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Do environmental policy instruments influence fiduciaries' decisions?

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Abstract. This paper examines the import for fiduciary investors (pension funds, insurance companies, and mutual funds in OECD countries) of companies' environmental performance levels in light of existing and nascent energy-usage and environmental management policies. The study is based on an experiment using a sample of fiduciaries located mainly in Europe, North America, and Australia. Subjects are allocated to one of two groups: one group invests with reference to environmental considerations, while the other tracks a conventional equities index. Responding participants indicate the frequency with which they use nominated sources of information and rate the importance of nominated types of information in their decisions concerning the portfolio. The results suggest that the wider population of fiduciaries considers existing policy measures to be of limited value, yet, on liquidity grounds, might be prepared to take environmental considerations into account in the portfolio construction process. Another contribution of this paper is its framing and consolidating of literature on energy and environmental management policy, environmental investing, and decision psychology.

Keywords: fiduciary investment, environmental reporting, energy policy, environmental policy, market-based policy instruments

1 Introduction

This paper is motivated by the messy state of value and information exchange between environmental lawmakers, regulators, and fiduciary investors (Bäckstrand and Lövbrand, 2007; Haigh, 2011; Kysar, 2010; Okereke, 2007) and by a long-standing debate about fiduciaries' recognition of environmental considerations in the portfolio construction process.[(1)] Discussion on whether there is an onus on institutional investors to take account of environmental and social considerations has been approached from fiduciary grounds (Harte et al, 1991; Richardson, 2011), economic grounds (Busch and Hoffmann, 2007; Clarkson et al, 2010; Dasgupta et al, 1998; Halme and Niskanen, 2001; Levitt, 1958), and the precautionary principle (Kysar, 2010, pages 203–228). Little attention has been paid to whether data points that relate to environmental and social considerations are *useful* for fiduciary financial institutions managing pooled investment schemes. This paper addresses that lacuna. In the process, the paper makes a major contribution by framing and consolidating literature on energy-usage and environmental management policy instruments, environmental investing, and decision psychology.

[(1)] A 'fudiciary' is a person holding the character of a trustee, being charged to act primarily for another's benefit with regard to specific property or affairs. Managers and responsible entities of assets entrusted to insurance companies, pension funds, and mutual funds are commonly characterised as having a fudiciary character.

In this paper we investigate the current and potential impact of market-based energy-usage and environmental management policy instruments on fiduciaries' investment decisions. The paper also investigates, by use of an experiment on a sample of fiduciaries and service providers, the moderating influence of the approach used to construct the portfolio. Via a questionnaire, participating subjects (our respondents) were instructed to make major investment decisions relating to a hypothetical balanced portfolio. Half of our sample was given responsibility over a balanced portfolio constructed using an environmental theme, while the other half was given responsibility over a balanced portfolio that tracked a broad equities index. Respondents then indicated the frequency with which they would use nominated sources of information and rated the importance of nominated types of information in their decision processes.

The results suggest that there is variance across market-based energy-usage and environmental management policy instruments inasmuch as those instruments might influence investment decisions. For the participating respondents the level of carbon prices affects investment decisions, but carbon taxes and the availability of energy-usage subsidies do not. Information bearing on companies' environmental performance levels is considered useful insofar as that information is priced.

Our presentation of these findings begins below with a discussion of information about companies' environmental performance levels, environmental policy measures, and investments. Following this we introduce our research questions, outline the model used to predict the investment decision, and present our experimental design. We then detail our results, mentioned in brief above, and outline the contributions of this paper to extant research and policy.

2 Prior literature and research questions

This section consists of two subsections, the first of which reviews and highlights lacunae in prior research on environmental considerations in investment decisions, and then describes energy-usage and environmental management policies with relevance to fiduciary investors. The second subsection presents a series of research questions.

2.1 Environmental considerations in fiduciary investment

We first explore existing work on investor behaviour. There is a growing literature on the responsiveness of financial institutions towards 'environmental considerations' (eg, Farzin and Kort, 2000; Hoffmann, 2007; Kolk et al, 2008; Levy and Kolk, 2002; Levy et al, 2010; Lohmann, 2008; Richardson, 2009). Systems-oriented theories (for example and most commonly, stakeholder and organisational legitimacy theories) have been used to explain investor interest in corporate environmental and social information disclosures (Freedman and Stagliano, 1991; Friedman and Miles, 2001; Haigh, 2006; Harte et al, 1991; King and Lenox, 2000; Knox-Hayes and Levy, 2011; Mason, 2008). Marketing studies have linked the behavioural motivations, intentions, and decisions of portfolio managers using theories derived from consumer psychology (Capon et al, 1996; Marks and Mayo, 1991). For the most part, studies on ethically inspired and environmentally responsive fiduciary investment have researched *retail* investors and not institutional investor studies and used behavioural approaches from economic psychology (Cullis et al, 1992; Epstein and Freedman, 1994; Lewis, 2001). We subscribe to the consumer approach mentioned above, particularly as typically it manifests in an experiment-based research design.

Experiment-based studies in the accounting and finance field have produced mixed evidence on investors' use of information pertaining to companies' environmental performance levels. Belkaoui (1980) shows that the provision of noneconomic accounting information may, in various contexts, affect the investment decision made by a user of that information.

Milne and Chan (1999) find limited support for a hypothesis that company-issued social information has a positive effect on retail investors' decisions regarding investments in those companies. Holm and Rikhardsson (2008) provide a contrast; they find moderate support for hypotheses that retail investors are led to invest in firms when supplied potentially cashflow-incremental environmental information. We find it problematic that none of these experiments rigorously explores the role of different environmental policy instruments. This effectively ignores a policy approach common to OECD countries (see appendix A) calling for fiduciaries to provide some sort of attention to environmental concerns.

In the existing literature, expectations as regards investment decisions, including 'patient' shareholders' (pension funds and insurance companies) level of usage of company-specific environmental information, tend to be based on the familiar agency framework (Deegan and Rankin, 1997; Halme and Niskanen, 2001; Holm and Rikhardsson, 2008; Rikhardsson and Holm, 2008). The agency approach has limited bearing on fiduciary investment as, according to the trust and fiduciary laws that govern the common forms of managed investment, fiduciary investors do not become agents of beneficiaries (Richardson, 2011). Neither does the agency approach have much truck in institutional markets, where regulatory requirement to take environmental considerations into account typically applies, fiduciary obligation to invest the funds of others in a demonstrably responsible manner exists, and the institutional pressures of financial markets are experienced at close hand.

Where the outcomes of research on the use of company-specific social and environmental information in fiduciary investment can be seen, it has been narrow in geographic focus and restricted to specific professional roles. Fayers et al (2000) identify factors affecting the ways Australian equity analysts take account of companies' environmental performance levels. Other studies have focused on information coming from a single source, such as De Villiers and Van Staden (2010) and Van der Laan Smith et al (2010), both of which examine the reactions of fiduciaries to data contained in companies' reports on their environmental and social projects. These studies effectively rule out transnational portfolios and fiduciaries handling multiple geographic concerns.

The remainder of this section explores existing work on environmental policy development. Fiduciaries' exposures to market-based environmental policy instruments: for example, production-based and consumption-based taxes, energy-usage subsidies, and tradable emissions permits, potentially bring environmental considerations to the forefront of the investment decision (Lydenberg, 2011). Environmental lawmaking in the US and other OECD countries has since at least 1969 been informed chiefly by what Kysar (2010, page 99) refers to as "value monism"—the beliefs of policy makers and regulators that ecological protection and environmental values like biodiversity should represent fungible benefits that can and ought to be liquidated. To sheet the burden of responsibility for global ecology even partly onto fiduciaries is not a light thing, given fiduciaries' obligations to provide for beneficiaries of these types of investment schemes. A roughly uniform policy approach in OECD countries has appealed to private actors in product and financial markets. This has been carried through to contrived situations: for example, the valuation of emissions trading markets.[2] With regard to fiduciaries' response to environmental considerations, the policy approach has been prescriptive and open ended rather than precautionary and open ended (Richardson, 2011), making the uptake of environmental policies the more difficult for fiduciaries governed by a narrowly construed concern for beneficiaries.

[2] For example, the near-linear assumptions of typical abatement benefit functions used in climate change models; the net present value calculations used to model emissions costs and offset purchases, cumulative emissions, and offsets; and emissions price paths as calculated by The World Bank and some scholars (see, further, Pizer, 2002).

The long-standing regulatory push for the private sector to shoulder environmental responsibilities (King and Lenox, 2000; Kysar, 2010, page 3) is reflected in a series of pronouncements and guidelines emanating from OECD countries that would promote fiduciaries to recognise and deploy environmental considerations in the portfolio construction process (see appendix A for a list of pronouncements). In all cases of regulations we have examined that promote fiduciaries to take account of environment issues, transparency is prioritised over ultimate responsibility for desirable environmental outcomes. As Kysar (2010, page 203) puts it: "The ideal of openness … does not readily lend itself to behavioral prescription; indeed, the very aim of ethics as first philosophy is to refuse to yield programmatic advice regarding how to live." The latter aim might apply equally to environmental lawmakers and fiduciaries of the vehicles that determine pensions provision for a sizeable proportion of the population of OECD countries. The policy problematic of *economy contra ecology* has centred on establishing no-net-cost equilibria (for example, the notion of emissions offsetting in the Clean Development Mechanism) but properly rests on considerations of intergenerational equity and intergenerational value creation. The modus operandus of environmental lawmakers has diverged from considerations of the latter type, deploying measures that are squarely aimed at realising immediate benefits. The primacy of a business-case mentality has assumed primacy over more emergent environmental and social values.

This paper, building upon the efforts of Holm and Rikhardsson (2008) and Rikhardsson and Holm (2008), extends and fills in gaps in existing research with a dedicated focus on the responses of fiduciaries to policy instruments such as carbon emissions permits, carbon taxes, energy-usage subsidies, and mandated carbon emissions reports. This lacuna deserves to be filled given ongoing contestation over whether market-based instruments can be expected to be efficacious in stemming the effects of climatic changes (Lohmann, 2008; Mason, 2010; Stavins and Jaffe, 1995). It also gets to the heart of the discussion about whether fiduciaries can legally drive market forces so as to stimulate inter alia companies' efforts to reduce their levels of carbon emissions (Busch, 2010) and whether such action is socially equitable (Bumpus and Liverman, 2008; Leiserowitz, 2006; Mackenzie, 2009; Richardson, 2011).

We investigate the connections between the portfolio decisions of an important group of investors—fiduciary insurance companies, pension funds, and mutual funds—and environmental policy instruments. Avoiding presumptions as to the salience of company-supplied information, we identify the information sources and selection criteria used by a global sample of fiduciaries and their contracted agents (for example, information providers and company raters) who are attracted to environmental investing. By having a wider sample than that used in the existing literature, we can better understand the ways in which the principal roles in fiduciary finance (for example, trustee, portfolio manager, advisers) take environmental considerations into account.

2.2 Research questions

Building upon the existing research described above, the present paper answers two research questions. First, to what extent do fiduciaries use information on companies' environmental performance levels? Fiduciaries are presumed to be uncertain to some degree about whether they should use such information in the portfolio construction process. Those seeking to allocate their assets in such a way that would lower the carbon emissions level of the portfolio face, like any fiduciary, a pressing obligation for stable investment returns. The best use of often unregulated and usually unpriced information on companies' environmental performance levels is, therefore, likely to be unclear to fiduciaries.

Second, how do fiduciaries respond to market-based environmental policy instruments? If policy instruments were to offer economic incentives for firms to swing into renewable energy sources, it seems likely that fiduciaries would attach value to those instruments,

given the eventual implications for the levels of portfolio distributions (payments to scheme members). Yet, fiduciaries, as much as any interested observer, would be aware that market-based policy instruments have not always performed as anticipated. Ultimately, we must focus on those policy instruments and other data which are used in the investment decision and that ultimately will influence the levels of portfolio distributions.

Data that answer both research questions are collected using a purposive and self-selected sample of fiduciaries working in and providing services to financial institutions around the globe. Using a survey questionnaire, the authors identify the information sources and selection criteria used by respondents to allocate funds to variously environmentally sensitive investment portfolios. The outcomes, we claim, have important implications for environmental policy design.

3 Approach

This section consists of three subsections to detail the methodological approach. The first sets the theoretical framework used to model the investment decision. The second subsection details the research instrument, specifies the information asymmetry conditions that attach to the first research question, outlines the experimental design, and outlines how we analyse the collected data. The third subsection describes our sample and the process through which the research instrument was administered.

3.1 Fiduciary decision making

The psychology of investing literature has sought to establish linkages between investors' motivations, behavioural intentions, and actual behaviour. In this context, we model investors' decision processes using the theory of planned behaviour, which states that the identification of a consumer's resource constraints and personal attitudes toward the characteristics of financial products under consideration allows predictions to be made about consumer behaviour (Ajzen, 1991; Fishbein and Ajzen, 1975). While planned behaviour theory has been largely applied in retail investing contexts where there are few if any fiduciary obligations (Haigh, 2008; Harte et al, 1991; Lewis, 2001; Webley et al, 2001), there is nothing to suggest that predictions that use planned behaviour theory will not be accurate here.

Our decision-making model is derived from consumer theory (viz Marks and Mayo, 1991). Economic consumption begins with an initial information-gathering phase (search) in which consumers use memory and external information sources to construct product and service attributes. In information search, consumers rank the importance of product/service attributes and use the rankings to assess alternate product/service offerings. Consumers then use the rankings to convert intentions to decisions.

To understand the usage of environmental information disclosure in fiduciary investment, we also utilise the theory of information asymmetry as used in research on corporate governance systems, theories of the firm, and company–customer relationships. For example, Holm and Rikhardsson (2008) and Rikhardsson and Holm (2008) identify information asymmetry conditions arising between investors and corporate reporters of environmental information. Capon et al (1996) and Haigh (2008) identify investors' perceptions of the quality of companies' information disclosures as a problem akin to a consumer dilemma. These four studies provide us with links among information on companies' environmental performance levels, market-based environmental policy instruments, and the fiduciary investment decision. We use the decision criterion of 'usefulness' as the foundation for our expectations about those relationships.

3.2 The research instrument and experimental design

Six closed-ended questions relating to three constructs are used to measure the decision process sketched above. The general form of the questions posed is adapted from a multiattribute model operationalised by Capon et al (1994). The three constructs are: (i) fiduciaries' intentions to take environmental considerations into account; (ii) information sources and evaluation criteria used in forming the investment intention; and (iii) information asymmetries experienced in the investment decision.[3]

The research instrument asks respondents to nominate their work roles, the geographical regions they cover, the frequency with which they use nominated sources of carbon emissions data, and their satisfaction levels with company-issued reports of their environmental performance levels. (The research instrument in its entirety can be found in appendix B) Responses are measured on Likert scales, and one open-ended question is attached to the question on information satisfaction.

The final question poses a hypothetical investment scenario in which respondents rate the importance of five nominated policy instruments (carbon taxes, subsidies for usage of sustainable sources of energy, and three ranges of carbon prices[4]) and informational items about company projects to decrease carbon emissions and company-based emissions reports. These items were all found to be salient in our pilot study-based trials.

This paper defines three conditions—incomplete information, unreliable information, and information in an inappropriate form for investment analysis—as information asymmetry conditions (Haigh, 2008; Holm and Rikhardsson, 2008). When any of these information asymmetry conditions are present, we can expect that investors will ignore the two environmental information items (nominated above) in their investment decisions.

The instrument employs a two-way experimental design using multiple factors with fixed levels. Two investment scenarios—one our control condition and the other our experimental treatment—are used in the design of the experiment, differing only with respect to the type of permitted portfolio construction approach. (See appendix B for exact wording.) The experimental treatment is an active, stock-picking approach such as might be used by a mutual fund focusing on new technology and energy stocks. The control condition is a 'passive', defensive management style of the type conventionally used by pension funds and insurance companies. This design is used to gather evidence on the extent to which the portfolio construction approach affects the decision to allocate funds towards environmentally sensitive assets.

The distinction between active and passive investing styles is a crucial one. An active investing style describes an investing approach that may depart from the composition and weighting of equity securities of major stock exchanges. The active portfolio manager, not a benchmark index, will set expected portfolio returns of the portfolio. A passive investment style, on the other hand, describes the approach fiduciaries commonly adopt for asset selection. The equity component of a passive portfolio typically reflects the composition of major stock exchanges: for example, the MSCI Global Equity Indices (http://www.msci.com/products/indices). We classify a passive investing approach as being analogous to our control condition on the grounds that this approach is likely to exclude environmental considerations from the investment decision.

[3] Motivations, which in the model used here precede (investing) intentions, are not measured. Due to the sampling method deployed, we can assume the experimental subjects are interested in finding ways to deploy environmental considerations in their investment decisions.

[4] Carbon price refers to a 'market-robust' carbon price that can be generated by price and quantity instruments (Pizer, 2002). The nominated carbon price ranges are informed from prices published by Point Carbon (http://wsww.pointcarbon.com/news) on 26 April 2010.

Analysis of the experimental treatment is informed by the investor studies of Rikhardsson and Holm (2008), Lewis (2001), and Webley et al (2001). Our analysis of the remaining data partly follows Capon et al's studies (1994; 1996) of US retail mutual fund investors and Haigh's (2008) global study of investors in retail ethical investment trusts. Various nonparametric and parametric procedures are conducted. The tests of relation address three relationships:

(1) *Area of professional responsibility and information on companies' environmental performance levels.* The purpose of this test is to compare the levels of usage of information on companies' environmental performance levels along the principal categories of trustee, portfolio manager, and adviser.

(2) *Information sources and information satisfaction.* This test assesses the sources of information that fiduciaries use to assess the environmental performance levels of companies.

(3) *Investing approach, policy instruments, information importance, and investment decision.* The purpose of this test is to examine the influence of the portfolio construction style on the relations between environmental policy instruments, information usage, and the investment decision.

3.3 Subject selection and instrument administration

The sample of participating respondents is obtained using three sources:

(i) *Certain individuals working at twenty-six fiduciary financial institutions and associations that are prominent in environmental investing practices.* With four exceptions, the financial institutions represented in this subsample are members of the nonprofit Carbon Disclosure Project and certain other nonprofit investor associations focused on climate-change issues. The institutions are located in the US, several European countries, Japan, and Australia.

(ii) *Responses to single-sheet copies of the instrument distributed to 120 delegates at an investor conference on the topic of climate change, held in Paris, June 2010.*

(iii) *Unpaid advertisements placed in selected fiduciary investment media outlets and networks operating in North America, Europe, Hong Kong, and Australia*. No retail investor networks are used in the procurement of the sample.

The sampling method above uses elements of self-selection and judgment. There are benefits of a judgmental, purposive sampling approach when a subpopulation provides expert information (Moser, 1952; Onwuegbuzie and Jiao, 2004; Tongco, 2007). Purposive sampling has appeared in behavioural experiment-based studies involving normative motivations (Gupta and Sulaiman, 1996; Mariri and Chipunza, 2011). We are confident that there is sufficient information in the sample to preclude either a need for randomisation or a larger population and that our sampling ratio is sufficiently large given the (currently) specialised nature of fiduciary investment that takes account of environmental considerations. Our use of a global spread of fiduciaries is not common in experimental investment research. The fact that all of these fiduciaries are interested in devising ways to incorporate environmental considerations in investment decisions makes our sampling method all the more compelling.

The online version of the instrument was administered on a dedicated Internet website over the period 1 May–31 July 2010. The Internet domain was designed so, when anyone visited the nominated website, an algorithm first read which of the two questionnaires was answered most recently, then redirected the current user to the alternate survey. Allocation between the two treatments was roughly equal over the three-month administration. Regarding the investor conference, both versions of the instrument were allocated systematically to delegates such that both versions were distributed equally between conference delegates.

4 Results

We present below, first, our findings related to associations between usage of information on companies' environmental performance levels, respondents' responsibility areas, and information satisfaction. We then examine the outcomes of the experimental treatment. A discussion of the outcomes concludes the section.

The findings reported are based on forty-six responses entered manually and automatically (the latter via an online questionnaire) into a database. Respondents are located in Australia, China, Canada, the US, and seven European countries.

Table 1 shows the investment functions of respondents (shown in rows) and their areas of geographical responsibility. Roughly two in three respondents focus on all three regions or claim a global focus (62.2%). Investment function is dominated by portfolio managers (51.1%), followed by investment advisers (26.7%), and fiduciaries here referring specifically to trustees and board members) at 11.1%.

Table 1. Respondents' investment functions and responsibility areas.

	North America	Europe	Asia Pacific	Global	Percentage
Fiduciary trustee	0	0	2	3	11.1
Advisory	1	3	1	7	26.7
Funds management	2	4	2	15	51.1
Governance adviser	0	0	1	2	6.7
Other adviser	0	1	0	1	4.4
Total (45)[a]	3	8	6	28	
Percentage	6.7	17.8	13.3	62.2	100.0

[a] One of the 46 respondents did not answer the 'responsibility area' question.

4.1 Importance of policy instruments and environmental information

Looking first at the level of usage of information on companies' environmental performance levels according to investment function, we present in figure 1 all five areas of professional responsibility. What is immediately clear is that subjects in the trustee category use information on companies' environmental performance significantly less often than do subjects from the other categories: 60% of trustees use company-supplied or company-derived information on

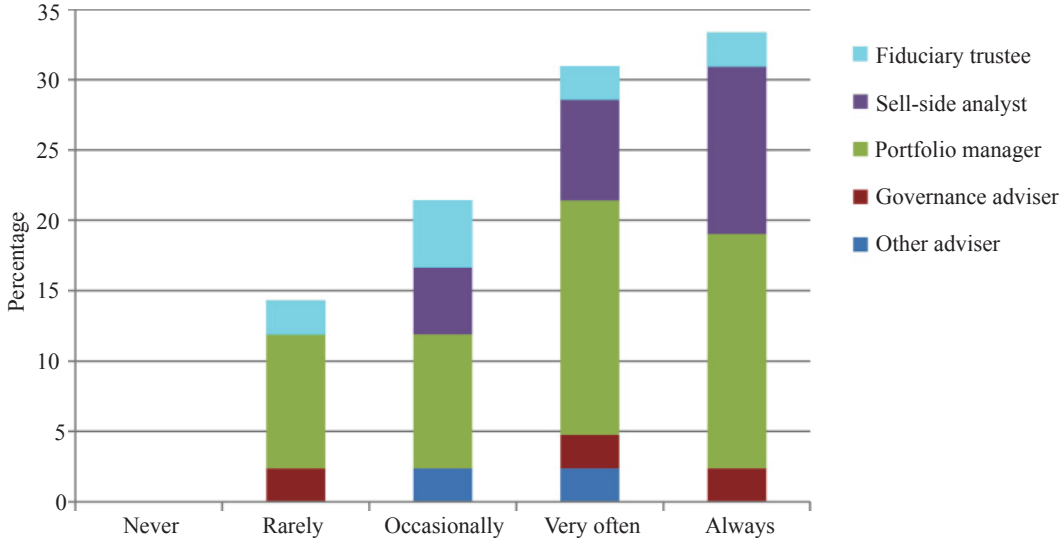

Figure 1. [In colour online.] Usage of environmental information by investment function. The *y*-axis shows percentage of responses, where all responses add to unity.

corporate environmental performance occasionally or rarely, while 80% of sell-side analysts and 60% of portfolio managers and governance advisers use this type of information very often or always. In aggregate, 58.0% use information on corporate environmental performance very often or always. The proportion increases to 65.0% when excluding the trustee category.

Turning now to the results of tests for information asymmetries, we observe that fiduciary investors are largely dissatisfied with information on companies' environmental performance levels (figure 2). Nearly 60% of respondents are dissatisfied with information on companies' environmental performance levels. Approximately 5%, 12%, and 9% of respondents are very dissatisfied with the appropriateness, completeness, and reliability of information on corporate environmental performance, respectively. A mere 10% of respondents are satisfied with 'carbon information' while none is very satisfied.

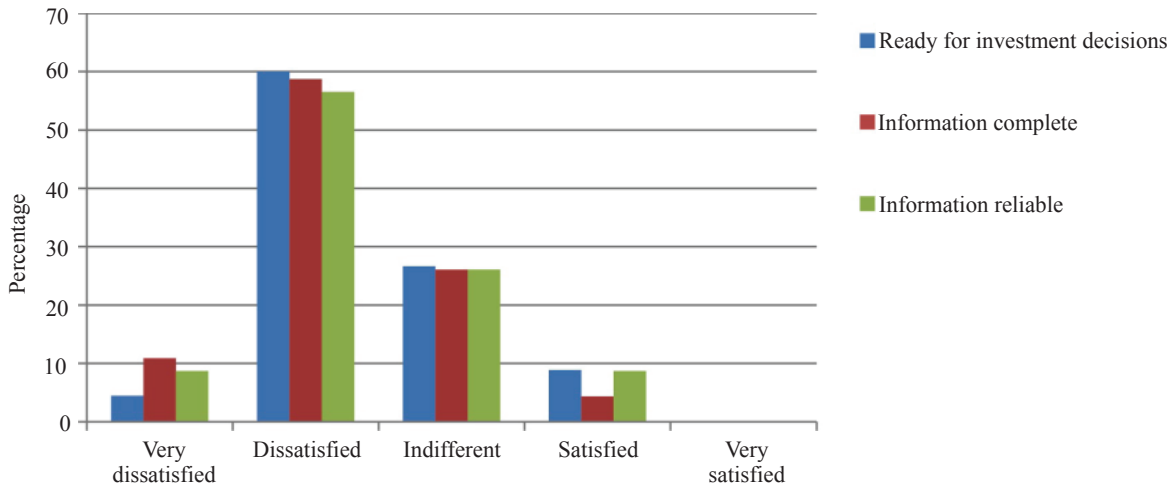

Figure 2. [In colour online.] Information satisfaction. The *y*-axis shows percentage of responses, where all responses (within each measure of information satisfaction) add to unity.

To identify the reasons for such dissatisfaction, we present a small selection of comments submitted by respondents to an open-ended question placed in the questionnaire (which immediately follows the questions about information satisfaction). Standardisation of information is the most common informational issue raised by those commenters who were 'not at all satisfied'.[(5)] The following comment is typical.

> "Carbon emission data continues to be calculated and reported in different ways between regions, between companies, and sometimes even with companies."

Commenters' desires for data standardisation are akin to the observed focus of environmental policy makers on "value monism" (Kysar, 2010, page 99). Value monism in the current context is represented by the fungibility of market-based policy instruments such as tradable emissions permits. Fungibility of information is connected to the reliability of such information, as the following comment shows.

> "Information is not reliable because there is no standard for disclosure. ... [Thus,] it is difficult to understand materiality and relevance of information to price."

For this subgroup, high-quality information is that which is commodified, standardised, and, above all, priced. Useful information for the wider group of participating respondents is that which animates tradeoffs, liquidity, and markets, and averts immediate financial risk. In line with existing literature (Mackenzie, 2009), we expect that fiduciaries of most pooled investment schemes assess the value of environmental information, as much as any other type of information, using exactly this type of lens.

[(5)] A total of 318 words were returned from sixteen respondents, none of whom was 'very satisfied' with any of the three categories of information satisfaction.

Data integrity is also a concern of our respondents. The following three comments of respondents are provided in their entirety.

"Most disclosures are not third-party verified, so we always take them with a grain of salt ..."

"It's the Wild West out there ..."

"One hopes that companies take the measurement of carbon data seriously, but there are some horror stories and it isn't audited, so the concern is that it is much less reliable that we had previously thought."

As information asymmetries become larger, we expect respondents to access environmental information sources more infrequently. Table 2 below displays Spearman's correlation coefficients between frequency of usage of nominated information sources and information satisfaction (in bold).

Table 2. Usage of information sources by information satisfaction. Spearman's rank correlation coefficients are shown in bold.

	CDP[a]	Subscriber databases	Earnings reports	Sustainability reports	Ready	Complete	Reliable
CDP	1.000						
Subscriber databases	0.0431	1.000					
Earnings reports	0.2122	0.0708	1.000				
Sustainability reports	0.3171*	0.0063	0.6291*	1.000			
Ready	**0.0799**	**−0.0359**	**−0.1155**	**−0.0377**	1.000		
Complete	**−0.1232**	**−0.1212**	**−0.0774**	**−0.0904**	0.7395*	1.000	
Reliable	**−0.1135**	**−0.0351**	**−0.0962**	**−0.0397**	0.5502*	0.6628*	1.000

*$p < 0.05$

[a]CDP—Carbon Disclosure Project.

While all of the relationships of interest are negative, no significant correlations are found, which suggests that information asymmetries do not influence frequency of usage of information on companies' environmental performance levels. This finding is surprising as it suggests that fiduciaries are collecting information independent of its fitness for purpose; 58.0% use information on corporate environmental performance very often and always, and nearly 60% are dissatisfied with information on companies' environmental performance levels.

The above analysis supports our expectation that fiduciaries are uncertain about how to use information on companies' environmental performance levels. Interestingly, respondents value such information, yet are dissatisfied with various aspects of its quality.

4.2 Influences on the investment decision

Turning now to our experimental treatment, we present here the results of tests for directional associations between levels of usage of information relating to the environmental performance levels of companies, nominated market-based environmental policy instruments, and investment decisions. We make the assumption that 'importance' is an appropriate proxy for respondents' usage of the nominated policy instruments and informational items in their investment decisions (Capon et al, 1996; Haigh, 2008; Milne and Chan, 1999).

Table 3 presents the means and standard deviations for the experimental treatment and control groups with regard to importance rankings of five nominated policy instruments and two nominated informational items. We conduct two-sample *t*-tests to identify significant

Table 3. Treatment effects: policy instruments and informational items.

Evaluation criterion	Control group[a]		Treatment group	
	mean	SD	mean	SD
Carbon price $20–50/tonne	3.96*	0.735	3.52*	0.814
Carbon price $50–100/tonne	4.24*	0.723	3.81*	0.981
Carbon price > $100/tonne	4.48	0.770	4.04	1.120
Carbon taxes	4.13	0.694	4.15	0.602
Subsidies	4.30	0.703	4.14	0.793
Company-provided information on environmental projects	4.13	0.869	4.15	0.688
Company-provided information on carbon emissions levels	4.08	0.909	4.04	0.669

*Significant at $p < 0.05$.

[a] Means are based on a five-point Likert score ranging from not at all important (1) to very important (5).

differences between these two groups (policies and informational items), but such differences relate only to the importance of carbon prices.

For carbon prices in the $20–50 per tonne range, the average score in the treatment group is 3.96 (five-point scale, 5 'very important'). As carbon prices increase, their importance increases: in the $50–100 per tonne range, the average score is 4.24; over $100 per tonne, the average score is 4.48, halfway between 'important' and 'very important'.

A similar pattern is found in the control group: importance rankings increase as carbon price ranges increase. Importance rankings of carbon prices in the control group are significantly higher than those of the treatment group, particularly with regard to the price ranges $20–50, $50–100, and over $100 per tonne of carbon emissions: $t_{(44)} = 1.91$, $t_{(44)} = 1.71$, and $t_{(44)} = 1.55$, respectively, the first two below the 5% significance level, while the third is significant at the 10% level.

Additional procedures were conducted on usage of informational items between the treatment and control groups. A two-way analysis-of-variance procedure yields the following significant results along the three given carbon price ranges:
$20–50 carbon price range: $F_{(3, 42)} = 2.42$, significant at the 10% level;
$50–100 range: $F_{(3, 42)} = 4.48$, significant at the 1% level;
greater than $100 a tonne of carbon emissions: $F_{(3, 42)} = 2.86$, significant at the 5% level.

As insignificant results are produced from tests of importance of the other four items between the two groups, these latter results are used to confirm that respondents are more sensitive to carbon prices than any other informational item, and that respondents are most sensitive to carbon prices between $50 and $100 per tonne of carbon emissions.

Considering these findings in tandem with figures 1, 2, and 3, and table 2, we suggest that the levels of carbon prices are particularly important to passively investing fiduciaries (the control group). Above a threshold in the vicinity of $50 a tonne, participating subjects are interested in using information on companies' environmental performance levels; below that threshold, participating subjects go so far as to collect such information but have little use for such information when making investment decisions.

We shift now to an examination of differences between the treatment and control groups on information satisfaction and levels of usage of the nominated four information sources. To better identify the differences between the treatment and control groups, we have created two indices based on

(i) informational items within the locus of company control: that is, company projects with a goal of decreasing carbon emissions, and information on companies' environmental performance levels; and
(ii) factors outside the locus of company control: that is, carbon prices, carbon taxes, and energy-usage subsidies.

Cronbach's α for firm-specific and non-firm-specific components of 0.76 and 0.75, respectively, suggests internal consistency of both indices.

We are now ready to test for differences between the groups' usage of these two indices. A priori expectations are that factors outside the locus of company control [group (ii)] will impact informational items within the locus of company control [group (i)]. In point, the presence of sufficiently high carbon prices is expected to influence the perceived importance of information disclosures, and in different ways between the two groups. The results of two-sample *t*-tests which can identify these expected differences are shown in tables 4 and 5.

Between the treatment and control groups, table 4 shows moderately significant differences in terms of the importance of carbon prices and company-specific informational items. Carbon taxes and energy-usage subsidies are not significantly associated with the two company-specific informational items, which is consistent with our results presented in table 3. These additional results indicate that the levels of carbon prices influence assessments

Table 4. Treatment effects: interactions between policy instruments and informational items.

Evaluation criterion	Control group [a]		Treatment group	
	mean	SD	mean	SD
Carbon price \$20–50/tonne and company project information	4.00	0.125	3.81	0.109
Carbon price \$20–50/tonne and company emissions information	4.02*	0.117	3.78*	0.117
Carbon price \$50–100/tonne and company project information	4.15	0.127	3.97	0.111
Carbon price \$50–100/tonne and company emissons information	4.16*	0.110	3.92*	0.125
Carbon price > \$100/tonne and company project information	4.28	0.121	4.10	0.118
Carbon price > \$100/tonne and company emissions information	4.28*	0.096	4.04*	0.141
Carbon taxes and company project information	4.14	0.104	4.14	0.111
Carbon taxes and company emission information	4.06	0.105	4.07	0.103
Subsidies and company project information	4.19	0.135	4.13	0.137
Subsidies and company emissions information	4.19	0.120	4.09	0.127

*Significant at $p < 0.10$.

[a] Means are based on a five-point Likert score ranging from not at all important (1) to very important (5).

Table 5. Treatment effects: aggregated policy instruments and aggregated informational items.

Evaluation criterion	Control group [a]		Treatment group	
	mean	SD	mean	SD
Corporate environmental disclosure	4.06	0.164	4.09	0.131
Policy instruments	4.24*	0.116	3.93*	0.123

*Significant at $p < 0.05$.

[a] Means are based on a five-point Likert score ranging from not at all important (1) to very important (5).

of information on companies' environmental performance levels, but that the passive-styled portfolio manager prioritises the fungibility of that information more than the active investor does. Such differences between passive and active investors are eliminated when company environmental management projects are simultaneously considered with the nominated policy instruments. Where differences remain, we attribute this to value monism and the linkages that passive investors make between carbon prices and company-supplied carbon emissions data.

The results in table 5 replicate those of table 3, but now the five nominated policy instruments—carbon taxes, subsidies, and three levels of carbon prices—are aggregated and held up to the aggregated company-specific informational items. In table 5 these aggregations are labelled 'policy instruments' and 'corporate environmental disclosure', respectively.

Table 5 shows that the control group places more importance on policy instruments: $t_{(44)} = 1.59$, significant at the 5% level, indicating that the investing approach influences respondents' assessments of policy instruments in aggregate. We use this test result as the basis for one final exploratory procedure.

Presented in table 6 are the results of two-sample *t*-tests for our subdivided treatment and control groups, this time in line with participating subjects' geographic foci. As the majority of our respondents are global in nature, and given the relative lack of attention in the literature to multinational investment patterns, this exploration is warranted.

Table 6. Treatment effects: aggregated policy instruments and aggregated informational items, by regional focus.

	Single-country focus				Global focus			
	control group		treatment group		control group		treatment group	
	mean [a]	SD	mean	SD	mean	SD	mean	SD
Corporate environmental disclosure	4.15	0.130	4.06	0.220	4.00	0.263	4.11	0.171
Policy instruments	4.19	0.175	4.01	0.183	4.21*	0.160	3.88*	0.169

*t-test shows significant different means at $p < 0.10$

[a] Means are based on a five-point Likert score ranging from not at all important (1) to very important (5).

A moderately significant result appearing in table 6 is that, within the group of fiduciaries with a global focus, passive investors ($n = 15$, after accounting for nonresponses) assign greater importance to policy instruments relative to active investors ($n = 13$): $t_{(26)} = 1.44$, significant at the 10% level.

Once again, our results confirm that passive-styled investors, with a fungibility orientation, place relatively more importance on market-based environmental policy instruments. The relative importance of market instruments may also be attributable to our observation that globally focused fiduciaries typically hold relatively large, well-diversified portfolios. By fiat, the larger fiduciary financial institutions are exposed to multiple policy regimes and so it can be expected that cashflow-incremental policy instruments will prove attractive.

Our test results also suggest that fiduciaries place value on information on companies' environmental performance levels—information for which fiduciaries have not as yet found a use. In the following subsection we discuss these results in light of extant literature and policy development.

4.3 Discussion

Adopting a decision-usefulness approach has produced results which, unexpectedly, straddle the literature. Both Milne and Chan (1999) and Holm and Rikhardsson (2008) find that the supply of environmental information leads to investment allocation decisions in negative

and positive ways, respectively. The results we have presented are different, and suggest that fiduciaries value environmental information highly but do not incorporate it in investment decisions.

These results suggest that carbon prices are a latent powerful policy instrument. They are latent in two senses. First, vigorously traded emissions markets may not be observed until prices and volumes combine to clear investors' financial materiality thresholds, and a history of stable trading is established. If this occurs, fiduciaries may be left with little option but to allocate funds towards sectors benefiting from emissions markets. Second, to the extent that carbon prices might influence the future value of company balance sheets, financial institutions modelling their portfolios on listed equity indices will become exposed to the vagaries of newly created futures markets. Fiduciaries can be expected to be less than receptive to 'environmental considerations' if that occurs. Fiduciaries of pension funds, for example, may be reluctant to remain in equities if faced with increased levels of volatility. The combined outcome on fiduciary behavior of course cannot be predicted, and global environmental policy development may be the poorer for that.

Epstein and Freedman (1994) allude to the difficulty of developing a model that can adequately represent the complexities of decision-making processes in economic transactions. It is difficult to do more here than suggest a dynamic between the level of usage of information on companies' environmental performance levels and market-based environmental policy instruments. Even so, our results extend the debate on private sector involvement in environmental policy development. It is suggested that relevant constraints to the inclusion of environmental performance in fiduciary investment decisions are informed by the monetised value of information. We highlight our observation above that respondents associate high-quality information with fungibility. It might be presumed, if following the neo-institutional turn, that informational items with a long-determined financial value are easier for fiduciaries to understand, compare, and use in the portfolio construction process.[6]

The evidence gathered suggests that the willingness of fiduciaries to invest according to environmental considerations does not depend on the investing approach set for the portfolio. While this might seem counterintuitive, fiduciary obligations and the nature of contractual accountabilities in financial markets (Haigh, 2006; Mackenzie, 2009) dictate a restricted set of options. Environmental considerations become important for fiduciaries when they are expected to impact on the value of the portfolio.

The evidence presented in this paper suggests that fiduciaries would be willing to allocate funds to lower-carbon-emitting companies (and, presumably, other asset categories) if the economic benefits of doing so were clear. This interpretation would concord with prior archival research which has shown that investors' decisions are motivated by the announcement of cashflow-incremental projects and are indifferent to cashflow-neutral firm-led activity (Dasgupta et al, 1998). Ongoing efforts to regulate environmental reporting and performance rating systems can be viewed in this light.

5 Conclusion

In response to the light treatment given in the existing literature to the behaviour of fiduciaries with regard to environmental concerns, we have pursued a deeper understanding of what drives the portfolio construction process in financial institutions. We tap and synthesise existing behavioural analyses on this subject to make a statement about what works with regard to fiduciaries' attentiveness to ecological considerations, including most obviously carbon emissions data germane to industrial sectors and regions. More importantly, we offer an explanation as to why such processes work, which is particularly salient for policy makers

[6] A referee's comment is acknowledged.

still undecided about how to integrate welfare reform (eg, pensions) and environmental law in pursuit of long-term and uncertain goals. In the contemporary market-driven political economy, policy makers' concerns have gravitated towards questions such as how much to assign per tonne of carbon emissions and whether an emissions price is even necessary. We have addressed these concerns too by contextualising the *possibility of* emissions trading markets against the conventions of fiduciary behaviour. The assignment of emissions prices can play an important, if unpredictable, role in fiduciary behaviour.

This paper also responds to the dearth of research regarding pooled investment behaviour at the global level. Our approach is novel in this regard, showing that passive-styled fiduciaries with a global focus are significantly focused on fungibility, which is consistent with the tenets of value monism. Yet, our work is but a beginning, and a global approach—we believe—represents the greatest opportunity for future research. Transnational joint ventures and equity investments in companies listed on securities exchanges around the globe are commonplace, but at what cost to the environment? As important is identification of novel approaches to environmental concerns beyond US-styled global environmental law. We encourage efforts to address these and other related questions.

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Appendix A
Requirement for fiduciaries to take account of environmental considerations

Table A1 shows a list of regulations, legislation, and pronouncements encouraging and in some cases requiring financial institutions that offer retail and in some cases also wholesale investment products to take account of environmental considerations.

Table A1. Regulations, legislation, and pronouncements.

Region	Regulations, legislation, and pronouncements
OECD	Guidelines For Pension Fund Governance (2009)
Scandinavia	Executive Orders issued by the Finanstilsynets (Danish Financial Supervisory Authority), requiring institutional investors to issue audited information disclosures on their social responsibility policies, practices, and strategies (2009), under Danish Financial Statements Act (2008) ss 8, 113, 114, and 132; Norway's ethical investment mandate was issued on 22 December 2005 pursuant to Regulation on the Management of the Government Pension Fund (2004); Sweden's Lag om allmänna pensionsfonder (AP-Fonder), Svensk författningssamling (2000) s 192
France	The Grenelle Act of 3 August 2009; Projet de loi sur l'épargne salariale (7 February 2001) No. 152, arts. 21, 23
Netherlands	Corporate Governance Code Monitoring Committee, "Report on the evaluation and updating of the Dutch corporate governance code" (2008)
United Kingdom	Stewardship Code (2009); and Combined Code on Corporate Governance (amended 2010, advocating shareholder evaluation of company disclosures on approaches to risks arising from social and environmental matters); both issued by the Financial Reporting Council; Occupational Pension Schemes (Investment) Regulations (2005) cl. 2(3)(b)(vi)–(3)(c)
USA	Securities and Exchange Commission, "Guidance regarding disclosure related to climate change", Release Nos. 33-9106; 34-61469; FR-82 (2010); also, 'Disclosure of Proxy Voting Policies and Proxy Voting Records by Registered Management Investment Companies' (31 January 2003)
Canada	Canadian Securities Administrators, National Instrument 81-106 Investment Fund Continuous Disclosure and Companion Policy 81-106 CP 92005)
Australia	Corporations Act 2001, s 1013D(1)(l); Australian Securities and Investments Commission, Section 1013DA Disclosure Guidelines about labour standards and environmental, social and ethical considerations in product disclosure statements
New Zealand	Superannuation and Retirement Income Act 2001, ss 58(2)(c) and 61(d)

Appendix B
Research instrument

Are investors taking into account climate risks and opportunities? The Climate Disclosure Standards Board is developing a global reporting framework and needs your opinions on how investors can better use company carbon reports. Your responses are important as they will be used to help companies better communicate their carbon management strategies. The questionnaire contains 6 questions. Your responses are completely anonymous.

1. *Please select your main area of professional responsibility.* Fiduciary / Funds management/ Investment advisory / Governance advisory / Other (please specify)

2. *What regions do you cover?* Asia / Australasia / Europe / North America / Other (please specify)

3. Do you use carbon emissions data in your main area of professional responsibility? (Always / Very Often / Occasionally / Rarely / Never)

4. *How often do you use the following sources to obtain climate change data and carbon data?* Please answer all parts. (Always / Very Often / Occasionally / Rarely / Never)

Carbon Disclosure Project / Subscriber databases, for example, Bloomberg / Company earnings reports, annual reports and filings / Company sustainability reports

5. *How would you rate company reports on carbon emissions levels and climate risk management?* (Very Satisfied / Satisfied / Indifferent / Dissatisfied / Very Dissatisfied)

Information is ready for investment analysis / Information is complete / Information is reliable / Comments (please specify)

6. The following information is relevant.

[SCENARIO 1]

Imagine you are responsible for the major decisions on a balanced investment portfolio. The following constraints apply: 1. The maximum deviation between the actual portfolio and the applicable benchmark portfolio is controlled. 2. The investment universe includes but is not restricted to asset classes that actively reduce carbon emissions.

[SCENARIO 2]

Imagine you are responsible for the major decisions on a balanced investment portfolio. The following constraints apply: 1. The maximum deviation between the actual portfolio and the applicable benchmark portfolio is relaxed. 2. The investment universe is restricted to asset classes that actively reduce carbon emissions.

How important is each of the following? (Very Important / Important / Indifferent / Not Important / Not At All Important)

Carbon prices between 20 and 50 US dollars per tonne / Carbon prices between 50 and 100 US dollars per tonne / Carbon prices greater than 100 US dollars per tonne / Carbon taxes / Company projects with a goal of decreasing carbon emissions / Information supplied by companies on their carbon emissions levels / Subsidies for sustainable energy use.