Corporate Environmental Policy and Shareholder Value: Following the Smart Money*

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October 2013

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Keywords: Environmental risk management, corporate social responsibility, socially responsible investing, institutional ownership, analyst coverage, firm value.

JEL classification: D71, G11, G12, G32, Q50

* We thank Antonio Camara, Sudheer Chava, Bill Dare, Louis Ederington, Bilal Erturk, Janya Golubeva, Joel Harper, Tomas Jandik, Marcin Kacperczyk, Ali Nejadmalayeri, Mitchell Petersen, Ramesh Rao, Clifford Smith, Johan Sulaeman, Yi Zhou, and seminar participants at the FMA Annual Meeting, FMA-Europe Conference, Academy of Management Annual Meeting, University of Oklahoma, and Southwest Finance Symposium for valuable discussions and comments. We are responsible for any remaining errors.

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Abstract

We examine the value consequences of corporate social responsibility through the lens of institutional shareholders. We find a sharp asymmetry between corporate policies that mitigate the firm's exposure to environmental risk and those that enhance its perceived environmental friendliness ("greenness"). Institutional investors shun stocks with high environmental risk exposure, which we show have higher systematic risk and lower valuations as predicted by risk management theory. These findings suggest that corporate environmental policies that mitigate environmental risk exposure create shareholder value. In contrast, firms that increase greenness do not create shareholder value and are also shunned by institutional investors.

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"*The social responsibility of a business is to increase its profits*." Milton Friedman (1970).

I. Introduction

Friedman's well-known statement reflects a widely-held view that only "socially-responsible" investors benefit directly from corporate actions that are deemed socially responsible. However, not all socially responsible policies are equally created. For example, socially responsible corporate actions that mitigate the likelihood of "bad" outcomes may reduce the risk exposure of firms to accidents, lawsuits, fines, etc., and thereby appeal to all investors. In contrast, actions that enhance the firm's perceived corporate social responsibility through investments that go beyond both legal requirements and any conceivable risk management rationale may be value decreasing and shunned by investors whose sole objective is profit maximization. However, the current literature does not focus on such nuances in socially responsible policies, nor provide much insight into how the form of corporate social responsibility influences the breadth and depth of ownership, and firm value.

In this paper, we study the relation between corporate environmental performance, institutional ownership, and shareholder value in a sample of U.S. firms. Corporate environmental policies are especially closely scrutinized by investors relative to other corporate actions that have social implications. As exemplified by recent episodes such as the 2010 British Petroleum (BP) gulf oil spill, which has cost BP well in excess of $10 billion to date in losses, damages, and fines, the financial costs and consequences of corporate environmental policies dwarf other socially relevant corporate

decisions. Since institutional investors are widely recognized as being better informed and more sophisticated,[1] our institutional investor perspective follows the smart money.

We classify corporate environmental practices into two categories: (a) actions that mitigate the likelihood of "bad" outcomes by reducing the exposure of firms to environmental risk (we label this type of exposure as "toxicity"); and (b) actions that enhance the firm's perceived "greenness" through investments that go beyond both legal requirements and any conceivable risk management rationale. Examples of the former include deploying safer petroleum drilling technologies or investments that mitigate the risk of hazardous chemical releases while investments in clean technologies or renewable energy sources can serve as examples of the latter.

While both groups of environmental practices are likely to be viewed as socially responsible, our bifurcation enables new insights into the costs and benefits for investors who are not constrained by SRI norms. Karpoff, Lott, and Wehrly (2005) show that firms pay substantial legal penalties and suffer corresponding market value losses following violations of environmental regulations. Consequently, investments that reduce the exposure of toxic firms to the risk of losses arising from environmental accidents, lawsuits, fines, etc., can create value for all shareholders by lowering expected costs of financial distress, financing costs, and underinvestment (Smith and Stulz (1984), Froot, Scharfstein, and Stein (1993)). Thus, there will be decreased interest among sophisticated investors in toxic firms, an effect that should be even more prominent if a sophisticated investor is norm-constrained.

[1] See, for example, Shleifer and Vishny (1986), McConnell and Servaes (1990), Smith (1996), Carleton, Nelson, and Weisbach (1998), Gillan and Starks (2000), Allen, Bernardo and Welch (2000), Hartzell and Starks (2003), Grinstein and Michaely (2005), and Boehmer and Kelley (2009).

Regarding investments in greenness, going beyond legal limits in corporate environmental policies may be value-decreasing, causing sophisticated shareholders to shy away from these stocks. Furthermore, shareholders that do not adhere to SRI norms are even less likely to invest in stocks of green firms that spend corporate resources on such environmentally friendly practices. Collectively, these criteria imply that institutional investors will have a higher propensity to invest in stocks of environmentally neutral firms relative to both toxic and green firms. Additionally, the negative effect of toxic stocks will be stronger in the subset of SRI norm-constrained institutional investors while the negative effect of green stocks will be stronger in investments of SRI norm-unconstrained institutions.

We follow several recent studies in the finance literature by using the KLD Research & Analytics, Inc. (KLD) social performance dataset to assess corporate environmental policy.[2] The KLD data provides information on corporate environmental, social, and governance characteristics to a large number of sophisticated investors (for example, money managers and institutional investors) who factor these characteristics into their investment decisions. This dataset is particularly well suited for our research since it allows us to differentiate between positive and negative environmental performance. For each stock, KLD provides seven sub-indicators for environmental

[2] See, for example, Kempf and Osthoff (2007), Galema, Plantinga and Scholtens (2008), Statman and Glushkov (2009), Chava (2010), and Gillan, Hartzell, Koch and Starks (2010).

strengths and seven sub-indicators for environmental concerns.[3] If the firm meets or exceeds the KLD threshold in each sub-indicator category, it is assigned a value of one, or zero otherwise.

We also account for asymmetric effects of positive and negative KLD scores and generate distinct measures for positive and negative environmental performance in our analysis.[4] Specifically, we use the total number of environmental strengths and concerns reported in the KLD data for positive and negative environmental performance, respectively. Firms that have higher negative scores have higher environmental risk exposure to losses due to accidents, lawsuits, fines, etc., relative to firms with low negative scores. A firm that takes actions to decrease its negative KLD score (for example, by reducing toxic emissions, minimizing regulatory violations, or mitigating hazardous waste exposure) will be engaging in environmental risk management actions that potentially reduce its financial costs. In contrast, actions that increase a firm's positive KLD score (for example, increasing recycling activity, switching to clean energy, or increasing environmentally-relevant communications) are likely to produce tangible social benefits and elevate the firm's standing in the eyes of green investors. However, these actions may not produce direct financial benefits in excess of incremental costs.

[3] As summarized by Chatterji, Levine, and Toffel (2009), the seven KLD environmental strength sub-indicators are (sale of) environmentally beneficial products and services, pollution prevention, recycling, clean energy, communications (of environmental practices), (environmental performance of) property, plant, and equipment, and other strengths while the seven environmental concern sub-indicators are hazardous waste liabilities, recent regulatory problems, manufacture of ozone-depleting chemicals, substantial emissions of toxic chemicals, production of agricultural chemicals, contribution to climate change, and other concerns.

[4] See Chatterji, Levine and Toffel (2009) for empirical evidence on this asymmetry between positive and negative KLD scores.

Accordingly, we categorize the firms in our sample into four groups with labels that reflect the above differences in their environmental performance: “green,” “toxic,” “gray,” and “neutral.” Green firms are positive environmental performers in the sense that they have at least one environmental strength and no environmental concerns, while toxic firms are negative environmental performers, having at least one environmental concern and no environmental strengths. Gray firms have both environmental strengths and concerns, while neutral firms have neither strengths nor concerns. The toxic and gray firms in our sample will have higher exposure to environmental risk than neutral or green firms. These classifications enable us to examine the effects of corporate environmental performance variations on ownership structure, analyst coverage, and shareholder value.

Our first major contribution is the novel evidence we provide on the formation of institutional holdings based on corporate environmental performance. Specifically, we find a non-monotonic relationship between environmental performance and institutional ownership. Both green and toxic firms have a significantly lower institutional ownership than neutral firms. The difference is made up by individual shareholders, who own green and toxic firms in significantly greater numbers than neutral firms. Collectively, these findings are consistent with our conjecture that environmental performance influences decisions of institutional investors.

Consistent with our results for aggregate institutional ownership, we also find lower numbers of institutional investors investing in green, toxic and gray firms for all institutional investor types in our sample. Norm-unconstrained institutional investors (representing banks, insurance companies, financial investment institutions and advisors) hold significantly smaller fractions of the shares of green firms while norm-constrained

institutions (representing universities, pension plans and employee stock ownership plans) hold a significantly lower percentage of shares of toxic firms. Notably, norm-constrained institutions do not invest more in stocks of green companies. Collectively, these results suggest that corporate environmental practices generate a variation in stock holdings between norm-constrained and unconstrained institutional investors.

Our findings help improve the understanding of the role of social norms in investor behavior. While Hong and Kacperczyk (2009) report significant between-industry effects of sin and non-sin stocks, our setting permits an examination of both within- and between-industry effects. We document that within-industry variation in environmental performance has an important influence on variables of interest. Furthermore, we consider the full spectrum of firms (including both positive and negative environmental performers) in our analysis, whereas Hong and Kacperczyk's (2009) focus on sin firms limits them to studying only bad social performers. We also observe considerable parallels in the ways institutional investors perceive sin stocks and toxic stocks. However, we find that socially unconstrained institutional investors are repelled by green firms. This finding indicates that unconstrained institutional investors do account for environmental performance in their portfolio allocations and are not indifferent to environmental performance as assumed by Heinkel, Kraus, and Zechner (2001). In fact, this finding suggests that institutions differentiate between investments that reduce toxicity ("prevent bad") and increase greenness ("do good"), and find only the former to be consistent with the interests of unconstrained investors.

Our second major contribution is the evidence we provide on the relation between environmental risk management and shareholder value. While risk management theory

(Smith and Stulz (1985); Froot, Scharfstein, and Stein (1993)) predicts that corporate risk management creates shareholder value by reducing of the expected costs of financial distress and mitigating underinvestment, the empirical evidence on this prediction is mixed. Allayannis and Weston (2001) find that the market value of firms using foreign currency derivatives is 4.87% higher on average than for nonusers, Graham and Rogers (2002) argue that derivatives-induced debt capacity increases firm value by 1.1% on average, and Carter, Rogers, and Simkins (2006) show that airlines that hedge jet fuel are valued as much as 10% higher than airlines that do not. On the other hand, Guay and Kothari (2003) find that for most of their sample firms, the cash flow and market value sensitivities to their derivative portfolios are small relative to the magnitude of sensitivities to traditional measures of economic exposures, and Jin and Jorion (2006) find that hedging does not affect the market value of oil and gas companies. Using the same methodology as Jin and Jorion (2006), we examine the relation between corporate environmental performance and Tobin's Q. Toxic stocks have significantly lower values of Tobin's Q relative to neutral stocks. This finding is in line with the view that toxic firms are more prone to environmental disasters, lawsuits, and other costly disruptions. Firms that alleviate their environmental risk exposure benefit from higher valuations, which is consistent with the predictions of risk management theory. We also find lower values of Tobin's Q for green firms, indicating that investments that enhance greenness beyond mitigating environmental risk exposure do not induce capital markets to value green companies at a premium. These findings on firm value are consistent with our finding of institutional investors' lower propensity to invest in both toxic and green stocks.

In our portfolio returns analysis, the green firm portfolio has lower risk relative to benchmark neutral firms while toxic and gray firms have higher risk loadings. But after adjusting for these risk differences, we fail to find any statistically or economically significant effect of environmental performance on net portfolio returns. Our finding of differential risk loadings supports the theoretical prediction by Heinkel et al. (2001) of a higher required return on stocks of polluting firms, while our results on risk-adjusted portfolio returns are consistent with the findings in the socially responsible investing (SRI) literature that SRI portfolios do not outperform. [5]

Our paper is related to studies on the relations between institutional holdings and firm characteristics. Previous studies find that firm characteristics, including firm size, liquidity and share price, are correlated with institutional holdings (Del Guercio (1996), Gompers and Metrick (2001), Bennett, Sias and Starks (2003)). By documenting a significant effect of environmental performance on institutional holdings, this study suggests that institutions account for corporate environmental performance in their investment decisions.

We also contribute to studies on the preferences of analysts (Hong, Lim and Stein (2000), Das, Guo and Zhang (2006)). We find a significant effect of environmental performance on analyst following. Specifically, analyst coverage is significantly higher for toxic firms. This finding is consistent with the notion that institutional prudency requirements may increase the demand for analyst coverage of toxic stocks (O'Brien and Bhushan (1990)), since these stocks are likely to have higher exposure to large fines

[5] See, for example, Hamilton, Jo and Statman (1993), Statman (2000), Bauer, Koedijk, and Otten (2005), Geczy, Stambaugh and Levin (2006), Renneboog, ter Horst, and Zhang (2008a, 2008b), and Galema, Plantinga, and Scholtens (2008).

associated with environmental non-compliance.[6] By showing a higher analyst following for toxic companies, this study suggests that analysts consider environmental performance in their stock coverage decisions. Overall, our findings suggest that in addition to investors, financial intermediaries also account for corporate environmental performance in their decisions.

The rest of the paper is organized as follows. We discuss the data and our empirical methodology in the next section. Section III presents our empirical findings. Section IV draws conclusions based on the findings.

II. Data and Methodology

We obtain our environmental performance measures from the KLD Research & Analytics, Inc. (KLD) social performance dataset. KLD is a financial advisory firm that provides social screening of firms to clients via its reports and socially screened mutual funds. The KLD dataset is the most widely used dataset in academic studies to measure corporate social and environmental performance.[7] Graves and Waddock (1994) argue that the KLD data is the best single source of social and environmental performance measures because of the expertise and objectivity of the analysts who assign the KLD ratings and the wide range of attributes across which these ratings are assigned. For example, in addition to reviewing all major SEC filings (e.g., 10-K, annual reports and proxies), KLD has surveyed over 14,000 global news sources for S&P 500 firms since 1991. It extended its coverage to Russell 1000 firms in 2001 and Russell 3000 firms in 2003.

[6] Karpoff, Lott and Wehrly (2005) show that legal penalties associated with environmental violations are, on average, 2.26 % of the market capitalization of corresponding firms.

[7] See, for example, Graves and Waddock (1994), Sharfman (1996), Mattingly and Berman (2006), Kempf and Osthoff (2007), Galema, Plantinga and Scholtens (2008), Statman and Glushkov (2009), Chava (2010), and Gillan, Hartzell, Koch and Starks (2010).

The KLD data provides information on corporate environmental, social, and governance characteristics. While firms have no discretion over some social factors such as being in a sin industry (other than exiting the industry), firms have considerable discretion over their environmental performance that may drive socially responsible investing. Even in industries such as power generation, petroleum and chemicals, firms have the ability to vary the extent to which their operations affect the natural environment. Additionally, as evidenced by the recent British Petroleum episode, corporate environmental costs dwarf other social norm-related corporate expenditures and are, therefore, likely to receive the most attention by firms, investors, and analysts. Consequently, to the extent that investors are affected by social norms, corporate environmental performance is the area where we are most likely to find evidence of socially responsible investing.[8] Moreover, the high costs of environmental expenditures affect all investors, not just socially responsible investors. Therefore we expect measurement problems to be minimized due to the exceptional scrutiny and reporting requirements associated with corporate environmental performance.[9] Therefore, we focus on environmental performance measures reported in KLD.

There are seven sub-indicators for environmental strengths and seven sub-indicators for environmental concerns. The sub-indicators of strengths include the extent

[8] The Social Investment Forum (2003) reports 292 shareholder resolutions on social, environmental and ethical issues, with the largest number of resolutions being related to environmental issues. Based on a survey conducted by Mercer Consulting in 2006, 39% of investors responded that they consider environmental sustainability as an important factor in their investment decisions (Starks, 2009).

[9] Corporate environmental performance is constantly monitored by the U.S. Environmental Protection Agency and other federal and state agencies, and publicized through various means including the EPA's Toxics Release Inventory. Additionally, private entities such as KLD Research & Analytics, Inc., RiskMetrics and the Social Investment Forum collect and disseminate information on corporate environmental performance, and the majority of large U.S. firms also provide regular reports on their environmental performance.

to which the firm has environmentally beneficial products and services, uses clean energy, provides open communication about its environmental program, and engages in extensive recycling. The concerns indicate if the firm releases hazardous waste, agricultural chemicals and ozone depleting chemicals, has regulatory problems, has substantial emissions, and contributes to climate change. If the firm meets or exceeds the KLD threshold in each area, it is assigned a value of one, and zero otherwise.

In this paper, we use the total number of environmental strengths and concerns reported in the KLD data to measure the environmental performance of the firms in our sample. Although these variables are available since 1991, the firm identification variable (CUSIP) is only available from 1996. Therefore, our analysis covers the period between 1996 and 2007.[10] Using the total number of strengths and concerns allows us to categorize firms into four groups: green, toxic, gray and neutral. Green (toxic) firms have at least one environmental strength (concern) while having no environmental concerns (strengths). Gray firms have both environmental strengths and concerns, whereas neutral firms have neither strengths nor concerns. We also define green and toxic industries. Green (toxic) industries are industries with the percentage of green (toxic) firms greater than 10% while the percentage of toxic (green) firms within the industry is less than 10%. These classifications enable us to examine the effects of environmental performance variations between and within industries on institutional holdings, analyst coverage, and stock market valuation and performance.

[10] There are two sub-indicators added to the KLD during the sample period: climate change in 1999 and management systems strengths in 2006. Estimations over the period between 2000 and 2005 yield qualitatively similar results.

We obtain accounting measures from Compustat, stock prices from CRSP, analyst coverage from I/B/E/S, and governance variables from the IRRC dataset on governance and directors. We also extract institutional holdings measures from the CDA/Spectrum 13F Holdings database. As most companies file semi-annually, we confine our attention as in Hong and Kacperczyk (2009) to year-end reports for institutional holdings. Consistent with previous studies, we set institutional holdings to zero for firms that do not have institutional investors reported in the dataset. In order to alleviate concerns regarding reverse causality, we use lagged explanatory variables in our analyses. In order to eliminate outliers generated by small and narrowly held firms, we exclude firms if they have less than 500 shareholders, a stock price below $5 and a market capitalization less than $200 million.[11] The final sample has 7118 observations of 1375 distinct firms between 1997 and 2007.[12]

III. Empirical Results

Table 1 reports the descriptive statistics for our sample. The multiple data screens that we apply to identify firms for our study results in a sample of large firms. The mean market capitalization (Market Value) of firms in our sample is $11.182 billion. Green firms constitute 9% of the sample while 13% and 7% are classified as toxic and gray firms, respectively. 17% of sample firms fall in green industries and 15% are categorized in toxic industries. The number of shareholders (NS) has a mean of 38,920 with a standard deviation of 92,700, indicating considerable variation across our sample.

[11] We obtain similar results when we do not apply these restrictions. These results are not reported, but are available upon request.
[12] Our sample starts in 1997 since the first available lagged value of environmental performance is in 1996.

Institutional investors hold 72% of the shares outstanding, on average. Analysts cover 80% of the firms in our sample, and the average number of analysts per firm is 9.15. 56% of the firms in our sample are in the S&P 500 index.

[Place Table 1 about here]

A. Univariate analysis

Table 2 reports mean and median values for variables of interest in subsamples of green, toxic, gray, and neutral firms. The table also shows the differences between the means and medians as well their t or z statistics. It presents preliminary evidence that there are systematic differences across sub-samples of green, toxic, gray and neutral firms. For example, relative to neutral firms both green and toxic firms have a higher number of shareholders, lower ratios of institutional investors, and lower percentages of shares held by institutions.[13] We also find systematic differences in analyst coverage and other characteristics across the different subsamples. Gray firms have the highest analyst coverage (97%) followed by toxic firms (90%), green firms (85%) and neutral firms (76%) and we observe a similar pattern in the average number of analysts following each firm. However, we find significant differences in size and age across these different subsamples that may explain the differences in ownership, analyst coverage and stock market valuation. We control for these differences in our multivariate analysis.

[Place Table 2 about here]

Both green and toxic firms have higher Gompers-Ishii-Metrick (2003) (GIM) indices than neutral firms, indicating poorer governance, while they also have higher

[13] In an unreported analysis, we find a higher number of individual investors and lower ratio of institutional investors for green and toxic firms relative neutral firms when we conduct a matched sample analysis based on industry (2-digit SIC) and size.

likelihoods of independent boards relative to neutral firms, indicating better governance.[14] In addition, toxic firms have lower CEO/Chair duality, suggesting that managers of toxic firms are less likely to be entrenched. Collectively, the conflicting findings on corporate governance suggest that the differences generated by green and toxic firms are less likely to be driven by variations in corporate governance.

B. Environmental performance and institutional ownership

Table 3 reports the coefficient estimates for our multivariate regressions of environmental performance on the breadth of ownership. Standard errors are robust to heteroskedasticity and to clustering within firm over time. In these regressions, we account for several factors that may affect the breadth of ownership. For instance, larger and older firms are more likely to attract the attention of a larger number of investors. Thus, we include the natural logarithm of the market value of equity (Market Value) to control for the effect of firm size.[15] As older firms have established track records, they are less prone to risk and therefore, may attract a larger number of investors. In order to account for the influence of S&P 500 membership, we include a S&P500 dummy in our analysis. We use a Nasdaq dummy to control for differences across stock exchanges. Corporate governance may potentially affect both the breadth of ownership and environmental performance. Therefore, we include a CEO/Chairman duality dummy, the GIM index and an Independent Board dummy in the regressions.[16] As market-based measures are correlated, we successively add Tobin's Q, stock return, standard deviation

[14] See, for example, Weisbach (1988), Rosenstein and Wyatt (1990), Byrd and Hickman (1992) and Brickley, Coles and Terry (1994) for the role of independent boards in corporate governance.
[15] We also include size and age variables separately, and continue to find similar results.
[16] Jensen (2001) and Tirole (2001) associate a high level of socially responsible corporate behavior with agency problems, suggesting that managers of green companies use company resources wastefully. Including governance measures in the multivariate regressions allows us to disentangle the agency issues that may be associated with corporate environmental performance.

of stock return, turnover and the inverse of stock price in the regression. Finally, we run a regression that includes all these variables. As in Hong and Kacperczyk (2009), we control for (but do not report) 1-digit SIC and year dummies in these regressions.

[Place Table 3 about here]

We find significant effects of environmental performance on the number of shareholders (NS). Specifically, green and toxic firms have 1,670 and 1,650 more investors on average, respectively, relative to neutral firms (Model 1). These are equivalent to 4.3% and 4.2% increases in NS, respectively, relative to the sample average. Gray firms also attract a larger number of investors. We continue to find significant effects of green, toxic and gray firms when we successively add market-based measures in the regression. Collectively, these findings are consistent with our univariate results, and provide strong support for our previous notion that there is a non-monotonic relationship between environmental performance and the breadth of ownership.

Several of our control variables also have explanatory power in the regressions. We find that older and larger firms attract a larger number of investors. Furthermore, the number of shareholders is negatively related to turnover, stock price and stock return volatility. Good corporate governance practices (e.g., independent boards and CEO/Chair separation) also improve the breadth of ownership.

In order to capture the effect of environmental performance on institutional investors relative to its effect on individual investors, we conduct similar regressions for both the ratio of the number of institutional investors to the total number of shareholders, and the ratio of shares held by institutions to the total shares outstanding. Models 7-12 in Table 3 report the regressions in which the dependent variable is the logarithm of the

ratio of number of institutional investors to NS. Regardless of the model specification, we observe decreases in the ratio of institutional investors that are statistically significant at the 1% level when firms are classified as green or toxic. Furthermore, in an unreported analysis on sub-samples of size and Tobin's Q quartiles, we continue to find a lower ratio of institutional investors to NS. Combined with a higher number of investors investing in green and toxic stocks, these findings collectively suggest that green and toxic firms attract disproportionately more individual investors and correspondingly fewer institutional investors.

Table 4 reports regressions of institutional holdings where the dependent variable is the ratio of shares held by all institutional investors to total shares outstanding. The effects of green, toxic and gray firms on total institutional holdings are negative and significant. They are also economically significant. Specifically, Model 6 documents that the share of institutional holdings in green, toxic and gray firms decrease by 2.8%, 2.8% and 3.0%, respectively, relative to neutral firms. Since the average institutional holding percentage in our sample is 72%, these decreases correspond to reductions of 3.9%, 3.9% and 4.2% for a representative firm in our sample.[17] These results are consistent with our finding of fewer institutional investors investing in green, toxic, and gray firms relative to neutral firms. Overall, these findings support our conjecture that institutional investors account for environmental performance in investment decisions.

[Place Table 4 about here]

[17] In an unreported analysis, we replicated the analysis for the sub-sample of firms that have analyst following, and continue to find negative effects of green, toxic and gray firms on total institutional holdings.

We also observe that institutional holdings increase with turnover and stock price, which is consistent with the findings of Gompers and Metrick (2001). Furthermore, firms listed on the S&P 500 index and firms that have higher average monthly stock returns also have larger relative institutional holdings. While firms with independent boards also attract larger institutional holdings (albeit statistically significant only at the 10% level), institutional holdings are unrelated to the GIM index or CEO/Chairman duality.

We also study the holdings of institutions differentiated by their various types. Corporate 13-F filings report five institutional investor types: banks, insurance companies, mutual funds, independent investment advisors (for example, hedge funds) and *others* (including universities, pension plans, and employee stock ownership plans). This classification scheme allows us to test whether environmental performance influences investments of norm-constrained institutional investors, including universities, pension plans and employee stock ownership plans.[18] As the classification scheme for institution types changed after 1997, we separately report institutional holdings by various types for 1997 and 1998-2007 in Panels A and B of Table 5, respectively.

[Place Table 5 about here]

The estimates based on the sub-sample of observations in 1997 (Panel A) indicate that the ratio of institutional investors to total number of investors is significantly lower for green firms in all categories of institutions. However, the effect of environmental performance on the fraction of shares held by institutional investors and the effects of toxic and gray firms as well as of green and toxic industries, are not statistically

[18] Anecdotal evidence suggests that pension funds, in particular, promote socially responsible investing. For example, the California Public Employees' Retirement System, the largest pension fund in the world, is well known for its socially responsible investment strategy.

significant. These results are likely to be driven by the relatively small number of observations (382) for 1997.

Panel B reports significant effects of environmental performance on holdings of various institutional investors for the 1998-2007 period. Consistent with our previous results for aggregate institutional ownership, we find smaller numbers of institutional investors in green, toxic and gray firms for all five institutional investor types in this sub-sample. All socially unconstrained institutions (including banks, insurance, investment and financial advisors) hold significantly smaller fractions of the shares of green firms in Models 6-9. In contrast, only *other* institutions representing SRI norm-constrained institutional investors (for example, universities, endowments and pension plans) hold a significantly lower percentage of shares of toxic and gray firms. These findings suggest that norm-constrained institutional investors shun stocks with poor environmental performance (i.e., toxic and gray firms) while socially unconstrained institutional investors are significantly less likely to invest in stocks of green firms. However, we find no significant effect of green stocks on norm-constrained investors, suggesting that penalties for deviations from social norms, rather than rewards for behaving in accordance with social norms, play the more important role in the investment decisions of norm-constrained investors. This may occur because the higher risk exposure from toxic/gray firms and costs of deviating from social norms (for example, loss of reputation among green investors or being a target of social activists) are considerably higher than any rewards for investing *exclusively* in green stocks.[19]

[19] Karpoff, Lott and Wehrly (2005) show that legal penalties associated with environmental violations are, on average, 2.26 % of the market capitalization of corresponding firms.

We also document the variation of institutional holdings across the different institutional types for green and toxic industries. For example, only banks have significantly lower holdings of firms in green industries. Furthermore, only *other* institutions have significantly lower holdings of firms in toxic industries. This finding is consistent with the binding role of industry environmental performance on norm-constrained investors.[20] Collectively, these results indicate considerable variation in the preference for environmental performance across the different institutional types.

C. Analyst coverage

Next, we examine whether the nature of corporate environmental performance influences analyst coverage. Specifically, Table 6 presents results from regressions relating analyst coverage to environmental performance. The dependent variables are the natural logarithm of the number of analysts covering the underlying stock in models 1-6 and the dummy variable for analyst coverage in models 7-12. We use OLS for the former and employ a probit specification for the latter. As coefficient estimates are hard to interpret in probit models, we report marginal effects in models 7-12.

[Place Table 6 about here]

We do not find a significant effect of green firms on the number of analysts covering a firm. In contrast, four of our six models report a significant positive effect for toxic firms, suggesting that analyst coverage is higher for toxic firms. Furthermore, gray firms also have a significantly larger number of analysts covering their stocks.[21] Specifically, the estimate for the gray firm dummy in model 6 is 0.304, which is

[20] See also Hong and Kacperczyk (2009) for discussion of the binding role of sin industries on investments of norm-constrained institutional investors.

[21] These results largely remain intact when we replicate this analysis for the sub-samples of Tobin's Q quartiles. These results are not reported ,but are available upon request.

equivalent to a 4% increase relative to a representative firm in our sample. Model 7 reports significant effects of toxic and gray firms on the likelihood of analyst coverage (7.1% and 14.5%), whereas the effect of green firms is statistically insignificant. The significant effects of toxic and gray firms correspond to 9% and 18% increases, respectively, relative to a representative firm in the sample. These results suggest that analysts have a higher propensity to serve investors in toxic and gray stocks. This finding contrasts sharply with the finding of Hong and Kacperczyk (2009) that sin stocks receive lower analyst coverage. It is, however, consistent with the notion that institutional prudency requirements may increase the demand for analyst coverage of toxic stocks. Since toxic and gray stocks are more prone to environmental litigation, penalties, and other costs that lower investor returns, institutional investors are more likely to rely on analyst reports when they invest in toxic and gray stocks.

It is important to emphasize that the above results are obtained after controlling for other factors that are known to drive analyst coverage. Analyst coverage is significantly and positively related to firm size, age, and S&P 500 index membership. We also find that firms with independent boards have a higher likelihood of analyst coverage and that firms with a higher GIM index receive more analyst coverage. The relationships we document between environmental performance and analyst coverage persist after these controls.

D. The effect of industry environmental performance on institutional ownership and analyst coverage

In this section, we examine whether environmental performance of an industry affects the variables of interest. Hong and Kacperczyk (2009) document that institutional investors and analysts shy away from sin stocks, which are classified based on the firm's (or one of its segment's) industry grouping. Hong and Kacperczyk (2009)'s findings for sin stocks suggest that industry environmental performance also may play an important role in investment choices and analyst coverage.

In order to disentangle the effects of firm and industry, we include green and toxic industry variables in the basic regressions reported in Table 7. We continue to find that firm environmental performance measures (i.e., green, toxic, and gray) are significant, while the effects of green and toxic industry dummies are insignificant. These findings suggest that within-industry variation in corporate environmental performance is a relatively more important determinant of ownership dispersion than the variation across different industries. Furthermore, the insignificant effects of industry environmental performance and significant effects of firm environmental performance on institutional holdings and analyst coverage suggest that overall, institutional investors and analysts also pay more attention to firm environmental performance than to industry environmental performance.[22]

[Place Table 7 about here]

[22] It is important to note that this finding reflects the overall behavior of institutional investors. In Table 5, we document variation across different institutional investor types.

E. Corporate environmental performance and firm value

In previous sections, we document that environmental performance has economically meaningful effects on investor holdings and analyst coverage. In this section, we examine whether the nature of corporate environmental performance influences firm values. Specifically, we examine differences in stock valuations using the Tobin's Q measure. Panels A and B of Table 8 report mean and median Tobin's Q values for environmental performance groups. We find that both the mean and median values of Tobin's Q of toxic firms are significantly lower than for neutral firms. Although Panel A shows significantly lower mean Tobin's Q values for green firms relative to neutral firms, we fail to find a significant difference in the corresponding median values in Panel B.

[Place Table 8 about here]

We also conduct a matched sample analysis to assess the difference in valuations in Panel C of Table 8. Specifically, we generate one-on-one matching samples of neutral firms for green, toxic and gray firms that share the same two-digit SIC. Matching firms are the closest in size from firms whose size is within +/-10% of the sample firm. We also statistically verify the efficacy of the size match. We compare Tobin's Q values of green, toxic and gray firms to a group of matched neutral firms. Panel C of Table 8 reports that toxic firms have significantly lower values of Tobin's Q relative to matched neutral firms, confirming our findings based on raw Tobin's Q measures in Panels A and B. These findings complement the evidence provided by Karpoff et al. (2005), Additionally, we find that green firms also have significantly lower values of Tobin's Q.

Finally, we conduct a multivariate regression to assess the effect of environmental performance on stock valuation. In Panel D of Table 8, Models 1-3 have the dependent

variable as Tobin's Q. In Models 4-6, the dependent variable is the natural logarithm of Tobin's Q. Toxic Firm Dummy has negative and significant effects on Tobin's Q in all models. In particular, the coefficient estimate for Toxic Firm is -0.154 in Model 1, representing a 7.6% decrease relative to the mean Tobin's Q in the sample (2.01). . Collectively, these multivariate results taken together with the univariate results in Panels A, B, and C provide strong evidence that higher environmental risk exposure reduces firm value.

We also examine the stock valuation of green firms in the multivariate regressions. Although the Green Firm Dummy has a significant negative effect in Models 1-3, the effect lacks statistical significance in Models 4-6. Collectively, these findings suggest that greenness does not increase shareholder value.

We also assess the portfolio returns of green and toxic firms. By following the matching methodology of Panel C, we form equally-weighted portfolios comprised of firms in our sample. Specifically, we calculate the net portfolio returns as the returns of green, toxic and gray portfolios minus the corresponding equally-weighted matching neutral firm portfolio returns. We then regress separately the net portfolio returns over 12 months on (a) excess market returns in the conventional market model; (b) the three factors in the Fama-French (1992) model; and (c) the four factors in the Fama-French and Carhart (1997) models. The intercept terms of the regressions of the net returns indicate abnormal returns (*Alpha*) while coefficient estimates are the risk loadings on the corresponding factors. Panel A of Table 9 reports the estimates from these regressions over 132 months between 1997 and 2007.

[Place Table 9 about here]

We fail to find any statistically or economically significant effect of environmental performance on net portfolio returns. Specifically, *Alpha* lacks statistical significance in all models. However, we find a significant influence of environmental performance on risk loadings. In particular, the green portfolio has lower risk relative to benchmark neutral firms in Model 1 while toxic and gray firms have higher risk loadings in Models 2 and 3.

Our findings on differential risk loadings support the prediction by Heinkel et al. (2001) of a higher required return on stocks of polluting firms, and are consistent with our results on analyst coverage and institutional holdings. Toxic firms are more prone to environmental disasters, lawsuits, and other costly disruptions, which may explain both the lower institutional presence in these stocks and the higher demand for analyst coverage. While green stocks are also more widely held and have lower institutional sponsorship, green stocks have lower systematic risk compared to neutral firms.

IV. Conclusions

This paper examines the effect of corporate environmental policy on institutional holdings, analyst coverage, and shareholder value. We find a sharp asymmetry between corporate policies that affect the firm's exposure to environmental risk ("toxicity") and its perceived environmental friendliness ("greenness"). We find a non-monotonic variation in ownership across the environmental performance spectrum. Both green and toxic firms have a larger number of shareholders relative to neutral firms, but a smaller percentage of institutional holdings. There is also some variation in holdings based on environmental performance across different types of institutional investors. Our finding that institutional investors, including institutions who are unconstrained by socially responsible investment

(SRI) norms, shun stocks with high environmental risk exposure, are consistent with the predictions of risk management theory and suggest that corporate environmental policies that mitigate risk exposure create value for all shareholders. Although green investors may derive non-pecuniary benefits from holding "green" stocks, our finding that institutional investors, especially those unconstrained by SRI norms, also shun firms that have high greenness scores suggest that high greenness also does not increase shareholder value. Additionally, we find that analyst following is significantly higher for toxic firms. Collectively, these findings indicate that the "smart money" controlled by institutional investors distinguishes between and reacts differently to different forms of corporate environmental policies.

We also observe significant differences in Tobin's Q across different environmental performance groupings. Both toxic and green firms have lower values of Tobin's Q than neutral firms. Our finding that toxic firms, which have higher exposure to environmental risk, have lower valuations is consistent with the predictions of risk management theory. Collectively, these findings indicate that lower valuations of green and toxic firms persist, which is in line with the lower institutional holdings in these stocks.

This study complements the growing literature on socially responsible investment by providing a much-needed investor perspective on corporate environmental policy. Our findings provide several new insights and point to a fruitful new line of research that is likely to grow in importance as environmental performance takes a more central place in the way firms run their businesses and investors perceive them.

Appendix A – Variable Definitions

(in alphabetical order)

Advisors are independent investment advisors and correspond to institutional investor type 4 in the CDA/Spectrum 13F Holdings database.

Age refers to the number of years between the year of estimation and the year in which the firm is first listed in CRSP dataset.

Alpha is the intercept of monthly return on the portfolio less the one-month Treasury bill rate on Fama-French three-factors plus momentum factor.

Analyst Coverage takes value one if the firm is covered by an analyst in the I/B/E/S dataset.

Average Inst. Investor Holdings is the ratio of *Fraction of Shares Held by Inst. Investors* to the *Number of Institutional Investors*.

Average Monthly Stock Return is the mean monthly holding period return.

Banks refers to institutional investor type 1 in CDA/Spectrum 13F Holdings database.

Book Debt is the sum of total debt in current liabilities (Compustat item *DLC*) and total long-term debt (Compustat item *DLTT*).

CEO/Chairman Dummy takes the value one if CEO is chairman of the board of directors.

EBITD/TA is operating income before depreciation (Item *OIBDP*) over *Total Assets* (Item *AT*).

Excess Return on Market refers to monthly return on the value-weighted market portfolio of NYSE, NASDAQ and AMEX stocks less the one-month Treasury bill rate.

Fraction of Shares Held by Inst. Investors is ratio of shares held by institutional investors to shares outstanding.

GIM Index refers to the number of antitakeover provisions reported in IRRC dataset.

Gray Firm Dummy takes the value one if the firm has one or more environmental strengths as well as one or more environmental concerns.

Green Firm Dummy takes the value one if the firm has one or more environmental strengths and has no environmental concerns.

Green Industry Dummy takes value one if 10 percent or more of the industry consists of Green Firms and the percentage of Toxic Firms is less than 10 percent.

High-Minus-Low Return refers to the difference between the returns on portfolios of high- and low Book Equity/Market Equity stocks.

Independent Board Dummy takes value one if the ratio of independent board members is greater than 50 percent.

Insurance refers to insurance companies and is identified as institutional investor type 2 in the CDA/Spectrum 13F Holdings database.

Investment refers to mutual funds and is identified as institutional investor type 3 in the CDA/Spectrum 13F Holdings database.

Market Value refers market capitalization (shares outstanding (Compustat item *CSHO*) times stock price (Compustat item *PRCC_F*)).

Market Leverage is *Book Debt* over *Total Assets* minus book value of equity *(*Compustat item *CEQ)* plus *Market Value* of equity.

Nasdaq Dummy takes value one if the firm trades at the NASDAQ Stock Exchange.

Neutral Firm takes value one if the firm does not have any environmental strength or concerns.

Neutral Industry takes value one if the industry is not classified as *Toxic* or *Green Industry*.

Number of Analysts refer to the number of analysts covering the company.

Number of Environmental Concerns is the number of environmental concerns reported in the KLD dataset. The concerns indicate if the firm releases hazardous waste, agriculture chemicals and ozone depleting chemicals, has regulatory problems, has substantial emissions and contributes to climate change. If the firm meets the KLD threshold in each area, it is assigned a value of one, and zero otherwise.

Number of Environmental Strengths is the number of environmental strengths reported in the KLD dataset. The sub-indicators of strengths include the extent to which the firm has environmentally beneficial products and services, uses clean energy, provides open communication about its environmental program and engages in extensive recycling. If the firm meets the KLD threshold in each area, it is assigned a value of one, and zero otherwise.

Number of Shareholders (NS) refers to number of shareholders of the company (Compustat item *CSHR*).

Other refers to institutional investors including pension plans, endowments and employee stock ownership plans and corresponds to institutional investor type 5 in the CDA/Spectrum 13F Holdings database.

R&D Missing Dummy is a dummy variable that takes a value of one if Compustat reports R&D expense (Compustat item *XRD*) as missing, and of zero otherwise.

R&D/TA is defined as R&D expenses (Compustat item *XRD*) over *Total Assets* (Compustat item AT).

Ratio of green firms is the ratio of *Green Firms* in the firm's industry.

Ratio of toxic firms is the ratio of *Green Firms* in the firm's industry.

S&P 500 Dummy takes value one if the firm is listed in the S&P 500 Index.

Small-Minus-Big Return refers to the difference between the returns on portfolios of small and big stocks

Std of Daily Stock Return is the standard deviation of daily holding period stock returns.

Tobin's Q is the ratio of *Total Assets* minus book value of equity *(*Compustat item *CEQ)* plus *Market Value* of equity to *Total Assets.*

Total Assets (TA) is measured as the book value of assets (Compustat item *AT*).

Toxic Firm Dummy takes value one if the firm has one or more environmental concerns and has no environmental strengths.

Toxic Industry Dummy takes value one if 10 percent or more of the industry consists of *Toxic Firms* and the percentage of *Green Firms* is less than 10 percent.

Turnover is average monthly trading volume over shares outstanding.

1/Stock Price is one over the stock price at the beginning of the fiscal year.

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Table1
Descriptive Statistics
This table reports summary statistics of the sample. Variable definitions are in Appendix A.

	N	Mean	Std. Dev.	5th Percentile	95th Percentile
Market Value ($ mil)	7118	11182.13	24542.13	404.15	50125.88
Age	7118	28.61	14.99	7.00	54.00
Number of Shareholders (NS) (Thousand)	7118	38.92	92.70	0.78	179.17
Total No. of Inst. Investors x 1000/ NS	7118	59.77	84.88	1.78	253.78
Fraction of Shares Held by Inst. Investors	7118	0.72	0.21	0.36	1.00
Number of Analysts	7118	9.15	7.56	0.00	23.00
Analyst Coverage	7118	0.80	0.40	0.00	1.00
S&P500 Dummy	7118	0.56	0.50	0.00	1.00
Tobin's Q	7118	2.01	1.24	1.02	4.63
Market Leverage	7118	0.16	0.13	0.00	0.41
Average Monthly Return	7118	0.01	0.03	-0.03	0.06
1/Price	7118	0.04	0.02	0.01	0.08
Std of Daily Stock Return	7118	0.02	0.01	0.01	0.04
Turnover	7118	1.58	1.32	0.42	4.39
CEO/Chairman Dummy	7118	0.40	0.49	0.00	1.00
Independent Board Dummy	7118	0.90	0.31	0.00	1.00
GIM Index	7118	9.67	2.54	5.00	14.00
Number of Environmental Stregths	7118	0.21	0.51	0.00	1.00
Number of Environmental Concerns	7118	0.38	0.86	0.00	2.00
Green Firm Dummy	7118	0.09	0.29	0.00	1.00
Toxic Firm Dummy	7118	0.13	0.34	0.00	1.00
Gray Firm Dummy	7118	0.07	0.26	0.00	1.00
Green Industry Dummy	7118	0.17	0.38	0.00	1.00
Toxic Industry Dummy	7118	0.15	0.36	0.00	1.00

Table 2
Univariate Analysis
This table reports mean (Panel A) and median (Panel B) values of variables for Green, Toxic, Gray and Neutral Firms. Variable definitions are in Appendix A. The *, ** and *** indicate 10%, 5% and 1% significance, respectively.

Panel A. Mean Values

	Green Firm	Toxic Firm	Gray Firm	Neutral Firm				
	1	2	3	4	1-4	2-4	3-4	1-2
Number of Observations	664	957	531	4966				
Market Value ($ mil)	13388	15274	23978	8731	4657 ***	6543 ***	15247 ***	-1886
Age	32.556	38.833	42.207	24.656	7.899 ***	14.176 ***	17.551 ***	-6.277 ***
Number of Shareholders (NS) (Thousand)	61.628	66.622	93.793	24.674	36.954 ***	41.947 ***	69.118 ***	-4.994
Total Number of Inst. Investors x 1000/NS	34.666	37.044	17.990	71.970	-37.304 ***	-34.926 ***	-53.980 ***	-2.378
Fraction of Shares Held by Inst. Investors	0.661	0.689	0.670	0.732	-0.072 ***	-0.044 ***	-0.062 ***	-0.028 ***
Log(# Analysts)	1.910	2.074	2.424	1.779	0.131 ***	0.295 ***	0.645 ***	-0.164 ***
Analyst Coverage	0.848	0.901	0.968	0.756	0.092 ***	0.145 ***	0.212 ***	-0.053 ***
Tobin's Q	1.972	1.636	1.717	2.124	-0.152 ***	-0.489 ***	-0.407 ***	0.337 ***
S&P500 Dummy	0.566	0.643	0.868	0.507	0.060 ***	0.136 ***	0.362 ***	-0.076 ***
Turnover	1.221	1.355	1.173	1.710	-0.488 ***	-0.355 ***	-0.536 ***	-0.133 **
CEO/Chairman Dummy	0.401	0.326	0.345	0.427	-0.026	-0.100 ***	-0.082 ***	0.075 ***
Independent Board Dummy	0.923	0.950	0.976	0.873	0.051 ***	0.077 ***	0.103 ***	-0.027 **
GIM Index	10.230	10.103	9.932	9.490	0.740 ***	0.613 ***	0.442 ***	0.127

Panel B. Median Values

	Green Firm	Toxic Firm	Gray Firm	Neutral Firm				
	1	2	3	4	1-4	2-4	3-4	1-2
Number of Observations	664	957	531	4966				
Market Value ($ mil)	2825	4437	8771	2941	-116	1496 ***	5831 ***	-1612.0 ***
Age	32	44	48	23	9.00 ***	21.00 ***	25.00 ***	-12.00 ***
Number of Shareholders (NS) (Thousand)	16.500	25.850	39.021	6.458	10.042 ***	19.392 ***	32.563 ***	-9.350 ***
Total Number of Inst. Investors x 1000/NS	14.056	11.747	9.838	34.167	-20.111 ***	-22.420 ***	-24.329 ***	2.309 **
Fraction of Shares Held by Inst. Investors	0.693	0.701	0.681	0.768	-0.075 ***	-0.067 ***	-0.087 ***	-0.008 **
Log(# Analysts)	2.197	2.303	2.565	2.197	0.000	0.105 ***	0.368 ***	-0.105 ***
Analyst Coverage	1.000	1.000	1.000	1.000	0.000	0.000	0.000	0.000
Tobin's Q	1.608	1.359	1.430	1.659	-0.050	-0.300 ***	-0.228 ***	0.249 ***
S&P500 Dummy	1.000	1.000	1.000	1.000	0.000	0.000	0.000	0.000
Turnover	0.898	1.027	0.909	1.250	-0.352 ***	-0.222 ***	-0.341 ***	-0.130 ***
CEO/Chairman Dummy	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Independent Board Dummy	1.000	1.000	1.000	1.000	0.000	0.000	0.000	0.000
GIM Index	10.000	10.000	10.000	9.000	1.000 ***	1.000 ***	1.000 ***	0.000

Table 3
Environmental Performance and the Breadth of Ownership
This table reports regressions of breadth of ownership. The dependent variables in these regressions are number of shareholders and ratio of number of institutional investors to total number of investors. Variable definitions are in Appendix A. The p-values are given in parentheses and are based on standard errors corrected for heteroscedasticity and clustering of firms over years. The *, ** and *** indicate 10%, 5% and 1% significance, respectively.

<< Table on the next page >>

	Log (NS)						Log (# Inst. Investors / NS)					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Green Firm	0.513***	0.536***	0.510***	0.516***	0.492***	0.441***	-0.473***	-0.498***	-0.474***	-0.479***	-0.446***	-0.405***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Toxic Firm	0.501***	0.549***	0.536***	0.530***	0.541***	0.474***	-0.494***	-0.551***	-0.537***	-0.531***	-0.540***	-0.484***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Gray Firm	0.670***	0.732***	0.718***	0.718***	0.705***	0.641***	-0.648***	-0.721***	-0.706***	-0.707***	-0.688***	-0.636***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log (Market Value)	0.597***	0.558***	0.550***	0.634***	0.564***	0.666***	-0.195***	-0.142***	-0.142***	-0.222***	-0.158***	-0.243***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log (Firm Age)	0.114*	0.132**	0.100*	0.131**	0.062	0.041	-0.132**	-0.148**	-0.122*	-0.152**	-0.070	-0.052
	(0.058)	(0.029)	(0.098)	(0.030)	(0.302)	(0.492)	(0.034)	(0.018)	(0.050)	(0.015)	(0.254)	(0.395)
S&P500 Dummy	-0.093	-0.070	-0.058	-0.138*	-0.037	-0.132	0.159*	0.118	0.120	0.196**	0.093	0.169*
	(0.253)	(0.391)	(0.477)	(0.090)	(0.642)	(0.101)	(0.072)	(0.180)	(0.172)	(0.026)	(0.280)	(0.052)
Nasdaq Dummy	-0.074	-0.136	-0.082	-0.155*	0.015	0.045	0.086	0.163*	0.107	0.177*	-0.019	-0.030
	(0.382)	(0.108)	(0.342)	(0.066)	(0.861)	(0.594)	(0.369)	(0.089)	(0.275)	(0.066)	(0.839)	(0.748)
CEO/Chairman Dummy	-0.082**	-0.086**	-0.080*	-0.084**	-0.077*	-0.067*	0.109**	0.116**	0.107**	0.111**	0.102**	0.097**
	(0.043)	(0.036)	(0.050)	(0.040)	(0.058)	(0.094)	(0.021)	(0.014)	(0.023)	(0.019)	(0.029)	(0.036)
Independent Board Dummy	0.175**	0.173**	0.167**	0.177**	0.188**	0.183**	-0.164*	-0.161*	-0.157*	-0.166*	-0.180**	-0.175**
	(0.029)	(0.033)	(0.038)	(0.028)	(0.021)	(0.021)	(0.057)	(0.063)	(0.071)	(0.057)	(0.040)	(0.039)
GIM Index	0.002	0.003	-0.001	0.009	-0.001	0.002	-0.011	-0.012	-0.008	-0.017	-0.007	-0.010
	(0.868)	(0.815)	(0.959)	(0.501)	(0.922)	(0.886)	(0.416)	(0.390)	(0.534)	(0.194)	(0.602)	(0.445)
Tobin's Q	-0.093***					-0.065**	0.108***					0.055*
	(0.000)					(0.016)	(0.000)					(0.060)
Average Monthly Stock Return		0.439				0.871*		3.899***				3.403***
		(0.347)				(0.099)		(0.000)				(0.000)
Std of Daily Stock Return			-12.328***			-13.895***			11.782***			10.861***
			(0.000)			(0.000)			(0.001)			(0.004)
1/Stock Price				8.201***		8.866***				-7.783***		-8.272***
				(0.000)		(0.000)				(0.000)		(0.000)
Turnover					-0.154***	-0.096***					0.181***	0.128***
					(0.000)	(0.000)					(0.000)	(0.000)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7118	7118	7118	7118	7118	7118	7118	7118	7118	7118	7118	7118
R-squared	0.477	0.473	0.476	0.487	0.486	0.503	0.251	0.249	0.248	0.258	0.265	0.283

Table 4
Environmental Performance and Institutional Ownership
This table reports regressions of institutional ownership. The dependent variables in these regressions are the fraction of shares held by total. Variable definitions are in Appendix A. The p-values are given in parentheses and are based on standard errors corrected for heteroscedasticity and clustering of firms over years. The *, ** and *** indicate 10%, 5% and 1% significance, respectively.

	Fraction of Shares Held by Inst. Investors					
	(1)	(2)	(3)	(4)	(5)	(6)
Green Firm	-0.036***	-0.035***	-0.033***	-0.033***	-0.027**	-0.028**
	(0.003)	(0.004)	(0.006)	(0.006)	(0.022)	(0.015)
Toxic Firm	-0.028**	-0.026**	-0.025**	-0.024*	-0.024**	-0.028**
	(0.023)	(0.034)	(0.042)	(0.051)	(0.039)	(0.016)
Gray Firm	-0.032**	-0.030**	-0.028*	-0.028*	-0.024*	-0.030**
	(0.031)	(0.046)	(0.055)	(0.057)	(0.096)	(0.037)
Log (Market Value)	-0.016***	-0.017***	-0.017***	-0.026***	-0.019***	-0.022***
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log (Firm Age)	-0.036***	-0.035***	-0.033***	-0.035***	-0.022***	-0.024***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.004)	(0.002)
S&P500 Dummy	0.045***	0.045***	0.045***	0.053***	0.040***	0.043***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Nasdaq Dummy	-0.042***	-0.044***	-0.049***	-0.042***	-0.074***	-0.063***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CEO/Chairman Dummy	0.008	0.008	0.007	0.007	0.006	0.006
	(0.226)	(0.223)	(0.275)	(0.251)	(0.361)	(0.309)
Independent Board Dummy	0.025*	0.025*	0.025*	0.024*	0.022*	0.021*
	(0.056)	(0.056)	(0.053)	(0.058)	(0.085)	(0.086)
GIM Index	-0.001	-0.001	-0.001	-0.002	-0.000	-0.001
	(0.502)	(0.527)	(0.644)	(0.329)	(0.847)	(0.545)
Tobin's Q	-0.003					-0.010***
	(0.326)					(0.007)
Average Monthly Stock Return		0.308***				0.334***
		(0.001)				(0.001)
Std of Daily Stock Return			1.111**			-0.509
			(0.036)			(0.375)
1/Stock Price				-0.819***		-0.741***
				(0.000)		(0.000)
Turnover					0.030***	0.030***
					(0.000)	(0.000)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7118	7118	7118	7118	7118	7118
R-squared	0.302	0.303	0.303	0.308	0.325	0.333

Table 5
Institutional Ownership by Different Types of Institutions
This table reports regressions of institutional ownership. The dependent variables in these regressions are (a) the ratio of number of institutional investors to total number of investors, and (b) the fraction of shares held by institutional investors. Variable definitions are in Appendix A. The p-values are given in parentheses and are based on standard errors corrected for heteroscedasticity and clustering of firms over years. The *, ** and *** indicate 10%, 5% and 1% significance, respectively.

Panel A. Institutional ownership by type: 1997

	Log (# Inst. Investors / NS)					Fraction of Shares Held by Inst. Investors				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Banks	*Insurance*	*Investment*	*Advisors*	*Other*	*Banks*	*Insurance*	*Investment*	*Advisors*	*Other*
Green Firm	-0.209**	-0.180**	-0.137*	-0.240**	-0.190**	-0.012	-0.005	0.006	-0.005	0.002
	(0.035)	(0.010)	(0.052)	(0.024)	(0.012)	(0.130)	(0.219)	(0.471)	(0.695)	(0.502)
Toxic Firm	-0.002	-0.028	-0.020	-0.037	-0.034	-0.012	-0.001	0.015	-0.008	0.007
	(0.985)	(0.709)	(0.788)	(0.740)	(0.662)	(0.188)	(0.915)	(0.161)	(0.514)	(0.197)
Gray Firm	-0.075	-0.029	-0.030	-0.085	-0.055	-0.004	-0.001	0.003	-0.025*	0.006
	(0.479)	(0.687)	(0.678)	(0.487)	(0.452)	(0.621)	(0.814)	(0.783)	(0.063)	(0.226)
Green Industry	-0.044	-0.011	-0.016	0.026	-0.013	-0.008	-0.006	0.011	-0.014	0.001
	(0.718)	(0.900)	(0.849)	(0.840)	(0.900)	(0.275)	(0.189)	(0.261)	(0.240)	(0.835)
Toxic Industry	-0.076	-0.002	-0.015	-0.030	0.012	0.001	-0.005	0.005	0.013	-0.007**
	(0.505)	(0.986)	(0.853)	(0.819)	(0.892)	(0.956)	(0.316)	(0.669)	(0.363)	(0.036)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	382	382	382	382	382	382	382	382	382	382
R-squared	0.374	0.432	0.431	0.390	0.408	0.270	0.125	0.218	0.284	0.095

Panel B. Institutional ownership by type: 1998-2007

	Log (# Inst. Investors / NS)					Fraction of Shares Held by Inst. Investors				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Banks	*Insurance*	*Investment*	*Advisors*	*Other*	*Banks*	*Insurance*	*Investment*	*Advisors*	*Other*
Green Firm	-0.300***	-0.175***	-0.117***	-0.297***	-0.417***	-0.005**	-0.004***	-0.001*	-0.005**	-0.017
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.032)	(0.007)	(0.085)	(0.048)	(0.135)
Toxic Firm	-0.340***	-0.171***	-0.114***	-0.325***	-0.501***	-0.004	0.001	-0.001	0.001	-0.025**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.178)	(0.432)	(0.148)	(0.724)	(0.023)
Gray Firm	-0.465***	-0.243***	-0.173***	-0.457***	-0.658***	-0.001	-0.000	-0.000	0.001	-0.033**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.737)	(0.949)	(0.824)	(0.806)	(0.010)
Green Industry	0.009	-0.004	-0.008	-0.012	0.016	-0.005**	0.002	0.000	-0.002	-0.012
	(0.861)	(0.900)	(0.708)	(0.802)	(0.806)	(0.022)	(0.182)	(0.613)	(0.394)	(0.134)
Toxic Industry	-0.037	-0.038	-0.022	-0.065	-0.034	-0.001	-0.000	0.001	-0.002	-0.013*
	(0.391)	(0.157)	(0.276)	(0.142)	(0.550)	(0.486)	(0.893)	(0.342)	(0.354)	(0.063)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6736	6736	6736	6736	6736	6736	6736	6736	6736	6736
R-squared	0.224	0.284	0.261	0.334	0.287	0.288	0.119	0.079	0.643	0.347

Table 6
Environmental Performance and Analyst Coverage
This table reports regressions of analyst coverage. The dependent variables in these regressions are the natural logarithm of number of analysts covering the underlying firm and the dummy variable for analyst coverage. Variable definitions are in Appendix A. The p-values are given in parentheses and are based on standard errors corrected for heteroscedasticity and clustering of firms over years. The *, ** and *** indicate 10%, 5% and 1% significance, respectively.

<< Table on the next page >>

	Log (1 + # Analysts)						P(Analyst Coverage=1)					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Green Firm	0.082	0.089	0.093	0.088	0.107	0.088	0.043	0.044	0.039	0.045	0.041	0.039
	(0.354)	(0.315)	(0.297)	(0.324)	(0.221)	(0.310)	(0.158)	(0.143)	(0.208)	(0.134)	(0.186)	(0.217)
Toxic Firm	0.108	0.123*	0.125*	0.122*	0.127*	0.101	0.072***	0.074***	0.072***	0.074***	0.073***	0.071***
	(0.116)	(0.075)	(0.070)	(0.079)	(0.066)	(0.142)	(0.004)	(0.003)	(0.004)	(0.002)	(0.003)	(0.005)
Gray Firm	0.301***	0.320***	0.322***	0.320***	0.331***	0.304***	0.145***	0.147***	0.146***	0.147***	0.146***	0.145***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log (Market Value)	0.270***	0.258***	0.258***	0.263***	0.254***	0.276***	0.019	0.016	0.014	0.011	0.017	0.014
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.142)	(0.190)	(0.225)	(0.418)	(0.163)	(0.314)
Log (Firm Age)	-0.249***	-0.244***	-0.240***	-0.244***	-0.216***	-0.228***	-0.066***	-0.065***	-0.072***	-0.064***	-0.071***	-0.074***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)
S&P500 Dummy	0.155**	0.162**	0.161**	0.158**	0.150**	0.130*	0.012	0.014	0.016	0.019	0.016	0.019
	(0.046)	(0.036)	(0.037)	(0.046)	(0.049)	(0.099)	(0.694)	(0.649)	(0.621)	(0.557)	(0.612)	(0.564)
Nasdaq Dummy	0.065	0.046	0.038	0.044	-0.015	0.010	-0.037	-0.041	-0.029	-0.039	-0.029	-0.022
	(0.442)	(0.595)	(0.665)	(0.606)	(0.867)	(0.910)	(0.237)	(0.194)	(0.368)	(0.211)	(0.370)	(0.500)
CEO/Chairman Dummy	-0.014	-0.015	-0.016	-0.015	-0.019	-0.015	-0.005	-0.005	-0.004	-0.005	-0.005	-0.004
	(0.715)	(0.692)	(0.672)	(0.694)	(0.614)	(0.691)	(0.737)	(0.727)	(0.789)	(0.728)	(0.753)	(0.787)
Independent Board Dummy	0.165**	0.165**	0.165**	0.165**	0.159**	0.155**	0.074**	0.074**	0.074**	0.074**	0.076***	0.075**
	(0.021)	(0.022)	(0.021)	(0.021)	(0.026)	(0.030)	(0.011)	(0.011)	(0.012)	(0.012)	(0.010)	(0.011)
GIM Index	0.021*	0.021*	0.022*	0.021*	0.023**	0.022**	0.003	0.003	0.003	0.003	0.003	0.002
	(0.066)	(0.063)	(0.057)	(0.058)	(0.043)	(0.049)	(0.469)	(0.462)	(0.573)	(0.509)	(0.509)	(0.612)
Tobin's Q	-0.029					-0.033	-0.005					-0.006
	(0.287)					(0.265)	(0.584)					(0.567)
Average Monthly Stock Return		0.160				0.079		-0.161				-0.086
		(0.722)				(0.877)		(0.323)				(0.652)
Std of Daily Stock Return			1.642			-6.744*			-2.607**			-1.694
			(0.628)			(0.075)			(0.034)			(0.233)
1/Stock Price				0.586		1.400				-0.538		-0.412
				(0.577)		(0.205)				(0.166)		(0.323)
Turnover					0.061**	0.086***					-0.011	-0.006
					(0.010)	(0.002)					(0.146)	(0.488)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7118	7118	7118	7118	7118	7118	7118	7118	7118	7118	7118	7118
(Pseudo) R-square	0.297	0.296	0.296	0.296	0.300	0.302	0.181	0.181	0.183	0.182	0.182	0.184

Table 7

The Effect of Industry Environmental Performance on Analyst Coverage and Breadth of Ownership

This table reports the effect of industry environmental performance on variables of interest. Variable definitions are in Appendix A. The p-values are given in parentheses and are based on standard errors corrected for heteroscedasticity and clustering of firms over years. The *, ** and *** indicate 10%, 5% and 1% significance, respectively.

	Log (NS)	Log (# Inst. Investors / NS)	Fraction of Shares Held by Inst. Investors	Log (1+# Analysts)	P(Analyst Coverage=1)
	(1)	(2)	(3)	(4)	(5)
Green Firm	0.446***	-0.407***	-0.028**	0.091	0.039
	(0.000)	(0.000)	(0.017)	(0.292)	(0.208)
Toxic Firm	0.462***	-0.478***	-0.028**	0.095	0.071***
	(0.000)	(0.000)	(0.018)	(0.166)	(0.005)
Gray Firm	0.635***	-0.634***	-0.031**	0.300***	0.145***
	(0.000)	(0.000)	(0.033)	(0.000)	(0.000)
Green Industry	-0.040	-0.004	-0.015	-0.047	-0.008
	(0.477)	(0.950)	(0.111)	(0.416)	(0.705)
Toxic Industry	0.037	-0.037	-0.010	-0.005	-0.006
	(0.496)	(0.518)	(0.191)	(0.908)	(0.775)
Controls	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Observations	7118	7118	7118	7118	7110
(Pseudo)-R-square	0.503	0.283	0.334	0.302	0.184

Table 8
Environmental Performance and Firm Value
This table reports the effects of firm environmental performance on Tobin's Q. Panels A and B report mean and median values of Tobin's Q for environmental performance groups, respectively. Panel C presents difference in Tobin's Q ratios of green, toxic and gray firms and matched neutral firms. In Panel D, Models 1-3 have the dependent variable as Tobin's Q. In Models 4-6, the dependent variable is the natural logarithm of Tobin's Q. Variable definitions are in Appendix A. The *, ** and *** indicate 10%, 5% and 1% significance, respectively.

Panel A. Mean Values

	Green	Toxic	Gray	Neutral				
	1	2	3	4	1-4	2-4	3-4	1-2
Tobin's Q	1.972	1.636	1.717	2.124	-0.152 ***	-0.489 ***	-0.407 ***	0.337 ***

Panel B. Median Values

	1	2	3	4	1-4	2-4	3-4	1-2
Tobin's Q	1.608	1.359	1.430	1.659	-0.050	-0.300 ***	-0.228 ***	0.249 ***

Panel C. Matched Subsample Analysis

	Green-Matched Neutral	Toxic-Matched Neutral	Gray-Matched Neutral
Tobin's Q	-0.393***	-0.721***	-1.279***

Panel D. Regression

	Tobin's Q			Log (Tobin's Q)		
	(1)	(2)	(3)	(4)	(5)	(6)
Green Firm	-0.102*	-0.115**	-0.100*	-0.033	-0.033	-0.031
	(0.059)	(0.041)	(0.067)	(0.139)	(0.150)	(0.163)
Toxic Firm	-0.154***	-0.186***	-0.160***	-0.083***	-0.087***	-0.088***
	(0.002)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
Gray Firm	-0.253***	-0.276***	-0.255***	-0.108***	-0.110***	-0.110***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log (Firm Age)	-0.043	-0.044	-0.044	-0.021	-0.021	-0.021
	(0.207)	(0.199)	(0.204)	(0.107)	(0.105)	(0.104)
S&P500 Dummy	0.291***	0.294***	0.291***	0.127***	0.128***	0.127***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Nasdaq Dummy	0.320***	0.321***	0.321***	0.121***	0.121***	0.121***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CEO/Chairman Dummy	-0.017	-0.017	-0.017	-0.008	-0.008	-0.009
	(0.564)	(0.552)	(0.552)	(0.428)	(0.424)	(0.405)
Independent Board Dummy	-0.019	-0.022	-0.019	-0.022	-0.022	-0.022
	(0.771)	(0.736)	(0.775)	(0.329)	(0.332)	(0.333)
GIM Index	-0.019***	-0.019***	-0.020***	-0.007**	-0.007**	-0.007**
	(0.008)	(0.008)	(0.008)	(0.012)	(0.012)	(0.011)
R&D/TA	8.639***	8.655***	8.652***	3.054***	3.063***	3.067***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R&D Missing Dummy	-0.024	-0.022	-0.023	-0.034	-0.034	-0.033
	(0.666)	(0.690)	(0.681)	(0.110)	(0.113)	(0.122)
Std of Daily Stock Return	-1.838	-1.611	-1.885	-1.900**	-1.903**	-1.929**
	(0.405)	(0.463)	(0.395)	(0.029)	(0.028)	(0.026)
EBITDA/TA	8.618***	8.629***	8.620***	3.505***	3.505***	3.506***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ratio of Green Firms		0.142			-0.014	
		(0.452)			(0.852)	
Ratio of Toxic Firms		0.177			0.025	
		(0.160)			(0.637)	
Green Industry			-0.003			-0.007
			(0.941)			(0.701)
Toxic Industry			0.028			0.020
			(0.421)			(0.152)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7118	7118	7118	7118	7118	7118
R-squared	0.533	0.533	0.533	0.588	0.588	0.588

Table 9
Environmental Performance and Portfolio Returns

This table reports the effects of firm environmental performance on portfolio returns. In Panel A, Models 1-3 have the dependent variable as long Green (monthly return for an equally-weighted portfolio of green firms) and short matched Neutral (monthly return for an equally-weighted portfolio of matched neutral firms). In Models 4-6, the dependent variable is long Toxic (monthly return for an equally-weighted portfolio of toxic firms) and short matched Neutral (monthly return for an equally-weighted portfolio of matched neutral firms). In Models 7-9, the dependent variable is long Gray (monthly return for an equally-weighted portfolio of gray firms) and short matched Neutral (monthly return for an equally-weighted portfolio of matched neutral firms). Matching is done based on industry (2-digit SIC) and size. Variable definitions are in Appendix A. The *, ** and *** indicate 10%, 5% and 1% significance, respectively.

	Green-Matched Neutral			Toxic-Matched Neutral			Gray-Matched Neutral		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Excess Return on Market	-0.169**	-0.153	-0.189*	0.180***	0.275***	0.244***	0.267***	0.326***	0.301**
	(-2.022)	(-1.617)	(-1.898)	(3.389)	(5.396)	(3.950)	(2.864)	(2.756)	(2.440)
Small-Minus-Big Return		0.212*	0.233*		0.099	0.118		0.235	0.249
		(1.748)	(1.905)		(1.332)	(1.440)		(1.192)	(1.228)
High-Minus-Low Return		0.189	0.167		0.353***	0.334***		0.332**	0.317**
		(1.430)	(1.252)		(4.031)	(3.890)		(2.003)	(2.058)
Momentum Factor			-0.078			-0.067			-0.053
			(-0.895)			(-1.124)			(-0.544)
Alpha	-0.001	-0.002	-0.002	-0.001	-0.003	-0.002	0.002	-0.000	0.000
	(-0.270)	(-0.712)	(-0.440)	(-0.494)	(-1.094)	(-0.861)	(0.366)	(-0.066)	(0.047)
Observations (months)	132	132	132	132	132	132	132	132	132
R-squared	0.045	0.091	0.102	0.077	0.203	0.216	0.060	0.107	0.110