The impact of environmental supply chain sustainability programs on shareholder wealth

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Abstract

Purpose – Multinationals are increasingly pressured by stakeholders to commit to environmental sustainability that exceeds their own firm borders. As a result, multinationals have started to commit to environmental supply chain sustainability programs (ESCSPs). However, little is known about whether such commitment is rewarded or punished by financial markets, and if the stock price reaction differs depending on the type of firm that commits to such a program. This paper aims to discuss these issues.

Design/methodology/approach – The authors conduct an event study followed by two-equation Heckman modeling, using a sample of 66 multinationals that committed to the ESCSP of the Carbon Disclosure Project (CDP).

Findings – It was found that generally there is a marginally significant negative stock price reaction to announcement of participation in this ESCSP (i.e. −0.8 percent, $p < 0.10$). However, the authors argue and show that firms in industries that have historically faced more pressure from consumers are less likely to announce their participation. If one corrects for this industry bias, then the negative stock price reaction is even more pronounced (i.e. −3.2 percent, $p < 0.05$).

Research limitations/implications – Using objective data, the study provides insights into the shareholder wealth effects of firms that commit to the ESCSP of the CDP. As such, the sample does not cover firms that set up their own ESCSPs.

Practical implications – The paper is valuable for practitioners and investors who are interested in finding out if participation in ESCSPs is financially attractive, and for (governmental) policy makers who may want to be assured that there is sufficient incentive for firms to pursue environmental supply chain sustainability.

Originality/value – This is the first paper that captures how financial markets react to announcements of ESCSPs.

Keywords Performance measurement, Sustainability, Supply chain management, Environmental, Event study, Stock price

Paper type Research paper

Introduction

Most environmental scientists agree that the environment is heavily burdened by mankind, and that this will have dramatic economic and social consequences (IPCC, 2007). Where environmental sustainability within firms used to be deemed sufficient to avoid such adversities, in recent years firms are increasingly pressured by consumers, action groups, governments, and green investors to ensure that their suppliers are also

environmentally sustainable. The main reason for this trend is that the bulk of environmental externalities is produced in the supply chain rather than in the company itself (Nixon, 2011). Yet, while firms are pressured to pursue environmental supply chain sustainability, it is unknown if this actually financially benefits them (i.e. if it increases shareholder wealth). Existing literature has studied the financial effects of environmental sustainability within firms, but has only narrowly covered the financial consequences of environmental supply chain sustainability (e.g. Bose and Pal, 2012; Zhu and Sarkis, 2004; Zhu *et al.*, 2007). In our paper, we address this gap in literature by dealing with the following research question:

RQ1. How is shareholder wealth affected by participation in environmental supply chain sustainability programs (ESCSPs)?

ESCSPs are programs set up by firms to promote an environmental agenda at their suppliers that adheres to the law or even goes beyond that which is required by law. Such programs can, for example, aim to limit greenhouse gas emissions, and/or energy, water, and material use within the supply chain. By studying the financial effects of ESCSPs, our study aims to complement and expand existing literature on environmental sustainability and its financial effects. In doing so, we increase the understanding of managers if participation in ESCSPs is financially attractive. Moreover, this study is of value for various stakeholders (e.g. such as governmental policy makers) who may want to assure that there is sufficient (financial) incentive for firms to pursue environmental supply chain sustainability.

As we explain in more detail in the theory section, ESCSPs have significant (yet difficult to estimate) costs and risks, and uncertain benefits. Because financial markets value these factors negatively (Scholes and Williams, 1977), we expect that shareholder wealth decreases when firms commit to ESCSPs. Furthermore, we expect that there is a selection bias regarding which firms announce commitment to ESCSPs. We argue that as consumer pressure increases throughout industries, all firms will be pressured to implement environmental sustainability in their supply chain. Yet, we reason that firms in industries that have historically faced relatively high consumer scrutiny have less gains from ESCSPs compared to firms in industries that have historically been pressured less by consumers. The reason for this is that firms in industries that have historically been pressured less are yet to be rewarded by financial markets for reducing their risk of environmental scandals, increasing revenue by charging price premiums, and reaching efficiency gains. On the other hand, while firms in industries that have historically faced more consumer pressure are equally or more pressured by stakeholders to follow the current trend and commit to ESCSPs, they will benefit less financially compared to firms in industries that have historically faced less consumer pressure; the first type of firms has already addressed many environmental supply chain sustainability issues under severe consumer pressure in the 1990s (e.g. Birch, 2012; Pierson Holding, 2012), and has reaped the benefits thereof. Therefore, although we expect that in line with the recent trend both firms in industries that have historically faced high and low consumer pressure will commit to ESCSPs, we hypothesize that firms in industries that have historically faced more consumer pressure are less likely to announce their commitment because they fear to be punished more severely by financial markets. The expected negative stock price reaction may thus be even more negative if we correct for this sample selection bias in announcing firms. In this paper, we will empirically study if such mechanisms are indeed at work.

In order to study these mechanisms, we will first assess the shareholder wealth effects of firms that announce their commitment to a ESCSP through an event study. With a two-equation Heckman (1979) selection model, we will then investigate if firms in some industries are more prone to announce their participation than others. Our data sample consists of firms that announce their participation in the ESCSP of the Carbon Disclosure Project (CDP). The CDP is a non-profit organization that is initiated by 665 large institutional investors who have more than $78 trillion under management. Firms that engage in this ESCSP, commit to reduce greenhouse gas emissions, water and energy consumption in their supply chain. Since this program was founded in 2007, 66 multinationals that are listed on stock exchanges have committed to it. While commitment to this program is costly and should only induce firms whose benefits exceed the costs to participate, not all firms that participate seem to be convinced of their participation; only 21 of the 66 multinationals announce their participation in this program through a press release.

This paper contributes to existing literature in two ways. First, we increase the knowledge regarding how environmental sustainability affects shareholder wealth. As the concept of sustainability is considered to contain both environmental and financial/economic aspects (in addition to social aspects), this study thus promotes a better understanding of how these dimensions of sustainability interact. Addressing this issue from a supply chain perspective is both novel and important; while suppliers have been documented to have a great impact on both the environmental and the financial performance of downstream firms (Brammer and Walker, 2010; Burton, 1988; Naumann and Reck, 1982; Chen and Paulraj, 2004; Zhu and Sarkis, 2004), the effects of ESCSPs on shareholder wealth have not yet been captured. Most literature has focussed on the effects of corporate environmental initiatives (e.g. Gilley *et al.*, 2000; Shane and Spicer, 1983; Klassen and McLaughlin, 1996; Stevens, 1984; Hamilton, 1995). As we will lay out in the theory section, environmental supply chain sustainability initiatives differ on various important points from corporate environmental initiatives. Furthermore, firms need completely different competencies to deal with environmental issues within their firm and environmental issues that concern their supply chain (Marcus and Anderson, 2006). These differences make it difficult to leverage corporate initiatives to a supply chain setting. Therefore, to complement the existing literature and further advance the knowledge on the effects of environmental sustainability on shareholder wealth, we specifically investigate environmental sustainability within a supply chain context. Second, we provide insights regarding which firms should expect financial rewards from environmental supply chain sustainability and why. By laying out that it matters whether firms are in industries that have historically faced high or low consumer pressure, we increase the theoretical and practical implications of our findings.

Theory
Sustainability
Sustainability within firms (also known as corporate social responsibility (CSR)[1]) occurs when firms engage in activities that appear to advance a social, environmental, ethical, and/or economic agenda that adheres to the law or even goes beyond that which is required by law (Brammer and Walker, 2011; Heal, 2005; Hillman and Keim, 2001; Lyon and Maxwell, 2008; McWilliams *et al.*, 2006; Preuss, 2009; Siegel and Vitaliano, 2007; Srivastava, 2007). Supply chain sustainability is achieved when a firm ensures that its upstream supply chain also has a concern for these elements of their

business conduct and tries to avoid negative externalities in these areas (Carter, 2000; Krause *et al.*, 1999; Srivastava, 2007).

In this paper, we focus on the environmental aspect of supply chain sustainability. This aspect is the earliest and most addressed element of supply chain sustainability in the private sector and in literature (Srivastava, 2007). Some studies mention that firms are coerced by regulation into implementing environmental supply chain sustainability initiatives (e.g. Giunipero *et al.*, 2012; Rahman and Subramanian, 2012; Schneider and Wallenburg, 2012; Zhu and Sarkis, 2007). Yet, by far most literature reports on environmental supply chain initiatives that firms implement voluntarily (e.g. Schneider and Wallenburg, 2012; Srivastava, 2007; Zhu and Sarkis, 2007). We will discuss this literature and the benefits of environmental supply chain sustainability in more detail later on.

While prior literature has stipulated the importance of achieving environmental supply chain sustainability, how it can be managed and what the antecedents and conditions are for setting up environmental supply chain sustainability management (Brammer and Walker, 2011), only few studies have captured the financial performance implications of environmental supply chain sustainability management. For example, Zhu and Sarkis (2004) and Zhu *et al.* (2007) capture how Chinese firms evaluate the change in their financial performance due to environmental supply chain sustainability management. Zhu and Sarkis (2004) show that firms face both benefits and costs, and Zhu *et al.* (2007) report an overall insignificant net effect of environmental supply chain sustainability management. While these papers have generated several useful insights, the conclusions regarding the financial performance implications of environmental supply chain sustainability management are limited due to three main reasons. First, the authors approach the issue from an operational perspective instead of a holistic firm perspective; as a result, several prominent financial benefits of sustainability (such as gains due to lower risk, an ability to charge price premiums and market expansion; Dam *et al.*, 2009; Lamming and Hampson, 1996) are not acknowledged. Second, the paper does not acknowledge the opportunity costs from allocating resources within the firm to environmental supply chain sustainability. Third, financial performance is measured on a Likert scale, making it difficult to get an exact quantification of the costs and benefits and the overall financial effect.

To complement existing literature, in this paper we approach the topic at hand from a different perspective. We propose that the financial effects of environmental supply chain sustainability can be captured by assessing the stock market reaction to announcements of firms that commit to an environmental supply chain sustainability program (ESCSP). In the next section, we will describe why this is a suitable approach to capture the effect of ESCSP on financial performance, and whether a positive or a negative effect can be expected based on literature.

Environmental (supply chain) sustainability and shareholder wealth
The finance literature presents abundant evidence that the most efficient indicator of changes in financial performance due to an event is the stock price reaction (Basu, 1977; Brown and Warner, 1985). An event is information previously unknown to financial markets that implies that the financial performance of firms may change. Information can be about firms that implement new policies and plans which are meant to enhance their financial performance (e.g. the implementation of sustainability programs, participation in an industry exchange consortium, or outsourcing announcements). Yet, information can also concern problems that can negatively

affect firms' financial performance (e.g. stock-outs, excess inventory, product-recalls, environmental disasters, or new governmental regulations).

When such information is made public, stock prices will respond rapidly in order to capitalize future costs, risks, and benefits associated with this event (also known as the efficient market hypothesis; Brown and Warner, 1985). Various papers have shown that the efficient market hypothesis also applies to information that concerns the supply chain of firms (e.g. Hendricks and Singhal, 2003; Mitra and Singhal, 2008; Papadakis, 2006). In addition, multiple papers have studied the reaction of stock markets to information regarding sustainability (Ambec and Lanoie, 2008; Margolis and Walsh, 2001; Orlitzky *et al.*, 2003). As far as we are aware, only one previous paper has addressed the effects of environmental supply chain sustainability on shareholder wealth. Bose and Pal (2012) study firm initiatives that are concerned with reducing material costs by re-using materials (by recycling, remanufacturing, and reverse logistics) or increasing speed and flexibility (by modular design). Although these initiatives could have environmental benefits, the firm announcements do not state that the primary reason for engaging in these initiatives is to pursue such environmental benefits. As such, it is still unclear how shareholder wealth is affected by firms that primarily pursue environmental benefits instead of an increase of their competitive capabilities. In this paper, we focus on exactly the effect of such programs and thus complement the work of Bose and Pal (2012). In addition, we theoretically extend the study of Bose and Pal (2012). As we will lay out in detail in the next sections, in line with literature that has stipulated the importance of consumer pressure for ESCSP adoption by firms (e.g. Miao *et al.*, 2012; Srivastava, 2007; Schneider and Wallenburg, 2012; Rahman and Subramanian, 2012), we propose that consumer pressure is of crucial importance for the shareholder wealth that firms derive from ESCSPs.

The limited coverage of the financial effects of environmental supply chain management is strange, especially in the light of the significant attention given to environmental aspects of supply chain sustainability in business practice and academic literature (Brammer and Walker, 2011; Seuring and Müller, 2008). In the next sections, we will lay out what the benefits, risks, and costs are of environmental supply chain sustainability, and which financial performance effect can be expected if information that firms commit to an environmental supply chain sustainability program reaches the financial markets.

Benefits, costs, and risks of environmental (supply chain) sustainability
Various benefits of environmental sustainability are mentioned in literature, which might all result in higher financial performance (Becchetti *et al.*, 2007; Carter and Rogers, 2008; Renneboog *et al.*, 2008; Scholtens and Dam, 2007; Srivastava, 2007; Zhu and Sarkis, 2004). Based on a literature overview, Zhu and Sarkis (2004) identify several important benefits. First, environmental sustainability can increase revenue by enabling firms to charge premium prices, and to access new markets and consumer segments. Second, environmental sustainability reduces various risks for firms such as the risk of higher costs from fines and damage payments, and the risk of lower sales due to reputation loss and changes in consumer preferences. Third, firms that pursue environmental sustainability can enhance their resource efficiency (e.g. by using less water, materials, and energy). Fourth, firms can benefit from higher employee productivity and commitment due to environmental sustainability. Finally, firms that are environmentally sustainable can gain access to financial aid and "green capital."

On the other hand, Zhu and Sarkis (2004) stipulate that environmental sustainability also has significant financial disadvantages. First, firms that pursue environmental sustainability need to make additional investments in new or modified products and processes (e.g. product redesign, training of employees, environmentally friendly machines). Second, firms may face increased operational costs as environmentally friendly production may require higher safety standards and more control. Finally, firms that dedicate resources to environmental sustainability need to consider opportunity costs from not using these resources in other parts of their business.

As we will lay out, literature is ambiguous if the benefits of environmental sustainability actually weigh against the costs and risks. First, findings regarding the net financial effect of environmental sustainability are mixed (Dam *et al.*, 2009; Margolis and Walsh, 2001; Delmas and Nairn-Birch, 2011). And while authors tend to interpret some results from prior event studies as support for a positive effect of environmental initiatives on shareholder value, we argue against such an interpretation. Indeed, several event studies found that poor environmental performance contributes negatively to shareholder wealth (e.g. Shane and Spicer, 1983; Stevens, 1984; Hamilton, 1995). Yet, these results should not be used to support a positive effect of environmental initiatives on shareholder value; financial punishment for poor environmental performance does not necessarily equate that all firm attempts at managing environmental performance are (both environmentally and economically) successful. In support of this argument, for example Gilley *et al.* (2000) did not find a positive but an insignificant effect of corporate environmental initiatives on share prices. In the same line of reasoning, it is questionable whether the findings of Klassen and McLaughlin (1996) that firms that excel in terms of environmentally sustainability and are rewarded by the stock market for this, can be leveraged to cover all environmental initiatives by all firms. Second, and adding to the doubts whether environmental sustainability is economically viable, not all firms seem convinced that environmental sustainability leads to better financial performance. While some firms develop pro-active strategies regarding environmental sustainability, others only engage in environmental sustainability when pressured by influential (green) investors or powerful members in their supply chain (Armstrong, 2011).

Several arguments can be made why the gains from resources spent on environmental sustainability are significantly lower when firms pursue it within their supply chain instead of their own firm. First, it is more difficult for a firm to lower its risk through environmental supply chain sustainability as it has less oversight and control regarding what other actors in the supply chain are doing. A firm does not fully know if upstream actors are really adhering to environmental sustainability standards or if they are simply "greenwashing" their organization in pursuit of higher profits. As such, it is uncertain if a firm really lowers the probability and severity of environmental scandals originating at suppliers. Simultaneously, a firm faces higher coordination and control costs when it manages the processes of others compared to when it manages its own processes (Williamson, 1985). Second, it is unclear who will benefit from increased resource efficiency at suppliers; will only suppliers benefit from lower costs (e.g. energy, water, and material costs) or will a significant part of these benefits be leveraged to buying firms? Third, it is unclear if employee productivity and commitment will increase at a firm that engages in environmental supplier sustainability; such sustainability is much less visible to employees than sustainability initiatives within their own firm. And again, it is uncertain if a firm will benefit from increased productivity and commitment at suppliers should these suppliers face such positive effects due to environmental sustainability. Fourth, a firm that commits to environmental

supply chain sustainability limits its supplier base to only those suppliers that are willing to meet certain environmental standards. As such, the firm faces not only higher component costs (as these suppliers tend to charge price premiums), but also increased dependence on these suppliers, which may negatively affect the firm's bargaining position and further increase component prices. Fifth, and perhaps even most important, it is questionable whether firms that commit to supplier sustainability are able to increase their revenue by charging premium prices, and accessing new markets and consumer segments. While some consumer groups may apply pressure on firms to become sustainable, it is uncertain if (the majority of) consumers is able to see the importance of environmental sustainability that goes beyond a firm's boundaries, and if they will be willing to pay for such sustainability.

In sum, there are significant costs and risks and uncertain benefits associated with environmental supply chain sustainability. As investors value all these factors (i.e. significant costs and risks, uncertain benefits) negatively (Scholes and Williams, 1977) we expect a negative stock price reaction to announcements of firms that set up an environmental supply chain sustainability program:

> *H1.* Announcing participation in a ESCSP will negatively influence the stock price of the announcing firm.

Bias due to differences in consumer pressure
While we expect that firms generally derive a negative stock price reaction due to commitment to ESCSPs, there may be variations regarding how negative this stock price reaction is across different firms. In particular, we expect that firms derive varying financial benefits from ESCSPs depending on the extent to which consumers, or consumer interest groups, expect firms to be environmentally sustainable and pressure them to engage in ESCSPs (see also Miao *et al.*, 2012; Srivastava, 2007; Schneider and Wallenburg, 2012; Rahman and Subramanian, 2012). Historically, especially multinationals in the consumer goods industries have faced high consumer scrutiny. These firms have received a lot of media coverage whenever they have been involved in sustainability scandals. For example, Nike was punished by large consumer boycotts in the 1990s because the firm denied being responsible for any malpractices that occurred at its subcontractors. In response, the firm has taken various precautions over the past decades to ensure supplier sustainability, and other prominent consumer brands such as Adidas, Puma, Timberland, and Reebok quickly followed the example of Nike (Birch, 2012). Similarly, oil and gas companies have faced increased consumer scrutiny since several decades. For example, Shell endured severe consumer boycotts in the mid-1990s that lead to a drop in revenue up to 50 percent after environmental and social scandals occurred in various parts of the world. Since then, the firm has taken measures to reduce the risk of such consumer boycotts (Pierson Holding, 2012). In sum, it is likely that some firms have already faced severe consumer pressure and thus have addressed the most important risk sources that originate from their suppliers. As such, although these firms have started to officially commit to ESCSPs only in the last five to ten years (Nixon, 2011), it is questionable if they will further reduce their risk or achieve other sustainability benefits due to such ESCSPs. Therefore, it is probable that financial markets may consider ESCSPs as costly and unnecessary greenwashing, which does not have further shareholder value.

On the contrary, basic materials, industrial and technology firms have faced less consumer pressure in the past and have had less incentive to address environmental

supply chain sustainability. As consumer pressure and the risk of consumer boycotts increases throughout industries (e.g. see Yanfeng *et al.*, 2011; for a recent sustainability scandal at a supplier of Apple), firms that historically faced less consumer pressure are likely to be rewarded by financial markets if they explicitly mitigate this risk through an ESCSP. Additionally, such firms tend to compete more strongly on operational efficiency than firms which face higher consumer pressure; in such cases relatively small improvements in the supply chain could lead to a competitive advantage and increased profits for these firms (Zhu and Sarkis, 2004).

In sum, while firms in various industries are pressured to follow the trend and commit to ESCSPs, an argument can be made why firms that have historically faced more consumer pressure will benefit less from ESCSPs than firms that have historically faced less consumer pressure. Therefore, although we expect that both types of firms will commit to ESCSPs, we hypothesize that firms that have historically faced more pressure are less likely to announce their commitment because they fear to be punished more by financial markets. If this announcement bias indeed exists and we correct for it, the expected negative stock price reaction due to ESCSPs may be even more negative. This is summarized by the following hypotheses:

H2. As firms have historically faced less consumer pressure, their probability of announcing participation in an ESCSP is higher.

H3. As firms have historically faced less consumer pressure, their stock price reaction to participation in an ESCSP is higher. If we correct for this announcement bias, the observed negative stock price reaction to ESCSPs is more negative.

Methodology
Sample
In this paper, we study firms that have committed to the ESCSP of the CDP. This is a non-profit organization which was initiated by 665 large institutional investors which have more than \$78 trillion under their management. The main goal of this ESCSP is to reduce carbon emissions in the supply chain of a firm. Yet, other benefits such as reduced water, energy, and material use are also pursued. The list of participating companies is annually disclosed by the CDP. We limited the actual set of firms that we used for our study based on several considerations. First, we did not include the companies that are not listed on stock exchanges. Second, we excluded companies that have been taken over between 2005 and 2011 because such public information will have an undesired effect on the volatility of stock (Mitchell and Mulherin, 1994). Applying this restriction leads to a sample of 66 companies (see Appendix 1). Interestingly, almost half of the companies that participate in the program are either from the Consumer Goods or Technology industry (30 out of 66). Third, companies who have not announced their participation explicitly but only mentioned it briefly in documents like their annual reports were considered non-announcers. Applying this restriction, 21 companies announced their participation (32 percent, see Table I and Appendix 2).

Table II shows some descriptives of the firms that announce participation versus those that do not announce participation. Most data are heavily skewed, which explains the high standard deviations. As can be seen, there are no significant differences between announcers and non-announcers. Therefore, we conclude that in

	Panel A Participating companies	Panel B Announcing companies	Panel C Announcement percentage within industry
Industry			
Technology	10	5	50
Financials	5	1	20
Telecommunication	2	1	50
Consumer Goods	20	6	30
Utilities	5	1	20
Health Care	7	1	14
Basic Materials	4	1	25
Consumer Services	4	2	50
Oil and Gas	1	0	0
Industrials	8	2	25
Total	66	21	32

Table I.
Descriptive statistics of the sample

	Number of companies	Mean	SD	Minimum	Maximum	*t*-test *p*-value
Size						
Sales (in million US$)						
Announcing	21	56,087	95,967	88	420,825	0.24
Not announcing	45	37,111	34,219	280	139,416	
Number of employees						
Announcing	21	193,059	468,296	1,102	2,120,000	0.14
Not announcing	45	86,304	98,408	1,716	479,422	
Net profit (in million US$)						
Announcing	21	2,838	4,130	−362	14,870	0.70
Not announcing	45	3,216	3,842	−1,635	13.956	
Finance						
Net debt (in million US$)						
Announcing	21	9.515	20,921	−7,107	86,040	0.43
Not announcing	45	26.009	91,742	−26,795	114,003	
Market to book ratio						
Announcing	21	4.21	5.93	0.84	27,01	0.61
Not announcing	45	4.14	4.71	0.60	16.92	
Ownership (in %)						
Investor						
Announcing	21	3.48	3.04	0	11.25	0.35
Not announcing	45	5.23	7.05	0	30.75	
Pension fund held						
Announcing	21	0.28	1.23	0	5.5	0.64
Not announcing	45	0.83	5.08	0	34.5	

Table II.
Descriptive statistics

order to adjust for selection bias of announcing participation, we can only use the industry classification of the firm (which we hypothesized is of significant influence).

Analysis
Event study. This paper uses the event study methodology to measure the stock price reaction of firms to the events in question (i.e. announcements of participation in the ESCSP of the CDP). The event study methodology is well established in various

academic fields such as business and economics, law, biology and medicine (MacKinlay, 1997). In the last decade, event studies have also become popular in the field of supply chain management where topics such as the shareholder wealth effects of various supply chain topics such as supply chain disruptions (Papadakis, 2006), supply chain glitches (Hendricks and Singhal, 2003), supply chain management systems (Hendricks *et al.*, 2007), supply chain integration through consortium-based exchanges (Mitra and Singhal, 2008), and environmental supply chain sustainability initiatives (Bose and Pal, 2012) have been addressed through event studies.

We primarily searched for press releases through Business Wire. Business Wire is suitable as it is the global leader in press release and multi-media distribution and regulatory disclosure. As a consequence, all information distributed by Business Wire is followed closely by investors. As we wanted to be certain that our event study contained all relevant events and that information about these events had not reached the market prior to the mention in Business Wire, we checked our events through searches in Google. Even with these checks, our approach is conservative; if information about events that we included did not reach the market (or did not reach the market on the day which we included in our event study), this will negatively affect the significance of our results (i.e. we lose significance). The event dates are shown in Appendix 2.

In an event study, the stock price reaction (i.e. the abnormal return) is calculated by first estimating the expected return (i.e. the estimated normal return) for a company. Then, the difference of the actual return with the estimated normal return is calculated for the event day, and several days surrounding this day (i.e. the "event window"). The difference per day is referred to as the abnormal return per day. It is recommended to assess the abnormal return on the event day itself unless there are theoretical reasons to expect information leakage prior to the event day or slow dissipation of information on and after the event day (MacKinlay, 1997). In our study, we do not have such theoretical reasons and therefore we assess the abnormal return on the event day itself. We also present all abnormal returns five days prior to and after the announcement of participation. We excluded holidays and non-trading days from this event window. All stock price returns were retrieved from Thomson Reuters Datastream and dividend payments are adjusted for in the returns.

It is common practice to use the so-called "market model" to calculate the abnormal returns (MacKinlay, 1997). The market model adjusts for systematic risk by regressing the stock returns on the market return in the estimation window. This model is especially valuable when the sample size is relatively small, as it is in our case. We will now explain how the abnormal returns can be assessed using this model. As we will explain, using the market model we will thus be able to answer *H1*.

Market model description . First, we calculate the stock and market returns by applying the formula:

$$R_{it} = \ln(P_{i,t}/P_{i,t-1}) \tag{1}$$

where R_{it} is the return of the stock (respectively the market) i on day t and $P_{i,t}$ is the closing price of the stock (respectively, the market) i at time t, adjusted for dividend payments. Continuous compounding of returns (i.e. taking the natural logarithm) is common practice in event studies as it assures a more symmetric return distribution and makes returns time additive (MacKinlay, 1997).

Second, to find out whether returns are "abnormal," we need to assess what "normal" returns are. To do so, we estimate a one-factor market model, using a market index as the main risk factor for an estimation window of 100 trading days, starting 110 days before the announcement date. The event window is not included in the estimation period in order to prevent the event from influencing the estimation of what constitutes normal returns. The market model we estimate is given by the following equation:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \tag{2}$$

where R_{it} is the return of the security i at time t, α_i is the intercept term, β_i captures the systematic market risk, R_{mt} is the return of the market at time t and ε_{it} is the error term. The market index used in this paper is the Dow Jones sustainability index. This index was selected because it tracks the main leading sustainability driven companies worldwide, and thus captures all relevant market risk for this type of companies. The parameters in this formula are estimated using ordinary least squares analysis in Stata.

Third, the abnormal returns due to event i are calculated by subtracting the predicted normal return from the actual return, using the fitted values from the estimation window. This can be written as:

$$AR_{it} = R_{it} - (\hat{\alpha}_i + \hat{\beta}_i R_{mt}) \tag{3}$$

where AR_{it} are the abnormal returns calculated for time t. We are interested in the abnormal return on the event day, where $t = 0$ is the event day. After calculating these abnormal returns the observations are aggregated through time and across stocks. The average abnormal return (AAR_t) at day t for the N events is written as:

$$AAR_t = \sum_i AR_{it}/N \tag{4}$$

Fourth, in order to assess significance of the AAR at the event day ($t = 0$), we calculate the standard deviation σ_{AAR}:

$$\sigma_{AAR} = (1/N)\sqrt{\sum_i \sigma_i^2} \tag{5}$$

where σ_i equals the standard deviation of the error term ε_{it} of event i of the time-series regression of (2) and N is the number of events.

Finally, the Z-test is then applied to assess significance. The Z-value can be written mathematically as:

$$Z = AAR_t/\sigma_{AAR} \tag{6}$$

We use this Z-statistic to assess the significance of the abnormal returns (at $p = 10$ percent). Thus, we test $H1$, i.e. whether announcing participation has an impact on stock price returns.

Sample selection bias: Heckman selection model. As argued in the theory section, consumer pressure can differ per industry and can influence the probability of announcing participation in a ESCSP, which may lead to a bias in the estimation of the abnormal return of participation in this program. To test this, a two-step procedure of the Heckman selection model is applied (Heckman, 1979). The methodology of

applying a Heckman selection model to control for announcement effects has been suggested by, for example, Acharya (1988). The Heckman selection model controls for a self-selection bias that may occur in the data. This model jointly estimates a two-equation system. The first equation evaluates whether industry can explain the probability of announcement. The second equation then estimates the effect of participation in the program, controlling for selection effects in announcing participation. The first-stage Heckman equation is a probit model, defined as:

$$
\begin{aligned}
Y_i &= 1 && \text{if} \quad Y_i^* > 0, \text{ and} \\
Y_i &= 0 && \text{if} \quad Y_i^* < 0, \\
\text{with } Y_i^* &= X_i'\delta + \mu_i
\end{aligned}
\tag{7}
$$

where $Y_i = 1$ if the firm has announced participation in the ESCSP and $Y_i = 0$ otherwise. X generally is a vector of variables that explain whether or not a company announced participation, δ the coefficient to be estimated, and μ_i is an error term. In our study, the vector X consists of industry dummy variables. Y^* is a latent variable that captures the "attractiveness" of announcing participation, only if announcing is attractive enough, i.e. Y^* is above a threshold (normalized at zero) will we observe that the firms announce their participation. It is somewhat subject to debate which firms are part of industries that have historically faced high or low consumer pressure, which is why we let the data reveal which industries are more likely to announce participation. If our hypothesis on differences in consumer pressure is false, it will be rejected when the parameter δ is insignificant. If the parameter is significant, we can check whether the signs of certain industry effects are indeed in line with what we would expect based on differences in consumer pressure. So we test *H2* by including fixed industry effects in estimating probabilities of announcing participation. Even though finding an industry effect is no evidence for consumer pressure as such, rejecting that there are differences between industries is also a rejection of *H2*.

Second, the unobserved effects of announcement by the different companies are controlled for by including the inverse Mills ratio in the second equation:

$$
AR_i = \gamma + \kappa \lambda_i + \varepsilon_i
\tag{8}
$$

in which AR_i is the individual abnormal return on the event day ($t = 0$), λ_i is the inverse Mills ratio generated from the first stage that controls for the selection bias, κ and γ are the coefficients to be estimated, and ε_i is the error term in the regression model. Sometimes the explanatory variables X of the first stage are included in the second equation, but identification of the model then strongly relies on functional form. Therefore it is commonly advocated to use an exclusion restriction, so that identification also relies on how well the excluded variables explain the selection equation. In our case we do not include the industry effects X in the second equation. We are interested in the coefficient γ, which measures the effect of participation on the stock price returns, corrected for the selection bias of voluntary announcements of participation. So we test *H3* by estimating and assessing the significance of the parameter γ in a Heckman model for the abnormal returns, in the spirit of Acharya (1988), where the dependent of the selection equation is an indicator for whether or not a company announced its participation in an ESCSP. Note that this adjustment for selection bias does not rely on whether our hypothesis for the reason of announcing is correct or not.

Results

This section presents the results and is divided into two parts. First, this section presents the abnormal returns and z-values of all announcing firms (*H1*). Second, the results of the Heckman selection model are presented (*H2* and *H3*).

Announcement effect

This section will present the results of *H1*. Figure 1 shows the average abnormal returns (AAR) and 10 percent confidence bounds. As laid out in the analysis, we are interested in the abnormal return on the event day (i.e. day 0 in Table III). It is possible that there is some leakage prior to the announcement or that the market is slow to adapt to information. Therefore, we do not only present the results on the event day, but also provide AAR for the surrounding days, namely the five days before and after the announcement. As can be seen from Figure 1, the AAR on day 0 crosses the 10 percent confidence bounds. This result indicates a significant abnormal stock price reaction of -0.8 percent on the event day ($p < 0.10$). This confirms *H1*. There are no significant abnormal stock price reactions in the surrounding days, which implies no leakage and no delayed market response.

However, since announcement of participation in the program is voluntarily, one can expect that firms that render it likely to be subject to very negative stock price returns choose not to announce their participation in the program, leading to a selection bias in the assessment of the effect of participation on stock price returns. We will now explore if this outcome is indeed influenced by this selection bias and thus test *H2* and *H3*.

Selection bias in abnormal returns. Table III shows both the first stage and second stage results for two specifications of the Heckman selection model. We cannot include a dummy variable for every industry in the selection equation, because inclusion of a constant would make the model unidentified, so we need to leave one industry dummy
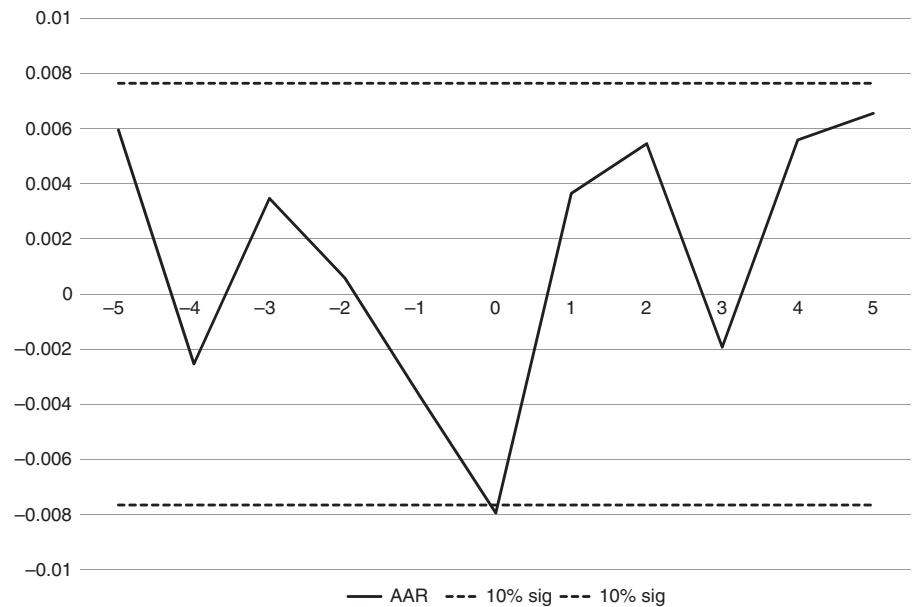

Figure 1.
Average abnormal
return relative to
announcement day

	Model 1	Model 2
Second stage: abnormal returns		
Dependent variable: abnormal returns		
Constant	−0.0324**	−0.0351***
	(−2.57)	(−2.79)
First stage: participation equation		
Dependent variable: announcement dummy		
Basic Materials	0.563***	0.501*
	(4.69)	(1.88)
Consumer Goods and Services	0.375***	0.344
	(3.92)	(1.14)
Financials	−0.0389	
	(−0.05)	
Health Care	−0.135***	−0.144
	(−3.38)	(−0.44)
Industrials	0.0133	
	(0.12)	
Oil & Gas	−4.956***	−5.118***
	(−26.39)	(−14.15)
Technology	1.021***	1.012***
	(7.92)	(2.83)
Telecommunications	0.319	
	(1.51)	
Utilities		−0.0213
		(−0.07)
Constant	−0.815***	−0.789**
	(−18.55)	(−2.51)
Correlation between residuals of the two equations (ρ)	0.603***	0.651***
	(4.27)	(5.78)
Standard error of residual of second equation (σ)	0.039***	0.040***
	(3.58)	(3.64)
Number of companies	66	66

Notes: Wald test of independent equations ($\rho = 0$); Model 1: $\chi^2(1) = 9.88$, prob $> \chi^2 = 0.0017$; Model 2: $\chi^2(1) = 15.83$, prob $> \chi^2 = 0.0001$. A Heckman selection model is estimated, where the first stage dependent variable is a dummy equal to one if the company announced participation in the program (21 out of 66 companies). Standard errors are clustered on the industry level, *t*-statistics in parentheses. *,**,***indicates significance at the 10, 5, and 1 percent levels, respectively

Table III.
Participation effects
on stock price returns,
accounting for
selection bias

variable out in this specification in the first stage. We choose to leave out the dummy for the Utilities industry; this choice does not influence our main announcement effect results as the industry will be included again in the second stage. As can be seen in the first stage of Table III (Model 1), when the dummy for Utilities is not included, we observe that companies in the Consumer Goods and Services, Basic Materials, and Technology industry are more likely to announce participation in the program, since these have a positive effect on the announcement dummy ($p < 0.01$). Likewise, companies in the Health Care and Oil & Gas industry are less likely to announce participation; their announcement dummy is negative and significant ($p < 0.01$). Yet, in this model, we did not include a dummy variable for Utilities. Model 2 is a robustness check and shows estimates for the same model, but uses as a specification only the industries that showed up significantly in Model 1, while including the Utilities industry dummy this time. As Model 2 shows, the industry effects are only robust for

the Technology and Oil & Gas industry when we include the Utilities industry dummy variable. As expected, the results still show that there are significant differences in likelihood of announcing participation between industries; the Oil & Gas industry has a smaller likelihood of announcing participation whereas the Technology industry has a larger likelihood of announcing participation. Despite the fact that the characteristics that drive the selection equation are rather broadly defined and subject to model specification, all findings combined do point toward a selection effect due to differences in industries when estimating the abnormal returns associated with participation in ESCSPs in the second stage. This provides support for *H2*.

The second stage results show that, once we account for the selection effect, participation in the program yields a more negative abnormal return. This can be observed when we assess the constant in the stage two models. In these models, the stock price reaction differs only slightly with regards to the model specification. If we consider the model with the weakest effects (Model 1), the stock price reaction to ESCSPs after correction for firm visibility is −3.2 percent ($p < 0.05$). Overall, our second stage results thus support *H3*.

Discussion and conclusion

While ESCSPs are much discussed in literature and there is a trend of firms to commit to ESCSPs, little is known about the financial effects of ESCSPs. In this paper, we investigate how shareholder value is influenced when firms commit to ESCSPs. Through an event study, we show that firms that announce participation derive a negative stock price reaction (−0.8 percent; $p < 0.10$). Yet, we expect that as firms have historically faced higher consumer pressure, they are less likely to announce their participation. The underlying reason is that such firms expect stock price reactions that are more negative compared to firms that have historically faced less consumer pressure. A Heckman procedure is required to address this selection bias because one cannot come to this conclusion by simply controlling the abnormal returns for industry effects, since the sample of abnormal returns only contains companies that have announced. That is, if an entire industry never announces, there are no observed abnormal returns for this industry, so the standard procedure of regressing abnormal returns on industry dummies is impossible and thus cannot address the selection bias. When we correct for this announcement bias through two-equation Heckman modeling, using industry dummies to explain the selection effect, the stock price reaction to ESCSPs is indeed even more negative (−3.2 percent; $p < 0.05$).

Theoretical and practical implications

Our study adds both to literature on environmental sustainability and on supply chain literature by capturing the financial effects of environmental supply chain sustainability. Prior studies provide valuable insights regarding these effects but are unable to form clear conclusions regarding the overall financial effect due to the chosen methodology and operational perspective (e.g. Zhu and Sarkis, 2004; Zhu *et al.*, 2007). In this paper, we provide a holistic perspective on the benefits, risks and costs of ESCSPs and capture the overall financial effects through an event study. We show that ESCSPs are negatively valued by stock markets and that this effect is more pronounced if we correct for the selection bias in the firms that announce. Our conclusions are valuable as our data are objective and does not suffer from a positive self-evaluation bias of survey and case studies that tend to interview the practitioners who chose to implement environmental initiatives in the first place.

Through our study, we also address practitioner concerns that environmental sustainability in supply chains might not pay off. As reported by Armstrong (2011) practitioners often reluctantly engage in environmental sustainability initiatives when they are pressured by government regulation, influential investors, or powerful customers. In this paper, we show that practitioner concerns about the potential negative financial effects of ESCSPs are valid. This finding could imply that firms should abstain from ESCSPs unless they receive clearer incentives from consumers (i.e. price premiums, larger market shares), governments (i.e. tax cuts for firms with environmentally sustainable supply chains, and/or fines for the remaining firms), or green investors (reward of extra capital to firms with environmentally sustainable supply chains, and/or withdrawal of capital from non-green firms) to engage in environmental supply chain sustainability. This also means that these stakeholder groups need to be more explicit regarding the rewards of the firms with environmentally sustainable supply chains and/or the punishment of the remaining firms. For example, governments that are concerned about the environment should ensure transparency and effectiveness of their regulation in order to make ESCSPs viable (as already suggested by Dahlman, 1979). In line with the argument put forward by Dahlman (1979), if regulation transparency and effectiveness is achieved, well implemented ESCSPs may be rewarded by the stock market (after an initial negative shock in the stock prices of all firms affected by this regulation).

Prior research has stipulated that sustainability within and between firms has three main components: environmental, social, and economic sustainability (Elkington, 1997). Our paper focussed on the relationship between two of these components: environmental and economic sustainability. We lay out that while these two dimensions may complement each other (as environmental sustainability may have economic benefits for firms), they may also clash (as these benefits may be lower than the costs and risks of environmental sustainability). By acknowledging this clash, we hope to contribute to questioning the nowadays often repeated mantra that the pursuit of environmental sustainability is always economically attractive for firms. As such, our study supports a growing amount of literature that put the benefits of environmental (supply chain) sustainability into perspective. For example, Seuring and Müller (2008) have put forward that environmental sustainability is an order qualifier rather than an order winner for firms. Furthermore, the study by Zhu and Sarkis (2007) promotes a contingency approach as it shows that the business context in which firms operate significantly influences the performance gains from environmental supply chain sustainability.

In addition, our paper highlights the importance of consumer perceptions in the clash between the components of sustainability. As argued in the theory section, consumer perceptions about environmental supply chain sustainability of firms do not need to match the reality; it is possible that some firms have enforced environmental sustainability within their supply chain prior to the popularization of official programs and certification. Yet, consumers may still perceive such firms as having lower environmental supply chain sustainability than firms that have such an official program or certification. In such cases, firms whose supply chain is already environmentally sustainable may feel pressured into joining additional programs to publicly display their environmental sustainability to consumers. Such additional programs could be labeled as "greenwashing" which does not add any environmental and economic value; on the opposite, these programs may actually waste resources and thus harm both the environmental and economic performance of firms. In this paper, we argued that if firms are aware of such waste, they may still engage in environmental programs to avoid

potential consumer uproar. But, as firms are aware of the redundancy and wastefulness of these programs, they may be reluctant to announce their participation. Our results show that there is indeed a selection bias across industries that is in line with our expectations: the Oil & Gas industry which has been pressured significantly by customers in the past decades is less likely to announce participation while the Technology industry which has only received customer attention in the last couple of years is more likely to announce participation. Thus, while we recommend that consumers give firms clearer incentives, we also want to emphasize the necessity that consumers provide the "right" incentives (i.e. incentives that diminish the waste of resources instead of incentives that promote "greenwashing"). In order to give such incentives, consumers may need to get more informed when official ESCSPs and certification contribute to environmental performance and when they may actually be wasteful.

Both consumers and firms may also want to become better informed about which programs work and which programs do not work. Our study may contribute to this understanding. We investigate a very large, all-encompassing, and pre-defined ESCSP that is implemented top-down in the participating organizations. While from an environmental perspective it would be great if firms are indeed able to implement such an elaborate, ready-to-go program relatively quickly within their organization, it is questionable if this is really feasible. Are firms not better off taking the bottom-up approach to environmental sustainability by making smaller steps that are better defined and better tailored to the specific firm, and are thus better manageable and more effective in their day-to-day business practice? Interestingly, and in line with this idea, the study of Bose and Pal (2012) which investigates smaller (bottom-up) environmental initiatives suggests that these initiatives are both economically and environmentally feasible. Only time and more research will tell which approaches work (and which do not) as firms will continue to take different approaches to (environmental) supply chain sustainability.

Limitations and directions for further research
Our study carries several limitations that provide directions for further research. First, our research sample is limited to firms that committed to the ESCSP of the CDP. Our sample consisted of a total of 66 companies that participated in this program, of which 21 of the participants announced their participation. While the sample is limited to this population and seems relatively small, it carries several benefits. First, the supply chain program of the CDP is the largest ESCSP to which multinationals can commit. Firms that set up their own ESCSPs design these in very different ways. This makes the various ESCSPs difficult to compare. As such, our current sample of ESCSPs is the largest possible sample of comparable events. Second, firms that implement their own ESCSPs frequently announce their plans over a period of time as they develop their programs. This makes their effects on shareholder wealth difficult to capture. Thus, it is practically impossible to draw conclusions from such comparisons of firms that set up their own ESCSPs. Although it was beyond the scope of our paper and may be very difficult to carry out in practice, for the reasons laid out in the previous section, we would welcome further research that aims to make comparisons between the environmental supply chain programs and initiatives of various firms.

Second, our study suggests that ESCSPs are not financially viable in the existing circumstances. Although the market is "right" under the current circumstances, it

cannot foresee all future developments. For one, it is possible that as suggested above, the various stakeholders may drastically change their approach and find a transparent and effective way to reward firms whose supply chain is environmentally sustainable and punish the remaining firms. If such a scenario would indeed develop, the early adopters of ESCSPs could have an advantage over their competitors whose supply chain is not yet environmentally sustainable. Yet, it is also possible that firms with bottom-up environmental supply chain sustainability initiatives achieve the same or even a better result. In any case, it would be very beneficial if further research would directly assess the exact benefits, costs and (mitigation of) risks due to ESCSPs and initiatives. For example, data on firm prices, market shares, and efficiency of firms could be compared; a longitudinal study could be conducted within firms that have committed to ESCSPs (or other environmental supply chain initiatives), or alternatively the performance of committers and non-committers could be compared. Such an approach would contribute greatly to answering the question if (and which kind of) environmental supply chain sustainability is really financially viable; do firms recover their environmental supply chain sustainability investments over time? While our study dealt with stock listed firms, this alternative approach could also provide insights into the benefits of environmental supply chain sustainability of privately held companies.

Third, an event study assumes that markets are efficient; all relevant information is immediately reflected in stock market prices. However, one could argue that participation in ESCSPs has long-term effects which are not immediately identified by market participants. If this is the case, the methodology of this paper (which only assesses the immediate period surrounding the announcement) should be adapted in such a way that long-term effects can also be measured. Yet, it is well-known that measuring long-term announcement effects is notoriously hard because stock market data are very volatile. Therefore, although the current event window may be limited regarding the period it captures, this seems to be the best possible option for assessing the effect of ESCSPs on shareholder wealth.

Finally, we lay out various motives of firms to participate in ESCSPs (or not) and to announce their participation (or not). Nevertheless, we formally only test differences in industries. Such a test is suitable to invalidate our hypothesis, yet our results are only a weak validation of differences in consumer pressure – other industry effects may be at play. Also, since we include individual industry dummies, instead of a dummy for consumer pressure industries, not many industries show a significant effect. They may be jointly significant, but we cannot test this without a proper justification of classifying of which industries are subject to consumer pressure. It would therefore be insightful if future work would complement our study with more qualitative data regarding the motives of firms (or other ways to gain insights into consumer pressure). For example, case studies could be conducted to verify the extent to which each motive mentioned in this paper actually influences firm assessments of ESCSPs and to uncover potential considerations that we have not identified. We suggest that such future work is set up from a holistic firm perspective and that data is gathered on a strategic level within the firm instead of on an operational level. In such research, it would be interesting to explicitly address how the firm strategy and organizational philosophy regarding environmental and/or supply chain initiatives shape the perception of the benefits, risks, and costs associated with participation in ESCSPs.

Conclusion

Concluding, our study theoretically argues and empirically substantiates that firms that commit to an ESCSP derive a negative shareholder wealth effect. If we investigate only firms that announce their commitment to an ESCSP, then the stock price reaction is −0.8 percent ($p < 0.10$). Yet, because there is a selection bias across industries (which we argued is due to historical differences in customer pressure), the actual stock price reaction to an ESCSP is −3.2 percent ($p < 0.05$) if we correct for this bias. Our paper thus stipulates that environmental supply chain sustainability is a complex issue which can become a financial fiasco instead of a financial success. By emphasizing that the business context in which firms operate (i.e. their industry) can greatly affect the financial performance that they derive from ESCSPs, we aim to provide further insights to academics and practitioners into when ESCSPs are successful and why.

Note

1. While the concepts of corporate sustainability (CS) and CSR are often used interchangeably, some authors stipulate that the concepts are not identical. For example, Van Marrewijk (2003) suggests that CS concerns the communal aspect of people and organizations and CSR concerns the agency principle.

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Further reading

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Clifford, S. (2013), "Some retailers say more about their clothing's origins", available at: www.nytimes.com (accessed 8 May 2013).

Appendix 1

Company name	Industry
Accenture	Financials
Acer	Technology
AsusTeK Computer	Technology
BAE Systems	Industrials
BT Group	Telecommunications
Babcock	Industrials
Banco Bradesco	Financials
Bank of America	Financials
Baxter International	Health Care
Biogen Idec	Health Care
Boeing Company	Industrials
CELESC	Utilities
Cadbury	Consumer Goods
Carrefour	Consumer Services
Colgate-Palmolive Company	Consumer Goods
Coloplast	Health Care
ConAgra Foods	Consumer Goods
Danone	Consumer Goods
	(*continued*)

Table AI.
Companies who committed to the ESCSP of the CDP

Company name	Industry
Dell inc	Technology
EADS	Industrials
EMC Corporation	Industrials
ENEL	Utilities
Eaton Corporation	Industrials
Endesa	Utilities
Eni	Oil & Gas
Exelon Corporation	Utilities
Fibria Celulose	Basic Materials
Ford Motor Company	Consumer Goods
Fujitsu	Technology
GlaxoSmithKline	Health Care
Google	Technology
H.J. Heinz Company (Heinz)	Consumer Goods
Hewlett Packard Company	Technology
Hynex Semiconductor	Technology
IBM	Technology
Imperial Tobacco	Consumer Goods
Johnson & Johnson	Health Care
Johnson controls	Consumer Goods
Juniper Networks	Technology
Kao	Consumer Goods
Kellogg Company	Consumer Goods
Kimberly-Clark Corporations	Consumer Goods
Kraft Foods	Consumer Goods
Logica	Technology
Merck & Co Inc	Health Care
Millipore Corp	Health Care
Molson Coors Brewing Company	Consumer Goods
National Australia Bank Group	Financials
National Grid	Utilities
Newmont Mining Corporation	Basic Materials
Pepsico Inc	Consumer Goods
Proctor and Gamble company	Consumer Goods
Prudential	Financials
Rautaruukki	Basic Materials
Reckitt Benckiser	Consumer Goods
Rolls-Royce	Industrials
Royal Phillips Electronics	Consumer Goods
SKF	Industrials
SSL International	Consumer Goods
Sony Corporation	Consumer Goods
Tesco	Consumer Services
Unilever	Consumer Goods
Vale	Basic Materials
Vivendi Universal	Consumer Services
Vodafone	Telecommunications
Walmart	Consumer Services

Table AI.

Appendix 2

Company name	Announcement date
Boeing Company	24-09-09
Cadbury	9-10-07
Carrefour	28-02-08
Dell Inc	30-11-07
Exelon Corporation	15-09-07
Hewlett Packard Company	23-09-08
Johnson controls	1-12-08
Juniper Networks	22-09-08
Unilever	25-09-08
Baxter International	3-10-11
ConAgra Foods	21-08-08
Kao	7-11-10
Logica	8-10-09
Rautaruukki	12-03-10
Rolls-Royce	23-04-10
BT Group	3-02-11
EMC Corporation	29-03-09
Fibria Celulose	16-07-10
Ford Motor Company	12-10-11
Hynex Semiconductor	11-04-11
Walmart	25-07-11

Table AII.
Announcement dates of
companies that announced
participation in the ESCSP
of the CDP

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