.M., Li, Y., Pinnuck, M., Richardson, G.D., 2015. The Valuation Relevance of Greenhouse Gas Emissions under the European Union Carbon Emissions Trading Scheme. Eur. Account. Rev. 24, 551–580. https://doi.org/10.1080/09638180.2014.927782

Collins, D.W., Maydew, E.L., Weiss, I.S., 1997. Changes in the value-relevance of earnings and book values over the past forty years. J. Account. Econ., Properties of Accounting Earnings 24, 39–67. https://doi.org/10.1016/S0165-4101(97)00015-3

Crifo, P., Forget, V., 2013. Think Global, Invest Responsible: Why the Private Equity Industry Goes Green. J. Bus. Ethics 116, 21–48. https://doi.org/10.1007/s10551-012-1443-y

Dani Rodrik, 2015. When Economists Go Wrong, in: Economics Rules: The Rights and Wrongs of the Dismal Science. WW Norton & Company, p. Ch 5.

Davis, K., 2011. Regulatory Reform Post the global Financial Crisis: An Overview.

Delmas, M.A., Nairn-Birch, N., Lim, J., 2015. Dynamics of Environmental and Financial Performance: The Case of Greenhouse Gas Emissions. Organ. Environ. 28, 374–393. https://doi.org/10.1177/1086026615620238

Derwall, J., Guenster, N., Bauer, R., Koedijk, K., 2004. The eco-efficiency premium puzzle. Financ. Anal. J. 51–63.

Doh, J.P., Howton, S.D., Howton, S.W., Siegel, D.S., 2010. Does the Market Respond to an Endorsement of Social Responsibility? The Role of Institutions, Information, and Legitimacy. J. Manag. 36, 1461–1485. https://doi.org/10.1177/0149206309337896

Douglas W., Raghuram G. Rajan, 2009. The Credit Crisis: Conjectures about Causes and Remedies. Am. Econ. Rev. 99, 606–610.
Douma, K., Scott, L., Bulzomi, A., 2017. The SDG Investment Case. PIR, PWC, UNEP, UN Global Compact.
Dunphy, D., 2011. Chapter 1 Conceptualizing Sustainability: The Business Opportunity, in: Eweje, G., Perry, M. (Eds.), Critical Studies on Corporate Responsibility, Governance and Sustainability. Emerald Group Publishing Limited, pp. 3–24. https://doi.org/10.1108/S2043-9059(2011)0000003009
Dunphy, D.C., Benn, S., Griffiths, A., 2014. Setting the agenda for corporate sustainability, in: Organizational Change for Corporate Sustainability, Understanding Organizational Change. Routledge, Abingdon, Oxon, pp. 3–33.
Eccles, N.S., Viviers, S., 2011. The Origins and Meanings of Names Describing Investment Practices that Integrate a Consideration of ESG Issues in the Academic Literature. J. Bus. Ethics 104, 389–402. https://doi.org/10.1007/s10551-011-0917-7
Eccles, R.G., Ioannou, I., Serafeim, G., 2014a. The Impact of Corporate Sustainability on Organizational Processes and Performance. Manag. Sci. 60, 2835–2857. https://doi.org/10.1287/mnsc.2014.1984
Eccles, R.G., Ioannou, I., Serafeim, G., 2014b. The Impact of Corporate Sustainability on Organizational Processes and Performance. Manag. Sci. 60, 2835–2857. https://doi.org/10.1287/mnsc.2014.1984
Edmans, A., 2016. Does Socially Responsible Investing Make Financial Sense? Wall Str. J.
Eun-Hee Kim, Lyon, T., 2011. When Does Institutional Investor Activism Increase Shareholder Value?: The Carbon Disclosure Project. BE J. Econ. Anal. Policy Contrib. Econ. Anal. Policy 11, 1–27. https://doi.org/10.2202/1935-1682.2676
European Commission, 2018. Action Plan: Financing Sustainable Growth.
Fatemi, A., Glaum, M., Kaiser, S., 2017. ESG performance and firm value: The moderating role of disclosure. Glob. Finance J. https://doi.org/10.1016/j.gfj.2017.03.001
FCCC/CP/2015/10/Add.1, 2015. Report of the Conference of the Parties.
Fisher-Vanden, K., Thorburn, K.S., 2011. Voluntary corporate environmental initiatives and shareholder wealth. J. Environ. Econ. Manag. 62, 430–445. https://doi.org/10.1016/j.jeem.2011.04.003
Francis Weyzig, Barbara Kuepper, Jan Willem van Gelder, Rens van Tilburg, 2014. The price of doing too little too late. Impact Carbon Bubble EU Financ. Syst. Rep. Prep. GreensEFA Group–European Parlam. Sustain. Finance Lab Profundo Green Eur. Found. Rep. Was Comm. Greens Eur. Free Alliance Eur. Parliam.
Freedman, M., Patten, D.M., 2004. Evidence on the pernicious effect of financial report environmental disclosure. Account. Forum 28, 27–41. https://doi.org/10.1016/j.accfor.2004.04.006
Fulton, M., Kahn, B.M., Sharples, C., 2012. Sustainable Investing: Establishing Long-Term Value and Performance. SSRN Electron. J. https://doi.org/10.2139/ssrn.2222740
G20 Green Finance Study Group, 2017. G20 Green Finance Synthesis Report.
Garud, R., Gehman, J., 2012. Metatheoretical perspectives on sustainability journeys: Evolutionary, relational and durational. Res. Policy, Special Section on Sustainability Transitions 41, 980–995. https://doi.org/10.1016/j.respol.2011.07.009
Ghoul, E., Sadok, Guedhami, O., Kim, H., Park, K., 2014. Corporate Environmental Responsibility and the Cost of Capital: International Evidence (SSRN Scholarly Paper No. ID 2470853). Social Science Research Network, Rochester, NY.
Global Sustainable Investment Alliance, 2016. Global Sustainable Investment Review.
Godfrey, P.C., Merrill, C.B., Hansen, J.M., 2009. The relationship between corporate social responsibility and shareholder value: an empirical test of the risk management hypothesis. Strateg. Manag. J. 30, 425–445. https://doi.org/10.1002/smj.750
Googins, B., 2013. Leading with Innovation: Transforming Corporate Social Responsibility, in: Osburg, T., Schmidpeter, R. (Eds.), Social Innovation. Springer Berlin Heidelberg, Berlin, Heidelberg, pp. 89–98. https://doi.org/10.1007/978-3-642-36540-9
Gray, R., Kouhy, R., Lavers, S., 1995. Corporate social and environmental reporting: a review of the literature and a longitudinal study of UK disclosure. Account. Audit. Account. J. 8, 47–77. https://doi.org/10.1108/09513579510146996
Greening, D.W., Turban, D.B., 2000. Corporate Social Performance As a Competitive Advantage in Attracting a Quality Workforce. Bus. Soc. 39, 254–280. https://doi.org/10.1177/000765030003900302
Haigh, M., Shapiro, M., St, T., 2011. Financial institutions: taking greenhouse gases into account. Rep. Prep. Carbon Discl. Stand. Board Defra CDSB Lond.
Harmes, A., 2011. The Limits of Carbon Disclosure: Theorizing the Business Case for Investor Environmentalism. Glob. Environ. Polit. 11, 98–119. https://doi.org/10.1162/GLEP_a_00057
Hassel, L., Nilsson, H., Nyquist, S., 2005. The value relevance of environmental performance. Eur. Account. Rev. 14, 41–61. https://doi.org/10.1080/0963818042000279722

Hein, E., Truger, A., 2010. Finance-dominated capitalism in crisis – the case for a Global Keynesian New Deal (MPRA Paper No. 21175). University Library of Munich, Germany.
Hirunyawipada, T., Xiong, G., 2018. Corporate environmental commitment and financial performance: Moderating effects of marketing and operations capabilities. J. Bus. Res. 86, 22–31. https://doi.org/10.1016/j.jbusres.2018.01.002
Hughes, K.E., 2000. The Value Relevance of Nonfinancial Measures of Air Pollution in the Electric Utility Industry. Account. Rev. 75, 209–228.
Ioannou, I., Serafeim, G., 2017. The Consequences of Mandatory Corporate Sustainability Reporting (SSRN Scholarly Paper No. ID 1799589). Social Science Research Network, Rochester, NY.
Jones, C.A., Levy, D.L., 2007. North American Business Strategies Towards Climate Change. Eur. Manag. J., Business, Climate Change and Emissions Trading 25, 428–440. https://doi.org/10.1016/j.emj.2007.07.001
Kaspereit, T., Lopatta, K., 2016a. The value relevance of SAM's corporate sustainability ranking and GRI sustainability reporting in the European stock markets. Bus. Ethics Eur. Rev. 25, 1–24. https://doi.org/10.1111/beer.12079
Kaspereit, T., Lopatta, K., 2016b. The value relevance of SAM's corporate sustainability ranking and GRI sustainability reporting in the European stock markets. Bus. Ethics Eur. Rev. 25, 1–24. https://doi.org/10.1111/beer.12079
Kauffmann, C., Teichmann, D., Tébar Less, C., 2012. Corporate Greenhouse Gas Emission Reporting (OECD Working Papers on International Investment No. 2012/01). https://doi.org/10.1787/5k97g3x674lq-en
Khan, M., Serafeim, G., Yoon, A., 2016. Corporate Sustainability: First Evidence on Materiality (SSRN Scholarly Paper No. ID 2575912). Social Science Research Network, Rochester, NY.
Kolk, A., 2016. The social responsibility of international business: From ethics and the environment to CSR and sustainable development. J. World Bus., The World of Global Business 1965-2015 51, 23–34. https://doi.org/10.1016/j.jwb.2015.08.010
Kolk, A., Levy, D., Pinkse, J., 2008. Corporate Responses in an Emerging Climate Regime: The Institutionalization and Commensuration of Carbon Disclosure. Eur. Account. Rev. 17, 719–745. https://doi.org/10.1080/09638180802489121
KPMG, Center for Corporate Governance in Africa, GRI, UNEP, 2016. Carrots and Sticks, Carrots and Sticks, Global trends in sustainability reporting regulation and policy.
Kuzey, C., Uyar, A., 2017. Determinants of sustainability reporting and its impact on firm value: Evidence from the emerging market of Turkey. J. Clean. Prod. 143, 27–39. https://doi.org/10.1016/j.jclepro.2016.12.153
Lee, D.D., Faff, R.W., 2009. Corporate Sustainability Performance and Idiosyncratic Risk: A Global Perspective. Financ. Rev. 44, 213–237. https://doi.org/10.1111/j.1540-6288.2009.00216.x
Lo, S.-F., Sheu, H.-J., 2007. Is Corporate Sustainability a Value-Increasing Strategy for Business? Corp. Gov. Int. Rev. 15, 345–358. https://doi.org/10.1111/j.1467-8683.2007.00565.x
Lourenço, I.C., Branco, M.C., Curto, J.D., Eugénio, T., 2012. How Does the Market Value Corporate Sustainability Performance? J. Bus. Ethics 108, 417–428. https://doi.org/10.1007/s10551-011-1102-8
Luo, L., Lan, Y.-C., Tang, Q., 2012. Corporate Incentives to Disclose Carbon Information: Evidence from the CDP Global 500 Report. J. Int. Financ. Manag. Account. 23, 93–120. https://doi.org/10.1111/j.1467-646X.2012.01055.x
Margolis, J.D., Elfenbein, H.A., Walsh, J.P., 2007. Does it pay to be good? A meta-analysis and redirection of research on the relationship between corporate social and financial performance. Ann Arbor 1001, 48109–1234.
Matsumura, E.M., Prakash, R., Vera-Muñoz, S.C., 2014. Firm-Value Effects of Carbon Emissions and Carbon Disclosures. Account. Rev. 89, 695–724. https://doi.org/10.2308/accr-50629
McWilliams, A., Siegel, D., 2000. Corporate Social Responsibility and Financial Performance: Correlation or Misspecification? Strateg. Manag. J. 21, 603–609.
Meadowcroft, J., 2011. Engaging with the politics of sustainability transitions. Environ. Innov. Soc. Transit. 1, 70–75. https://doi.org/10.1016/j.eist.2011.02.003
Mercer, 2015. Investing in a Time of Climate Change, Responsible Investment.
Morgan Stanley, 2017. Sustainable Signals, new data from the individual investor (Institute for Sustainable Investing).
Nieuwenkamp, R., 2016. 2016: CSR is dead! What's next? [WWW Document]. OECD Insights Blog. URL http://oecdinsights.org/2016/01/22/2016-csr-is-dead-whats-next/ (accessed 2.1.17).
OECD, 2011. OECD Guidelines for Multinational Enterprises (OECD Publishing).
Ohlson, J.A., 1995. Earnings, Book Values, and Dividends in Equity Valuation*. Contemp. Account. Res. 11, 661–687. https://doi.org/10.1111/j.1911-3846.1995.tb00461.x

Orlitzky, M., Schmidt, F.L., Rynes, S.L., 2003. Corporate Social and Financial Performance: A Meta-Analysis. Organ. Stud. 24, 403–441. https://doi.org/10.1177/0170840603024003910
Pachauri, R.K., Allen, M.R., Barros, V.R., Broome, J., Cramer, W., Christ, R., Church, J.A., Clarke, L., Dahe, Q., Dasgupta, P., others, 2014. Climate change 2014: synthesis report. Contribution of Working Groups I, II and III to the fifth assessment report of the Intergovernmental Panel on Climate Change. IPCC.
Porter, M.E., 1992. Capital Disadvantage: America's Failing Capital Investment System. Harv. Bus. Rev.
Porter, M.E., Kramer, M.R., 2011. Creating Shared Value: How to reinvent capitalism—and unleash a wave of innovation and growth. [WWW Document]. Harv. Bus. Rev. URL https://hbr.org/2011/01/the-big-idea-creating-shared-value (accessed 2.10.17).
Porter, M.E., van der Linde, C., 1995. Toward a New Conception of the Environment-Competitiveness Relationship. J. Econ. Perspect. 9, 97–118.
Renneboog, L., Ter Horst, J., Zhang, C., 2008a. Socially responsible investments: Institutional aspects, performance, and investor behavior. J. Bank. Finance 32, 1723–1742. https://doi.org/10.1016/j.jbankfin.2007.12.039
Renneboog, L., Ter Horst, J., Zhang, C., 2008b. The price of ethics and stakeholder governance: The performance of socially responsible mutual funds. J. Corp. Finance, Special Issue: Contractual Corporate Governance 14, 302–322. https://doi.org/10.1016/j.jcorpfin.2008.03.009
Robins, N., Krosinsky, C., 2008. After the credit crunch: the future of sustainable investing. Public Policy Res. 15, 192–197. https://doi.org/10.1111/j.1744-540X.2008.00539.x
Ruhnke, K., Gabriel, A., 2013. Determinants of voluntary assurance on sustainability reports: an empirical analysis. J. Bus. Econ. 83, 1063–1091. https://doi.org/10.1007/s11573-013-0686-0
Schaltegger, S., Hansen, E.G., Lüdeke-Freund, F., 2016. Business Models for Sustainability: Origins, Present Research, and Future Avenues. Organ. Environ. 29, 3–10. https://doi.org/10.1177/1086026615599806
Servaes, H., Tamayo, A., 2013. The Impact of Corporate Social Responsibility on Firm Value: The Role of Customer Awareness. Manag. Sci. 59, 1045–1061. https://doi.org/10.1287/mnsc.1120.1630
Sparkes, R., Cowton, C.J., 2004. The Maturing of Socially Responsible Investment: A Review of the Developing Link with Corporate Social Responsibility. J. Bus. Ethics 52, 45–57. https://doi.org/10.1023/B:BUSI.0000033106.43260.99
Stubbs, W., Cocklin, C., 2008. Conceptualizing a "Sustainability Business Model." Organ. Environ. 21, 103–127. https://doi.org/10.1177/1086026608318042
Sullivan, R., 2009. The management of greenhouse gas emissions in large European companies. Corp. Soc. Responsib. Environ. Manag. 16, 301–309. https://doi.org/10.1002/csr.187
Sullivan, R., Gouldson, A., 2012. Does voluntary carbon reporting meet investors' needs? J. Clean. Prod. 36, 60–67. https://doi.org/10.1016/j.jclepro.2012.02.020
UNEP, 2015. THE FINANCIAL SYSTEM WE NEED The UNEP Inquiry Report ALIGNING THE FINANCIAL SYSTEM WITH SUSTAINABLE DEVELOPMENT.
Unerman, J., O'Dwyer, B., 2007. The business case for regulation of corporate social responsibility and accountability. Account. Forum, Shareholder Value 31, 332–353. https://doi.org/10.1016/j.accfor.2007.08.002
UNIDO, 2013. Towards Inclusive and Sustainable Industrial Development. Development 58, 446–451. https://doi.org/10.1057/s41301-016-0055-8
Vitols, S., 2015. Introduction: a stakeholder perspective on the long-term investment debate, in: Long-Term Investment and the Sustainable Company: A Stakeholder Perspective. Vol. III. ETUI, pp. 9–18.
Vitols, S., 2011. What is the Sustainable Company?, in: Vitols, S., Kluge, N. (Eds.), The Sustainable Company: A New Approach to Corporate Governance. ETUI, pp. 15–38.
Waddock, S.A., Graves, S.B., 1997. The Corporate Social Performance-Financial Performance Link. Strateg. Manag. J. 18, 303–319.
Wagner, M., 2010. The role of corporate sustainability performance for economic performance: A firm-level analysis of moderation effects. Ecol. Econ., Special Section: Ecosystem Services Valuation in China 69, 1553–1560. https://doi.org/10.1016/j.ecolecon.2010.02.017
Walsh, G., Bartikowski, B., 2013. Exploring corporate ability and social responsibility associations as antecedents of customer satisfaction cross-culturally. J. Bus. Res., Recent Advances in Globalization, Culture and Marketing Strategy 66, 989–995. https://doi.org/10.1016/j.jbusres.2011.12.022
WBCSD, 2012. Changing Pace, Public policy options to scale and accelerate business action towards Vision 2050.
Whelan, T., Fink, C., 2016. The Comprehensive Business Case for Sustainability. Harv. Bus. Rev. 21.
Winnard, J., Adcroft, A., Lee, J., Skipp, D., 2014. Surviving or flourishing? Integrating business resilience and sustainability. J. Strategy Manag. 7, 303–315. https://doi.org/10.1108/JSMA-11-2012-0059

Appendix A:

National (Table A.1) and international (Table A.2) initiatives promoting corporate and financial sustainability (from G20 Green Finance Study Group, 2017 and UNEP, 2015).

Table A.1 National initiatives for sustainable finance and ESG disclosure

France	2010	Grenelle II requirements on corporate sustainability
Brazil	2011	In 2011, Banco Central do Brasil (BACEN) was the world's first banking regulator to request banks to monitor environmental risks as part of the implementation of Basel III's Internal Review for Capital Adequacy
South Africa	2011	Requirements for institutional investors to consider sustainability factors in investment activities - Pensions Act, Regulation 28; Code for Responsible Investing in South Africa (CRISA)
China	2012	Green Credit Guidelines of the China Banking Regulatory Commission, evolved from an initial principle based approach to a standardized, metrics-driven performance assessment of all licensed banks.
UK	2013	Mandatory corporate disclosure of greenhouse gas emissions
USA	2013	Launch of the National Impact Initiative (NII) to expand the use of impact investing
China	2014	The People's Bank of China established a Green Finance Task Force, resulting in 14 recommendations across information flows, legal frameworks, fiscal incentives and institutional design
France	2014	Advance of Grenelle II requirements on corporate sustainability reporting with the launch of a White Paper on Financing the Ecological Transition, a joint initiative of the Ministry of Ecology and the Treasury
Indonesia	2014	Launch of the Roadmap for Sustainable Finance, the country's first attempt to map out the developments needed to advance sustainable finance through 2019. The Roadmap covers banking, capital markets and non-bank financial services sector
UK	2014	A review of fiduciary duties by the UK's Law Commission concluded that pension fund trustees may take account of any financial factor that is relevant to investment performance and should take account of financially material risks, including risks to a company's long-term sustainability
India	2015	The securities regulator, SEBI, requires the 100 largest listed companies to publish annual business responsibility reports
India	2015	National Voluntary Guidelines for Responsible Finance by the Indian Banking Association, based on the government's development priorities
UK	2015	Bank of England's Prudential Regulatory Authority: assessment of the implications of climate change for the 'safety and soundness' of insurance companies and the protection of policyholders
China	2016	The State Council approved the "Guidelines for Establishing the Green Financial System", to incentivise and promote green loans, green bonds, green funds, green insurance, and mandatory environmental information disclosures, among others.
France	2016	Energy Transition Law (art 173) - requirements for investors to include in their annual reports how they manage sustainability factors, including the risks of climate change and their contribution to the international goal of limiting climate change.
Italy	2017	Release of the results of a one-year national dialogue on sustainable finance, which identified 18 options of action

Table A.2 International initiatives for sustainable finance and ESG disclosure

Sustainable Banking Network (SBN) - World Bank Group	2012	Community of financial sector regulatory agencies and banking associations from emerging markets committed to advancing sustainable finance in line with international good practice
Sustainable Stock Exchanges (SSE) initiative, UN Conference on Trade and Development	2009 (first actions in 2012)	Peer-to-peer learning platform for exploring how exchanges, in collaboration with investors, regulators, and companies, can enhance corporate transparency – and ultimately performance – on ESG (environmental, social and corporate governance) issues and encourage sustainable investment
Corporate Reporting Dialogue	2014	Involves CDP, CDSB, FASB, GRI, IFRS, IIRC, ISO and SASB and aims to respond to market calls for greater coherence, consistency and comparability between corporate reporting frameworks, standards and related requirements
G20	2014	Launch of the Energy Efficiency Financing Task Group that aims to enhance capital flows for energy efficiency investments in G20 economies. It also serves as a forum for G20 policy makers to share best practices in policies and financial instruments through peer-to-peer workshops and direct engagement with members of the private and public finance community, industry and international organisations
Global Reporting Initiative Standard	2014	Corporate Reporting Dialogue (CRD), introduced by the International Integrated Reporting Council (IIRC)
G20	2015	The G20 finance ministers requested the Financial Stability Board (FSB) to examine the issue of financial stability in the face of climate change
Financial Stability Board	2015	The FSB established the Task-force on Climate-related financial disclosures, to produce recommendations for data preparers to disclose consistent information on the climate-related risks and opportunities they face and the potential financial impacts
G20 - Green Finance Study Group	2016	Launch of the Green Finance Study Group by the G20. The Study Group is co-chaired by China and the United Kingdom, with support from UN Environment as secretariat
UN Financial Innovation Platform	2016	Launch of a new platform for scaling up innovative finance solutions to support the achievement of the Sustainable Development Goals (SDGs). The Financial Innovation Platform aims to identify and pilot innovative finance instruments that can drive investment and support SDG interventions
OECD Centre on Green Finance and Investment	2016	Establishment of the Centre on green finance and investment. The Centre's mission is to help catalyse and support the transition to a green, low-emissions and climate-resilient economy through the development of effective policies, institutions and instruments for green finance and investment
OECD	2017	Recommendation on Disaster Risk Financing Strategies that provides high-level policy guidance on the financial management of disaster risks
UN Environment and the World Bank Group	2017	Published the "Roadmap for a Sustainable Financial System" to propose an integrated approach that can be used by all financial sector stakeholders to accelerate the transformation toward a sustainable financial system.
UNEP FI	2017	19 leading banks and investors totaling US$6.6 trillion in assets launched the Principles for Positive Impact Finance. The Principles provide guidance for financiers and investors to analyse, monitor and disclose the social, environmental and economic impacts of the financial products and services they deliver

Appendix B

Table B.1 Distribution of firms by country

Country	N firms	Country	N firms
Abu Dhabi	1	Kuwait	2
Australia	183	Luxembourg	3
Austria	16	Malaysia	45
Belgium	21	Mexico	23
Brazil	75	Morocco	3
Canada	178	Netherlands	27
Channel Islands	1	New Zealand	8
Chile	21	Nigeria	1
China	76	Norway	19
Colombia	11	Oman	1
Cyprus	1	Peru	2
Czech Republic	2	Philippines	21
Denmark	23	Poland	24
Dubai	1	Portugal	8
Egypt	8	Qatar	1
Finland	23	Russian Federation	27
France	72	Saudi Arabia	4
Germany	68	Singapore	49
Greece	13	South Africa	104
Hong Kong	145	South Korea	100
Hungary	4	Spain	36
India	77	Sri Lanka	1
Indonesia	26	Sweden	43
Ireland	10	Switzerland	53
Israel	12	Taiwan	124
Italy	42	Thailand	21
Japan	388	Turkey	25
Jordan	1	United Kingdom	274
Kazakhstan	1	United States	762
		Total	3,311

Table B.2 Distribution of firms by year

Year	N firms
2010	2,624
2011	2,760
2012	2,712
2013	2,654
2014	2,611
2015	2,422
2016	2,260
Total	18,043

Table B.3 Distribution of firms by industry

Industry	N firms	Industry	N firms
Aerospace & Defense	31	Insurance	112
Automobiles & Auto Parts*	80	Investment Banking	96
Banking Services	247	Leisure Products	18
Beverages	37	Machinery	185
Biotechnology & Medical Research	18	Media & Publishing	73
Chemicals*	115	Metals & Mining*	197
Coal*	22	Multiline Utilities*	23
Collective Investments	8	Office Equipment	11
Communications & Networking	16	Oil & Gas*	132
Computers, Phones & Household E..	43	Oil & Gas Related Equipment*	71
Construction & Engineering*	87	Other Specialty Retailers	84
Construction Materials*	40	Paper & Forest Products	18
Containers & Packaging	32	Passenger Transportation Services*	48
Diversified Retail	52	Personal & Household Products	43
Diversified Trading	16	Pharmaceuticals	55
Electric Utilities & IPPs*	105	Professional & Commercial Services	106
Electronic Equipments & Parts	12	Real Estate Operations	135
Food & Drug Retailing	55	Renewable Energy*	10
Food & Tobacco	102	Residential & Commercial REITs	87
Freight & Logistics Services	58	Semiconductors	75
Healthcare Equipment & Supplies	48	Software & IT Services	90
Healthcare Providers & Services	24	Telecommunications Services	94
Holding Companies	5	Textiles & Apparel	41
Homebuilding & Construction*	47	Transport Infrastructure*	34
Hotels & Entertainment Services	86	Uranium	2
Household Goods	21	Water Utilities*	10
Industrial Conglomerates*	34	Natural Gas Utilities*	20
		Total	3,311

*climate sensitive sectors

Appendix C

Table C.1 Main results of the study obtained with overall ESG performance as main explanatory variable

	MVE_t All sample	MVE_t All sample	MVE_t No CSS
BVE	0.305***	0.312***	0.257***
	(13.87)	(14.08)	(10.41)
Income	0.110***	0.111***	0.114***
	(13.96)	(14.14)	(13.21)
ESG	0.00131***	-0.000253	-0.000975
	(2.69)	(-0.44)	(-1.45)
ESG × 2011		0.0000614	0.000175
		(0.18)	(0.45)
ESG × 2012		0.00148***	0.00185***
		(3.60)	(3.99)
ESG × 2013		0.00205***	0.00264***
		(4.56)	(5.02)
ESG × 2014		0.00270***	0.00338***
		(5.49)	(5.90)
ESG × 2015		0.00304***	0.00386***
		(5.17)	(5.69)
ESG × 2016		0.00261***	0.00296***
		(3.94)	(3.95)
Capex	0.0472***	0.0478***	0.0308***
	(7.67)	(7.78)	(5.25)
Sales	0.144***	0.149***	0.191***
	(5.50)	(5.63)	(6.28)
Leverage	0.00198***	0.00204***	0.00158***
	(2.84)	(2.84)	(3.03)
ROA	1.238***	1.220***	0.966***
	(6.72)	(6.69)	(5.23)
Year fixed effects	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes
N	17409	17409	12265
N_g	3305	3305	2274
r2_a	0.455	0.459	0.508
r2_o	0.681	0.680	0.669
F test Sust	7.23	7.48	7.80
F test Sust (p value)	0.007	0.000	0.000

t statistics in parentheses. Robust standard errors. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

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