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Environmental Disclosure: Evidence From *Newsweek*'s Green Companies Rankings

Thomas P. Lyon[1] and Jay P. Shimshack[2]

Abstract

Corporate-level environmental information disclosure is increasingly common. This article studies the impact of a prominent media-generated sustainability ratings program, *Newsweek*'s 2009 ranking of the 500 largest U.S. firms. Using an event study methodology, the authors find the rankings had a significant impact on shareholder value. Firms in the top 100 experienced abnormal returns after the information release that were 0.6%–1.0% higher than returns of firms in the bottom 400. The form of the information released had significant effects as well. Nuanced environmental score variables had no independent impact on market outcomes; only the final ranking mattered. This article also explores possible channels through which the rankings may have had their impact. The authors find suggestive evidence that private and public politics mechanisms were the most important.

Keywords

disclosure, environmental information, sustainability rankings, event study

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Environmental disclosure schemes are proliferating rapidly. Information programs now include pollution inventories such as the U.S. Toxics Release Inventory and state-level carbon reporting rules; external firm-level environmental performance ratings such as Greenpeace's company scorecards and India's Green Ratings Program; and ecolabels like the USDA Organic certification and the DOE's EnergyStar label. Despite their significant recent expansion, the effects of environmental transparency programs on business, public policy, and society remain controversial (Fung, Graham, & Weil, 2007; Tietenberg, 1998).

This article helps address these gaps by examining the impact of *Newsweek* magazine's 2009 Greenest Companies ratings on financial market outcomes. The specific setting is of interest for at least two reasons. First, the 2009 *Newsweek* rankings were the first large-scale environmental assessment created by a media organization in the United States. All of the 500 largest U.S. companies were evaluated, *Newsweek* is a household name, and the findings were disseminated widely. Rankings by media organizations may be different from rankings by governments, nongovernmental organizations (NGOs), or voluntary consortia. Second, while the data underlying the performance ratings were high-quality, they were already widely available to investors with an interest in corporate environmental responsibility. So, even with significant publicity, it was not clear a priori whether the rankings would constitute news to the stock market itself.

This article makes three contributions. First, the authors use a financial event analysis to examine the stock market impacts of *Newsweek*'s corporate environmental rankings. While concerns about self-selection and self-reporting arise in many related studies, the rated firms in our context did not have the choice to opt in or opt out of the strictly external evaluation. This article's event also had a sharply defined starting time, so we have an unusually clean setting for a capital market event study. Second, we go beyond the direct impact of the ratings to explore how the specific information format affected market outcomes. Unlike many studies that evaluated single metric information releases, our setting allows us to investigate which specific environmental ratings affected markets and which specific environmental ratings did not. Third, we explore the possible channels linking corporate-level environmental information to financial outcomes. These underlying mechanisms are very poorly understood in the existing literature, and we know of no other empirical study that systematically considers all of the major possible channels in a single setting.

The authors find that the 2009 *Newsweek* rankings had a substantial impact. Highly rated firms had abnormal returns following the disclosure

event that were 0.6%–1.0% higher than the returns of firms rated poorly. We also find that the form of the information disclosed mattered a great deal. Only the aggregate 1–500 rankings mattered; more nuanced individual metrics like overall green score, environmental impact score, or environmental policy score had no independent market impact. Finally, we find suggestive, but not definitive, evidence that private politics (activist pressure) and public politics (regulator pressure) channels provide the most compelling link between the *Newsweek* rankings and observed financial market outcomes. While our channel explorations do not necessarily shed light on mechanisms driving other information settings, our analysis does provide a roadmap for future research in the area.

Background

In this section, the authors provide context for this study. We first describe the nature of the *Newsweek* rankings and the publicity the rankings received. We then discuss the novelty of the information and the implications for our research strategy.

The Newsweek Rankings

On Monday, September 21, 2009, *Newsweek* magazine released an issue with a distinctive green cover and the headline "The Greenest Big Companies in America: An Exclusive Ranking."[1] The cover story evaluated the environmental performance of the 500 largest U.S. companies by revenue, market capitalization, and number of employees. According to the magazine, "this is the first time a media organization ranked companies in this way. Most green lists are anecdotal—ours is the result of a massive database research project."

An independent advisory panel of academics, environmental NGO representatives, and media partners oversaw a rankings process. Each company's ranking was based on a 0–100 overall green score composed of three separate factors: (a) environmental impact, which was computed using data provided by the private environmental accounting firm Trucost; (b) a green policies score, which was based on "environmental strength" measures developed by the social investment firm KLD Research and Analytics; and (c) a reputation score, which was calculated from CorporateRegister.com surveys of corporate social responsibility professionals, academics, environmental experts, and industry executives. Environmental impact scores were meant to measure factors like greenhouse gas emissions, water use, solid waste disposal,

conventional air pollution, and toxic releases, all calculated per dollar of revenue. Green policy scores were designed to capture proactive environmental management, climate change policies and performance, pollution policies and performance, and product impacts relative to others within the same industry. Reputation scores were developed to reflect perceptions about whether the firm was a leader or laggard within its sector on environmental performance, commitment, and communications. The three component scores were standardized and averaged into an overall green score using weights of 45% environmental impact, 45% green policies, and 10% reputation. Sector-neutral scores based on reputation and internal policies were deliberately given greater total weight than environmental impact to help facilitate meaningful comparisons across industries. The final weighted average overall green score determined the 1-500 performance ranking. For illustration, Table 1 replicates rankings and scores for the top 10 and the bottom 10 firms.

For the top 100 firms, the print edition reported ranking, overall green score, environmental impact score, green policies score, and reputation score. For these firms, the ranking itself received the most prominent attention. For firms ranked 101–500, the print edition reported ranking and overall green score. The online edition reported all ratings for all firms, including environmental impact score, policies score, and reputation score. However, even online, rankings were highlighted relative to other metrics. The importance of rank was reinforced in the text, as the article referred to "No. 4 Intel," "No. 59 Walmart," and so on.

The article implied that the top 100 firms were particularly notable performers. As noted, the print edition provided greater score detail for the top 100. Furthermore, the article stated that "many of the companies that finished in our top 100 are recognized leaders in sustainability."

Publication, Coverage, and Publicity

Newsweek's "Greenest Big Companies in America" issue arrived on newsstands and was published online on Monday, September 21, 2009. At this time, the magazine's circulation was approximately 1.97 million. The authors are unable to obtain the exact number of page views for the Internet version of the story. However, we are able to use Google Trends to approximate the frequency of Internet searches related to the *Newsweek* rankings around the time of the story. During the week of September 20–26 (the event week), Google searches for "Newsweek and green" were 122 times the average volume from January 2004 to December 2009. For the week of September 27 to October 3 (the week after the event), searches were 119 times the average

Table 1. Sample *Newsweek* Rankings: Top 10 and Bottom 10

Rank	Company	Industry sector	Overall green score	Environmental impact score	Green policies score	Reputation survey score
1	Hewlett-Packard	Technology	100.00	64.80	97.90	88.44
2	Dell	Technology	98.87	67.70	100.00	70.80
3	Johnson & Johnson	Pharmaceuticals	98.56	56.70	98.17	75.88
4	Intel	Technology	95.12	46.70	87.87	81.86
5	IBM	Technology	94.08	76.90	84.20	77.56
6	State Street	Financial services	93.62	95.00	84.39	70.69
7	Nike	Consumer products, cars	93.28	77.10	78.31	89.90
8	Bristol Meyers Squibb	Pharmaceuticals	92.62	27.80	88.52	64.73
9	Applied Materials	Technology	91.79	50.90	89.51	44.51
10	Starbucks	Media, travel, leisure	91.63	30.50	82.01	75.42
490	Duke Energy	Utilities	44.91	1.60	48.32	58.59
491	First Energy	Utilities	43.15	2.40	16.89	32.46
492	Southern	Utilities	36.54	1.40	43.06	23.76
493	Bunge	Food and beverage	33.96	2.20	3.95	21.11
494	American Elec. Power	Utilities	33.17	1.00	29.48	47.68
495	Ameren	Utilities	31.63	1.20	28.05	31.34
496	Consol Energy	Basic materials	28.65	1.80	4.59	44.71
498	Allegheny Energy	Utilities	25.04	0.60	42.11	24.23
499	NRG Energy	Utilities	22.75	0.80	15.49	29.72
500	Peabody Energy	Basic materials	1.00	0.20	16.12	42.26

Notes: ConAgra was originally ranked 497 in the print edition, but this was due to a calculation error. The rank was subsequently changed online. We omit this firm from all analyses.

volume. For the week of October 4 to 10 (2 weeks after the event), searches were 86 times average volume. Google Trends uncovered no abnormal search volume for any other week. These results suggest that the public

responded to the *Newsweek* story by seeking more information about the rankings online.

In addition to *Newsweek*'s own print and online circulation, the story received substantial follow-up coverage in other media outlets. Blogs and trade outlets gave the story considerable attention beginning late Monday, September 21 and lasting through Friday, September 25. Larger media outlets, including the *Wall Street Journal*, CNN, and MSN, carried the story throughout the week as well. However, most of the large media outlet coverage appeared later in the week, beginning on Wednesday. Local media continued to carry the story into the following week.

While the *Newsweek* article itself suggested that the Top 100 firms in its ranking were environmental leaders, the broader media took many different approaches to covering the story. A particularly common form of coverage listed the overall top 5 to 20 companies by name. Another common strategy was to choose an industry and discuss best and worst performers from that industry. A small number of stories listed the overall worst performers. Like *Newsweek*'s own treatment, nearly all external coverage focused on performance rank only.

The Novelty of the Information

Searches on Lexis-Nexis, Google News, Google, and Factiva found no web or media coverage of *Newsweek* rankings prior to the September 21, 2009 publication date. Google Trends identified no significant Internet search volume spikes for "Newsweek and green" or "Newsweek and environment" prior to September 21. This absence of spikes suggests that it is very unlikely that our event was significantly anticipated. Lack of public discussion prior to the story is perhaps not surprising, as the magazine had incentives to maximize impact by preventing leakage.

Nevertheless, it is surely true that at least some, and perhaps much, of the information underpinning the ratings was known to select market participants ahead of time. At least a subset of highly motivated investors formed their own expectations about individual companies' environmental performance prior to September 21, 2009. This inference is especially likely because *Newsweek*'s scores mostly reflected Trucost and KLD data that could have been obtained prior to publication. Of course, overall corporate environmental performance information is extremely complex (Chatterji, Levine, & Toffel, 2009), and even well-informed investors may have updated their own beliefs after seeing this prominent new aggregation.

More importantly, environmental performance rankings would be potentially novel to markets even if every individual investor was already fully aware of the information. As long as investors believed that the environmental information would be considered novel to *some* stakeholders, the information release might cause investors to revise their expectations about companies' environmental opportunities and challenges. For example, if some investors believed that consumers would respond to the highly public *Newsweek* rankings, those investors would adjust their beliefs about the present value of the firm's profitability. In short, stock prices may be expected to change even if investors themselves were fully informed about the information content.

Literature Review and Conceptual Framework

In this section, the authors discuss their empirical investigations and their relationship to the scholarly literature. We first consider the potential for the *Newsweek* rankings to affect market outcomes. We then explore the role of the specific information format. Finally, we investigate the possible mechanisms linking environmental disclosure to market outcomes.

The Impact of Environmental Information

A growing empirical literature studies the effects of mandatory environmental information disclosure programs. One strand of this work links external environmental information disclosure to changes in environmental outcomes and risks (Bennear & Olmstead, 2008; Blackman, Afsah, & Ratunanda, 2004; Blackman & Rivera, 2010; Chatterji & Toffel, 2010; Delmas, Montes-Sancho, & Shimshack, 2010; García, Afsah, & Sterner, 2007; García, Sterner, & Afsah, 2009; Shimshack, Ward, & Beatty, 2007). The collective conclusion is that environmental information can influence behavioral and environmental outcomes, although responses to specific programs are often nuanced.

Other research explores financial market responses to specific environmental events. Here, evidence suggests that stock markets tend to respond to environmental information by punishing firms with poor environmental records (Beatty & Shimshack, 2010; Gupta & Goldar, 2005; Hamilton, 1995; Khanna, Quimio, & Bojilova, 1998; Konar & Cohen, 1996; Laplante & Lanoie, 1994). Evidence on the market response to positive environmental news is less readily available, and generally more ambiguous. In some cases,

stock markets reward exemplary performance (Dasgupta, Laplante, & Mamingi, 2001; King & Lenox, 2001; Klassen & McLaughlin, 1996). In others cases, good performers seem to receive no abnormal returns (Beatty & Shimshack, 2010) or even experience negative returns (Cañón-de-Francia & Garcés-Ayerbe, 2009; Lyon, Lu, Shi, & Yin, 2011). A neutral response may also occur if external parties cannot distinguish "greenwash" (Lyon & Maxwell, 2011) or "symbolic action" (Delmas & Montes-Sancho, 2010; Westphal & Zajac, 1994) from substantive action.

Additional studies consider the importance of corporate reputation factors for firm-level outcomes. Such factors include being a good corporate citizen, a most admired company, a good place to work, or a good place for working mothers (Brammer, Brooks, & Pavelin, 2009; Brown, 1998; Diermeier, 2011; Filbeck & Preece, 2003; Fombrun, 1996; Fulmer, Gerhart, & Scott, 2003; Hannon & Milkovich, 1996; Jones, Jones, & Little, 2000). Findings in this line of work are mixed (Filbeck & Preece, 2003). However, there is some evidence that firms rated as good corporate citizens or good places to work may earn higher returns (Brammer et al., 2009; Filbeck & Preece, 2003; Fulmer et al., 2003; Hannon & Milkovich, 1996). Well-regarded companies may also be buffered against market downturns (Jones et al., 2000).[2]

In sum, a diverse literature suggests that external environmental information may influence firms' financial market performance, and that highly rated firms may experience positive market returns relative to poorly rated firms. However, we do not know a priori if this will be the case with the *Newsweek* ratings as (a) results from the literature vary substantially across specific contexts, (b) the *Newsweek* ratings were the first large-scale environmental assessment by a media organization, and (c) the *Newsweek* rankings were based on data that were largely available to motivated investors. Thus, our core empirical analyses will test a null hypothesis of no difference in market performance for firms rated highly by *Newsweek* and firms rated poorly by *Newsweek* against an alternative hypothesis of significant differences in market performance for firms rated highly by *Newsweek* and firms rated poorly by *Newsweek*.

The Form of Information Disclosure

An emerging literature explores how the form of disclosure affects its impact. In a review of numerous disclosure schemes, Fung et al. (2007) determined that transparency is most effective when disclosed information is clear and standardized. They also found that disclosure is most effective when the information is relevant to users' decisions and embedded in the decision-making process. More recent research suggests that environmental information has more impact when it is processed into a simple and readily

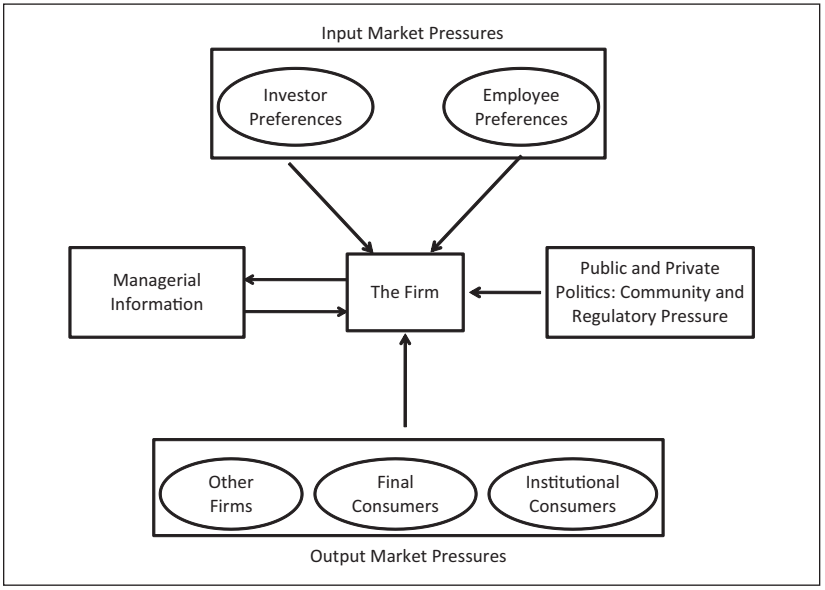

Figure 1. Environmental information: channels of influence

interpreted form (Bae, Wilcoxen, & Popp, 2010). Some studies suggest that disclosure is most effective when it uses ratings categories that appropriately reflect underlying performance differences (Heinzle & Wüstenhagen, 2010).

As discussed, *Newsweek* rankings were simpler and more readily interpretable than the overall green scores that they were based on. Furthermore, the rankings were substantially more standardized and readily embedded in the decision-making process than the component environmental impact score, green policies score, and reputation score. Thus, our supplemental empirical analyses will explore whether overall green score, environmental impact score, green policies score, or reputation score had any independent influence on the relationship between *Newsweek* ratings and financial market performance (after controlling for the interpretable and prominent ranking metric).

Mechanisms Linking Environmental Information to Financial Outcomes

Several scholarly papers examine the channels potentially linking disclosure and outcomes (Powers, Blackman, Lyon, & Narain, 2011; Tietenberg, 1998). While this literature is unsettled, we summarize the main mechanisms in Figure 1. Major channels may include (a) input market pressures, (b) output

market pressures, (c) public politics (regulator pressures) and private politics (activist pressures), and (d) managerial information channels.[3]

One input market mechanism linking environmental and financial performance is investor preferences. If investors have "green" preferences, capital markets may reward those disclosed as good environmental performers and penalize those disclosed as poor environmental performers. Limited survey evidence does suggest that corporate reputation may influence self-reported investor loyalty and satisfaction (Helm, 2007).

However, event studies showing that stock markets respond to environmental news are not necessarily evidence that investors have preferences for positive environmental performance. An alternative argument is that wealth-maximizing investors update their beliefs about how *other* mechanisms respond to disclosed environmental information. The number of investors with green preferences may be too small to move stock prices significantly. Indeed, the related literature detects no significant financial market impact when small groups of investors publicly announce stock divestitures for social purposes; other investors appear immediately willing to buy divested stocks (Davidson, Worrell, & El-Jelly, 1995).

Another possible input market channel is employee preferences. Business ethics researchers find positive associations between companies' social responsibility ratings and students' self-reported opinions of employment attractiveness (Albinger & Freeman, 2000; Backhaus, Stone, & Heiner, 2002; Turban & Greening, 1996). Investors may believe that publicly identified good environmental performers may be able to attract and retain better and more loyal employees. However, if employee preferences for social responsibility drive financial outcomes on a large scale, socially oriented firms should be able to hire and retain employees at lower wages than less socially oriented firms. The empirical labor economics literature finds little evidence in support of this "donated labor" hypothesis (Frye, Nelling, & Webb, 2006; Goddeeris, 1988; Leete, 2001; Ruhm & Borkoski, 2003). Employees at socially responsible firms are indeed paid lower observable wages on average, but the evidence to date suggests that wage differences disappear once worker, job, and basic workplace characteristics beyond corporate environmental or social performance are included in empirical models.

Firms disclosed as good environmental performers may also attract and retain customers with preferences for environmentally differentiated products or companies. In this output market channel, investors may believe that publicly identified good environmental performers may be more profitable in the future. Indeed, emerging empirical evidence indicates that environmental performance is increasingly important to firms' institutional and business

customers (Vandenbergh, 2006-2007). When a major retailer like Walmart decides it can reduce waste, help the environment, and improve profitability simultaneously, the pursuit of such "win/win" outcomes can be a powerful driver of business behavior. A related possibility is that final consumers may be a source of output market pressure. Large marketing and environmental economics literatures find that social performance influences consumers' product perceptions, consumers' product responses, and consumers' willingness to pay (e.g., Eichholtz, Kok, & Quigley, 2011; Loureiro & Lotade, 2005; Roe, Teisl, Levy, & Russell, 2001). The rapidly growing number of "green claims" made on product packaging suggests that companies believe at least some final consumers prefer green products.[4]

Firm-level environmental ratings information may also affect expected firm profitability through public and private politics channels. Firms with disclosed good environmental performance may experience reduced "public politics" pressures from regulators. A growing literature finds that firms respond strongly to current government oversight and to the perceived threat of future government actions (Gray & Shimshack, 2011). Innes and Sam (2008) find that facilities with good environmental performance in any given period are rewarded with fewer inspections in future periods, and Decker (2003) finds that facilities with good environmental performance may receive environmental permits for new facilities more quickly. Similarly, firms with disclosed good environmental performance may experience reduced "private politics" pressures from activists. A growing literature indicates that environmental NGOs have significant impacts on corporate environmental behavior (Baron & Diermeier, 2007; Eesley & Lenox, 2006; Feddersen & Gilligan, 2001; Gupta & Innes, 2009; Innes, 2006). Protests, boycotts, letter writing campaigns, proxy votes, or even citizen suits may become more legitimate and urgent in the presence of disclosed poor environmental performance.

A final possible mechanism linking disclosure and financial market outcomes is that environmental ratings provide information about managerial ability. Environmental disclosure may inform investors about general managerial ability, as environmental performance may proxy for overall managerial ability. In this case, investors may believe that publicly identified good environmental performers may be more profitable in the future. An alternative argument is that disclosure may inform firm managers themselves about areas for improvement. Blackman et al. (2004) and Powers et al. (2011) find evidence to support this notion in Indonesia and India, respectively. In this case, investors may believe that publicly identified poor environmental performers may be more profitable in the future, as the external ratings have highlighted correctable production inefficiencies.

These four different channels—input market pressures, output market pressures, public and private politics pressures, and managerial information—each yield distinct empirical implications. First, input market channels are especially likely to link environmental disclosure and financial market outcomes when and where the disclosed information is most novel. Disclosure is less likely to affect market outcomes via investor preference channels if investors already know which firms are "green." Second, output market channels are especially likely to link environmental disclosure and financial market outcomes for companies with high consumer orientation. Disclosure is less likely to affect market outcomes via final consumer channels for companies that do not sell to final consumers. Third, public and private politics channels are especially likely to link environmental disclosure and financial market outcomes for companies that are especially likely to be targeted by regulator and activist actions. Disclosure is less likely to affect market outcomes via regulator and activist channels for companies that are rarely targets of inspections, boycotts, and letter writing campaigns. Fourth, if environmental disclosure signals general management ability, managerial information channels are especially likely to link environmental disclosure and financial market outcomes for companies that are not already perceived as having strong management. Disclosure is less likely to affect market outcomes via managerial information channels for companies that are already suspected of having strong management teams. In contrast, if environmental disclosure signals correctable production inefficiencies, managerial information channels imply that poorly ranked firms should experience greater financial returns after the information release relative to highly ranked firms. In this case, disclosure signals "win/win" opportunities for improvement that will enhance future profitability of poor performers.

The supplemental empirical analyses will therefore explore the empirical implications discussed in the preceding paragraph. As with other papers in the literature, we will be unable to definitively determine the mechanism(s) linking our information event and subsequent market outcomes. Nevertheless, we believe our novel channel explorations will shed light on the likely relative importance of alternative channels in our context and will provide a starting point for future disclosure channel explorations.

Data

Our primary goal is to understand the determinants of market responses to *Newsweek*'s green ratings. Consequently, we match environmental ranking and score data with financial market data at the company level. We use

performance rankings and scores from *Newsweek* and Newsweek.com's 2009 "Greenest Big Companies in America" story. We use historical New York Stock Exchange (NYSE) and National Association of Securities Dealers Automated Quotations (NASDAQ) daily stock data obtained from Google Finance. We use firm characteristics data from the CompuStat financial database, including size as measured by sales, earnings per share, advertising expenditures per dollar of sales, and Tobin's Q.[5] Standard & Poor's 500 (S&P500) index returns data come from Google Finance and Wilshire index returns data come from Wilshire.com.

The final sample includes 492 of the 500 originally rated firms. We omit one firm because its score was incorrectly reported in print but corrected online. We omit seven other firms because of incomplete or potentially inaccurate stock market data, most often because the company was acquired during our sample period.[6] The remaining 492 firms have complete market returns data for the entire sample period.

Adjusted daily closing prices for each security and our two market indices are directly observed. To control for firm scale across securities, we follow convention and use daily returns as the basic unit of analysis. Logarithmic returns represent gains (losses) of the current day's adjusted close price relative to the previous adjusted close prices. Returns are expressed as percentages and are calculated as $\log(\text{close}_t / \text{close}_{t-1})$.[7]

The sample period begins one full year before the September 21, 2009 *Newsweek* story. Our "estimation window," or the pre-event calibration time frame, spans the 251 trading days between Monday, September 22, 2008 and Friday, September 18, 2009. We chose one full year to maintain day-of-week, week-of-month, and month-of-year balance throughout the estimation window. The "event window," or the period of expected information impact, begins following the information release and continues for several trading days. In our main analysis, the event window begins the first possible trading day after publication and dissemination of the *Newsweek* story (Tuesday, September 22, 2009) and continues through the end of the trading week (Friday, September 24, 2009).[8]

Industry-Specific Summary Statistics

Table 2 presents summary statistics for the full sample and by industry. We use *Newsweek* and Newsweek.com's exact sector designations, which are based on the Dow Jones Industry Classification Benchmark. As expected, the mean rank for the full sample is 250 and 20% of firms in the full sample are ranked in the top 100. The mean overall green score is 70.5 points out of

Table 2. Industry-Specific Summary Statistics

Industry sector	No. of firms	Mean rank	% in top 100	Score	Sales (billion US$)	Earnings per share (US$)	Tobin Q	Advertising expense per dollar of sales
Full sample	492	250.4	20	70.5	19.209	1.69	1.57	0.03
Banks and insurance	36	211.0	22	73.2	21.198	–0.47	1.06	0.01
Basic materials	28	295.4	7	65.3	12.599	2.08	1.47	n/a
Consumer products, cars	29	223.8	28	73.0	16.651	0.65	1.73	0.06
Financial services	29	195.9	24	73.8	9.851	1.64	1.55	0.03
Food and beverages	26	274.0	23	67.6	18.147	2.17	1.87	0.04
General industrials	28	227.7	25	71.8	15.563	1.77	1.41	n/a
Health care	27	331.6	11	67.2	16.068	2.79	1.81	0.00
Industrial goods	45	246.6	20	71.1	10.313	2.33	1.65	0.01
Media, travel, leisure	35	235.1	23	71.5	12.570	–0.45	1.47	0.03
Oil and gas	31	294.6	3	69.0	47.399	3.86	1.30	n/a
Pharmaceuticals	16	197.5	38	74.8	16.022	1.63	2.48	0.04
Retail	52	186.4	23	73.8	32.140	1.16	1.60	0.03
Technology	52	216.0	35	74.6	20.370	1.44	1.77	0.02
Transportation, aerospace	21	284.0	14	69.5	22.082	3.91	1.84	n/a
Utilities	37	383.9	3	58.1	10.837	2.48	1.12	n/a

Notes: n/a means not available.

a possible 100. Mean company characteristics for fiscal year 2008 were US$19.2 billion in sales, US$1.69 in earnings per share, and US$0.03 in advertising expenditures per dollar of sales. The average Tobin's Q was 1.57.

The combined results of Tables 1 and 2 suggest that final rankings do not appear to be sector-neutral, even though overall green scores were designed with disproportionate weight attached to sector-neutral metrics. Firms in the retail, financial services, pharmaceuticals, banks and insurance, technology, and consumer product sectors received favorable performance ratings on average. Technology companies were overrepresented in the top 10. Firms in the utilities, health care, basic materials, and oil and gas sectors received unfavorable performance ratings on average. Utilities were overrepresented in the bottom 10.

Table 2 also demonstrates that firm characteristics differed substantially by industry. On average, oil/gas and retail companies were large and financial services, industrial goods, and utility companies were comparatively

Table 3. Performance Rating Correlation Matrix

	Rank	Top 100 rank	Overall green score	Environmental impact score	Green policies score	Reputation survey score
Rank	1.00		—	—	—	—
Top 100 rank	–0.70**	1.00				
Overall green score	–0.88**	0.62**	1.00	—	—	—
Environmental impact score	–0.19**	0.09*	0.28**	1.00	—	—
Green policies score	–0.87**	0.69**	0.77**	–0.10**	1.00	—
Reputation survey score	–0.48**	0.51**	0.43**	–0.09*	0.46**	1.00

Note: * and ** indicate statistically significant pairwise comparisons at the 10% and 5% significant levels, respectively.

small. Transportation and oil/gas firms had high earnings per share while banks/insurance and media/travel/leisure firms experienced net losses, on average. Pharmaceutical and food/beverage companies had relatively high Tobin's Q measures and consumer products/car companies had relatively high advertising expenditures per dollar of sales.

Performance Rating Correlations

As noted earlier, environmental rankings were based on overall green scores that were calculated as the weighted average of environmental impact scores, green policy scores, and reputation scores. The final rankings received the vast majority of attention in the *Newsweek* text and in the broader media coverage, and the print edition only presented rankings and overall green scores for firms ranked outside of the top 100. However, component metrics were presented online for all firms. Table 3 presents a performance rating correlation matrix for all metrics.

We note several features of Table 3. As expected, overall rank is very strongly negatively correlated with the overall green score and top 100 rank is very strongly positively correlated with the overall green score. Similarly, many of the individual metrics determining the overall green score are highly collinear. The overall green score, the green policies score, and the reputation survey score are strongly positively correlated with one another. However,

the environmental impact score is negatively, albeit weakly, correlated with other metrics. A potential implication is that the environmental impact score may be expected to contain somewhat different information than the other metrics, and therefore this score may be the most likely to influence returns independently of overall rank or overall green score.

Basic Empirical Approach

This study's methodological point of departure is the financial event study literature as originally developed in Ball and Brown (1968) and Fama, Fisher, Jensen, and Roll (1969) and summarized in MacKinlay (1997). To abstract away from general market influences, we use a market model to compute abnormal returns. Abnormal returns reflect the difference between observed returns for a given security on a given day and predicted returns for the same security on the same day. Predicted returns are based on the performance of the overall market. Our main analysis then examines the determinants of these abnormal returns during the event window. Most notably, we explore the relationship between *Newsweek* environmental performance ratings and abnormal returns for a several-day period following the information release.

The Market Model

Our first empirical step is to relate individual companies' returns to overall market returns. For each firm, we regress the company's daily stock returns on daily returns for the market as a whole. Note that running separate regressions for each firm implies that time-invariant unobserved firm heterogeneity cannot bias estimated relationships between individual company returns and overall market returns. We perform this analysis for the pre-event estimation window only because we wish to identify co-movement between the individual stock's returns and market returns absent the impact of the event. More formally, for each rated company i and day t of the 251 trading day pre-event estimation window, we relate return $R_{i,t}$ on day t to overall market return $R_{m,t}$:

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + u_{i,t} \quad (1)$$

where $u_{i,t}$ is a mean zero, finite error term. β is the coefficient relating firm-specific returns to the returns of the market as a whole, and corresponds to the well-known β parameter from finance's portfolio theory. As always, it

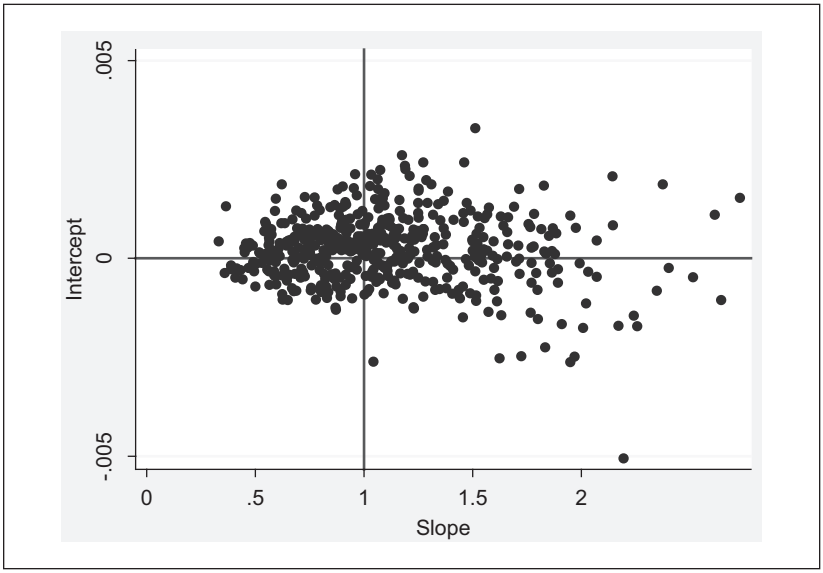

Figure 2. Market model results summary

is a function of firm-specific volatility, market volatility, and the correlation of firm and market returns.

Our main analysis uses the S&P500 index as our market returns measure $R_{m,t}$. This index contains large cap stocks traded on both NYSE and NASDAQ markets. Our 492 rated companies are the largest firms by revenue, so they overlap significantly with S&P500 firms. The advantage of the S&P500 index for market model purposes is that index returns have high predictive power for the returns of individual securities in our sample.[9]

Figure 2 summarizes each of the firm-specific market model results in more detail. If a given stock tracked the S&P500 market index perfectly, its intercept coefficient would be zero and its slope coefficient would be one. Across all sample companies, the average regression intercept was 0.0002 and the average regression slope coefficient was 1.11. The mean intercept was statistically indistinguishable from zero, and all 492 individually estimated intercepts were statistically indistinguishable from zero as well. In other words, if the market index experienced zero returns on a given day, our sample firms experienced zero returns on that same day on average. The mean slope coefficient was statistically different from zero, and all 492 individually estimated slope coefficients were statistically different from zero as

well. If the market index closed up (down) 1% on a given day, on average our sample firms closed up (down) 1.11% on that same day. The 274 firms with slope coefficients above one had magnified movements relative to the market as a whole, and the 218 firms with slope coefficients below one had dampened movements relative to the market as a whole.[10]

Abnormal Returns and Cumulative Abnormal Returns

Our second empirical step is to use the market model results to generate abnormal returns for individual securities. The market models represented by Equation (1) and summarized in Figure 1 describe the typical relationship between a given security and the market as a whole during the pre-event estimation window. Predictions from these models can be used to calculate expected daily returns for a given security on a given day based upon the performance of the S&P500 index on that same day. For any rated firm *i* during the entire sample period (including both the estimation and event windows), *expected* returns $E(R_{i,t}|R_{m,t})$ on day *t* are

$$E\left(R_{i,t} \mid R_{m,t}\right) = \hat{\alpha}_i + \hat{\beta}_i R_{m,t} \tag{2}$$

Given expected returns, abnormal returns are the difference between the observed return, $R_{i,t}$, and the predicted return for that day, $E(R_{i,t}|R_{m,t})$. More formally, for any rated firm *i, abnormal* returns $AR_{i,t}$ on day *t* are

$$AR_{i,t} = R_{i,t} - E\left(R_{i,t} \mid R_{m,t}\right) = R_{i,t} - \hat{\alpha}_i \quad -\hat{\beta}_i R_{m,t} \tag{3}$$

For example, suppose the S&P500 was up 1% on a given day. Our market model results suggest that we would predict Apple, Inc. to be up 0.90% that same day. If Apple were actually up 0.95%, its abnormal return for that day would be 0.05% (0.95 – 0.90).

The standard approach to explaining abnormal returns over multiple days in an event window is to aggregate abnormal returns across days to obtain *cumulative* abnormal returns. For example, cumulative abnormal returns might represent the total abnormal returns over an event period spanning the first day following the information release to the last day of the trading week. For a given security, cumulative abnormal returns across days are calculated by simple summation. For an event occurring on day *t*, cumulative abnormal returns calculated over *d* subsequent event window days can be expressed as

$$CAR_{i,d} = \sum_{k=t+1}^{t+d} AR_{i,k} \tag{4}$$

Statistical Concerns: Event Date Clustering and Cross-Sectional Dependence

A natural concern with the traditional event study methodology in our context is event date clustering. Event time and calendar time exactly coincide for all analyzed firms. In other words, the information event potentially affected all of the 492 largest companies on the same days. This clustering poses two potential problems. First, the market measure $R_{m,t}$ may be endogenously influenced by the information event. The 492 large firms in our sample significantly overlap with the 500 large firms in the S&P500 index, so the market index used to predict returns during the event window is not strictly exogenous on these days.[11] One might mitigate the endogenous index difficulty by using a market index that contains none of the rated firms (like the Wilshire4500 small and mid cap index). However, there is some question whether such an index is an appropriate benchmark, as its firms are smaller than those in the S&P500. In addition, the cross-sectional independence assumptions necessary to accurately calculate traditional event study test statistics will still be violated with significant event date clustering. This is a particularly important concern when the sample contains nearly all of the market's large firms, as our sample does. Collins and Dent (1984) and Sefcik and Thompson (1986) demonstrated with analytical and simulation exercises that magnitudes of errors in inference can be large when sample size is large.

It is therefore not possible to infer whether a given firm, or a given set of firms, experienced statistically and practically significant net positive or negative abnormal returns in response to the *Newsweek* ratings event. Thus, our empirical analysis explores differences in abnormal returns between good and bad environmental performers rather than the simple presence of positive or negative abnormal returns (the simplest event study approach). Estimation details are presented in the next subsection, but the key point here is that *our empirical results are appropriately interpreted in a relative sense*. We will test, for example, if highly rated firms experienced significantly higher cumulative abnormal returns during the event window than poorly rated firms. We will not test if this difference represents rewards to good performers or penalties to poor performers (or both).[12]

Determinants of Cumulative Abnormal Returns

To investigate the determinants of abnormal returns during the event window, we regress cumulative abnormal returns during the event window (calculated as described above) on *Newsweek*'s environmental performance

ratings. Our simplest regression specification, for all rated firms *i,* can be written as follows:

$$CAR_i = \alpha + \beta RATING_i + \varepsilon_i \quad (5)$$

where *CAR* are cumulative abnormal returns, α and β are coefficients, and ε are the usual idiosyncratic error terms. All firms are weighted equally. *RATING* may refer to the firm's 1–500 overall environmental performance ranking or may represent a 0/1 dummy variable indicating if the firm is ranked among the top 100 performers. Recall that the *Newsweek* article singles out the top 100 firms as leaders in sustainability. β is the coefficient of most direct interest, and it now represents the average impact of a one unit increase in the rating on cumulative abnormal returns during the event window.[13]

Tables 1 and 2 demonstrated that ratings may be strongly correlated with industrial sector. We therefore augment regressions of the form of Equation (5) with additional specifications that include industry fixed effects. For firm *i* in industry *j*, the extended specifications can be written as follows:

$$CAR_{ij} = \alpha + \theta_j + \beta RATING_{ij} + \varepsilon_{ij} \quad (6)$$

As there are 15 industries, regressions include 14 industry fixed effects represented by the vector θ_j.

Environmental performance ratings may also be correlated with firm-level characteristics beyond industrial sector. We therefore estimate specifications of the form of Equation (6) that also include firm size as measured by sales revenue, profitability as measured by earnings per share, and market value relative to book value as measured by Tobin's Q.[14] For covariate and parameter vectors *X* and Γ, these specifications are

$$CAR_{ij} = \alpha + \theta_j + \beta RATING_{ij} + X_{ij}\Gamma + \varepsilon_{ij} \quad (7)$$

Finally, we supplement regressions of the form of Equation (7) with specifications that group *Newsweek* rankings into five categories: (a) ranking in the top 100, (b) ranking between 101 and 200, (c) ranking between 201 and 300, (d) ranking between 301 and 400, and (e) ranking between 401 and 500. In regressions with categorical ranking variables, we must omit a category to avoid the perfect collinearity problem typically referred to as the *dummy variable trap*. We omit category (c), so that all other coefficients are interpreted relative to this middle-of-the-pack group. We test null hypotheses of

no difference between categories against alternative hypotheses that good performers exhibit higher cumulative abnormal returns than middle-of-the-pack performers and that poor performers exhibit lower cumulative abnormal returns than middle-of-the-pack performers.

Basic Results

In this section, we report our main empirical findings. We start with a discussion of the relationships between *Newsweek* green ratings and cumulative abnormal returns. We also examine whether the results are driven by industrial sector heterogeneity or firm-level characteristics. We then conduct a number of sensitivity analyses to establish robustness.

The Relationship Between Performance Ratings and Cumulative Abnormal Returns

Table 4 presents our main regression results, with findings presented for two different event window lengths per specification. Standard errors are presented in parentheses below coefficient estimates. Robust (heteroskedastic consistent) standard errors are systematically smaller than presented standard errors, so statistical inference is conservative. For presentation purposes, all coefficients and standard errors are scaled by a factor of 100, such that a coefficient of 1.00 represents a 1% increase in cumulative abnormal returns over the event window. Before turning to our main results, we note that F statistics suggest our independent variables explain significant portions of the variability in cumulative abnormal returns during the event window.

Results from specifications (1a) and (1b) indicate that rank coefficients are significantly negative. Cumulative abnormal returns after the information release are a decreasing function of *Newsweek* ranking. Results from specifications (2a), (2b), (3a), and (3b) demonstrate that significant negative coefficients are highly robust to conditioning on industry and other covariates. Point estimates and standard errors remain largely unchanged. Most firm-level control variables are not statistically significant, suggesting that cumulative abnormal returns during the event window are not correlated with most firm-level characteristics after controlling for industry. Profitability, as measured by earnings per share, is positively related to cumulative abnormal returns during the event window.

Three days after the event, cumulative abnormal returns were approximately two one-thousandths of a percent lower for each one unit increase in rank. Four days after the event, cumulative abnormal returns remained

Table 4. Basic Results: Regressions of Cumulative Abnormal Returns on Performance Ratings

	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)	(4a)	(4b)	(5a)	(5b)
	3-day CAR	4-day CAR	3-day CAR	4-day CAR	3-day CAR	4-day CAR	3-day CAR	4-day CAR	3-day CAR	4-day CAR
Rank	–0.0021** (0.0007)	–0.0017** (0.0008)	–0.0023** (0.0007)	–0.0020** (0.0009)	–0.0022** (0.0007)	–0.0020** (0.0009)	—	—	—	—
Rank ≤ 100	—	—	—	—	—	—	0.739** (0.255)	0.622** (0.300)	0.789** (0.322)	0.990** (0.378)
Ranking 101-200	—	—	—	—	—	—	—	—	0.348 (0.314)	0.823** (0.369)
Ranking 301-400	—	—	—	—	—	—	—	—	–0.267 (0.319)	0.056 (0.374)
Ranking 401-500	—	—	—	—	—	—	—	—	0.048 (0.333)	0.503 (0.391)
Industry fixed effects	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sales		—	—	—	0.004 (0.003)	0.002 (0.003)	0.003 (0.003)	0.002 (0.003)	0.003 (0.003)	0.001 (0.003)
Earnings per share		—	—	—	0.054** (0.024)	0.047* (0.028)	0.051** (0.024)	0.044 (0.028)	0.052** (0.24)	0.044 (0.028)
Tobin's Q		—	—	—	–0.087 (0.133)	–0.026 (0.157)	–0.086 (0.134)	–0.024 (0.157)	–0.100 (0.134)	–0.042 (0.157)
Constant	–0.090 (0.201)	–0.144 (0.237)	0.842* (0.454)	0.849 (0.532)	0.743 (0.487)	0.750 (0.574)	–0.128 (0.388)	–0.028 (0.457)	–0.119 (0.458)	–0.366 (0.535)
Observations	492	492	492	492	490	490	490	490	490	490
F-statistic	9.04**	4.54**	3.25**	3.30**	3.16**	2.92**	2.86**	3.12**	2.85**	2.79**
Prob > *F*	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: Standard errors in parentheses. * and ** indicate statistical significance at the 10% and 5% levels, respectively. In specifications (5a) and (5b), the category "Rank 201-300" is omitted.

approximately two one-thousandths of a percent lower for each one unit increase in rank. In other words, after conditioning on industry and firm covariates, a ranking that was 100 places more favorable (i.e., rank 50 vs. 150) was associated with a 0.2% increase in cumulative abnormal returns over the four days following the information release.

Table 4's results for specifications (4a) and (4b) reinforce the above findings. Coefficients on top 100 dummy variables are significantly positive. Cumulative abnormal returns after the information release are an increasing function of being named a top 100 performer. After conditioning on industry and firm covariates, firms ranked in the top 100 experienced cumulative abnormal returns over a 3-day event window that were 0.73% higher than returns for firms ranked 101–500, on average. Four days after the event, cumulative abnormal returns for firms in the top 100 remained a full 0.62% higher than returns for firms ranked outside of the top 100.

Categorical specification results in Table 4 are also consistent. After conditioning on industry and firm covariates, firms ranked in the top 100 experienced cumulative abnormal returns during the event week that were 0.79%–0.99% higher than cumulative abnormal returns for firms ranked 201–300, on average. We also find suggestive evidence that firms ranked 101–200 experienced cumulative abnormal returns that were somewhat higher than returns for firms ranked 201–300. In contrast, differences in cumulative abnormal returns between firms receiving middle-of-the-pack rankings and firms receiving poor rankings were generally small in magnitude and not statistically significant. More precisely, firms ranking 301–400 and 401–500 experienced cumulative abnormal returns that were not statistically different than cumulative abnormal returns for firms ranking 201–300.

Robustness

Our results are consistent across several specifications, but possible concerns remain. Findings may be driven by omitted factors or events unrelated to the *Newsweek* story event. Perhaps, the event itself was largely anticipated. Outliers may drive the estimates. Perhaps, the chosen event window length was unusual. An endogenous market index might have influenced our results. In this section, we present results from a number of sensitivity analyses designed to address these concerns.

Our first sensitivity check involves falsification tests which replicate all previous analyses for the weeks preceding the event window. Table 5 presents a summary of falsification tests results. In marked contrast to the results

Table 5. Falsification Test Results: Regressions of Cumulative Abnormal Returns on Performance Ratings for the 1st Through 6th Weeks Preceding the Event

	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)	(4a)	(4b)	(5a)	(5b)	(6a)	(6b)
	3-day CAR	4-day CAR	3-day CAR	4-day CAR	3-day CAR	4-day CAR	3-day CAR	4-day CAR	3-day CAR	4-day CAR	3-day CAR	4-day CAR
Rank	–0.0001	–0.0003	–0.0003	–0.0004	0.0013	0.0023**	–0.0023	–0.0015	–0.0004	–0.0007	–0.0007	–0.0007
	(0.0011)	(0.0012)	(0.0011)	(0.0012)	(0.0010)	(0.0011)	(0.0018)	(0.0021)	(0.0009)	(0.0011)	(0.0008)	(0.0010)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	490	490	490	490	490	490	490	490	490	490	490	490
F-statistic	3.01**	2.88**	2.98**	2.76**	3.06**	2.89**	2.98**	2.76**	2.61**	2.60**	2.99**	2.76**
Prob > *F*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: Standard errors in parentheses. * and ** indicate statistical significance at the 10% and 5% levels, respectively. Specification number refers to the number of weeks preceding the event, so that specifications (3a) and (3b) are regressions of cumulative abnormal returns on environmental ranking for 3 week preceding the actual information event.

in Table 4, we find no evidence for a negative relationship between *Newsweek* ranking and cumulative abnormal returns for any of the 6 weeks prior to the event. Nearly all estimated coefficients are statistically insignificant at conventional levels. The sole statistically significant coefficient is positive rather than negative. Two implications follow. First, we find no evidence supporting the hypothesis that the *Newsweek* information was significantly anticipated or leaked. Second, the lack of a systematic relationship between environmental performance rankings and cumulative abnormal returns during other weeks suggests that our key results in Table 4 are unlikely to be driven by omitted unobserved factors. Firms with good rankings did not *typically* receive unexpectedly high returns relative to firms with poor rankings during the estimation window; these firms *only* received unexpectedly high relative returns after the information release.

It remains possible that an event unrelated to the *Newsweek* rankings might drive our key results if (a) that event occurred during our event week and (b) that event differentially affected highly rated firms and poorly rated firms after controlling for industry and observable firm characteristics. We searched the *Wall Street Journal* and the business and financial section of the *New York Times* for our event week. The only potentially significant large-scale shock to business during the event week was a Fed Open Market committee announcement of a reduction in mortgage assistance programs. It is difficult to imagine that this Fed announcement favored good environmental performers relative to poor environmental performers, after controlling for industry, size, profitability, and Tobin's Q. However, to ensure that our results are not driven by a handful of firms experiencing unusually high or unusually low returns due to the Fed announcement or another confounding event, we replicated the analyses in Table 4 omitting potential outlying firms. Specifically, we repeated the analysis omitting all firms in the top ten percent and all firms in the bottom ten percent of the cumulative abnormal returns distribution during the event week. Reassuringly, results are qualitatively similar to those presented in Table 4. Point estimates are smaller, as expected, but cumulative abnormal returns remain related to rank in a statistically significant negative manner and cumulative abnormal returns remain related to the top 100 dummy variable in a statistically significant positive manner.

A related concern is that the first-stage market model regressions do not control for the possibility of outliers. As daily returns outliers may bias the cumulative abnormal returns that serve as the dependent variable in our determinants of cumulative abnormal returns analyses, they may bias key estimates of the relationship between disclosure and financial market

performance. Therefore, we replicated our market models using robust S-estimators and then replicated all of our determinants of cumulative abnormal returns analyses.[15] Point estimates are systematically larger in absolute value and patterns of statistical significance are unchanged, so results in Table 4 are conservative.

We choose event window lengths of 3 and 4 days as these event windows make up the week of the information release. However, perhaps results from these event windows are unusual. We replicated the key analyses in Table 4 using various event window lengths. Results for regressions with industry fixed effects and firm-level control variables are presented in Table 6. We see a practically small, and statistically insignificant, relationship between *Newsweek* environmental rankings and abnormal returns 1 day after the event. However, we see practically large, and typically statistically significant, relationships between *Newsweek* rankings and cumulative abnormal returns beginning 2 days after the information release and persisting for several weeks following the event. It is interesting to note that the relationship between environmental rankings and financial performance may have even become stronger after 2 weeks, perhaps as blog and non-*Newsweek* media attention accumulated.

As discussed earlier, it is possible that the S&P market index is endogenously influenced by the event itself. Therefore, as a sensitivity test, we replicated all analyses reflected in Table 4 using the Wilshire4500 index as the regressor in our market model. The Whilshire4500 index measures the average performance of every traded firm with regularly available price data, save for the 500 largest firms making up the S&P500 index. The Whilshire4500 index is unlikely to be endogenously affected by the rankings themselves during the event week, as ratings did not directly apply to the firms comprising the Wilshire4500 index. Reassuringly, results are quantitatively and qualitatively similar (virtually identical) to those presented in Table 4.[16]

A final possible concern is that our pre-event estimation window, September 2008 to September 2009, was a tumultuous period for U.S. markets. In particular, overall markets fell precipitously between mid-September 2008 and mid-March 2009. We therefore replicated all analyses reflected in Table 4 using a shorter estimation window spanning Monday, March 23, 2009 to Friday, September 18, 2009. This period was characterized by few very large market swings and a steady increase in overall market returns. Reassuringly, results are quantitatively and qualitatively similar to those present in Table 4. Point estimates are nearly identical (very slightly smaller) in sign, magnitude, and significance.

Table 6. Regressions of Cumulative Abnormal Returns on Performance Rankings: Varying Event Window Lengths

	Week 1				Week 2					Week 3				
	1-day CAR	2-day CAR	3-day CAR	4-day CAR	5-day CAR	6-day CAR	7-day CAR	8-day CAR	9-day CAR	10-day CAR	11-day CAR	12-day CAR	13-day CAR	14-day CAR
Rank	–0.0005 (0.0005)	–0.0016** (0.0007)	–0.0022** (0.0007)	–0.0020** (0.0009)	–0.0012 (0.0010)	–0.0015 (0.0010)	–0.0016 (0.0012)	–0.0021 (0.0013)	–0.0025* (0.0014)	–0.0023** (0.0007)	–0.0031** (0.0014)	–0.0036** (0.0016)	–0.0038** (0.0017)	–0.0035** (0.0017)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Standard errors in parentheses. * and ** indicate statistical significance at the 10% and 5% levels, respectively.

Further Explorations

The above results demonstrate that highly rated firms received significantly higher cumulative abnormal returns than poorly rated firms. In this section, we explore these results in more detail. We first examine how market outcomes were affected by the information format. We then turn to the more complex, and more speculative, question of the relative importance of the alternative channels through which the disclosure had its effects.

The Effects of Information Format

Which environmental metrics influenced outcomes? Which environmental metrics did not? Here, we first examine the impact of *Newsweek* rankings versus the impact of the *Newsweek* overall green scores used to calculate the rankings. We then explore the impacts of aggregate measures like rank versus component scores. All regressions take the general form of Equation (7), but *RATING* is no longer restricted to ranking or a top 100 performer dummy. In addition, multiple metrics may be included simultaneously.

Table 7 presents our information format results, with findings again presented for two different window lengths per specification. Standard errors are presented in parentheses below coefficient estimates. Robust (heteroskedastic consistent) standard errors are systematically smaller than presented standard errors, so statistical inference is conservative. For presentation purposes and comparability to earlier results, all coefficients and standard errors are scaled by a factor of 100, such that a coefficient of 1.00 represents a 1% increase in cumulative abnormal returns over the event window.

Results from specifications (1a) and (1b) indicate that overall green score coefficients are significantly positive when included alone. After conditioning on industry- and firm-level covariates, a ten-point increase in overall green score is associated with a 0.28% increase in cumulative abnormal returns over the event week. However, the results from specifications (2a) and (2b) suggest that the impacts of overall green score are driven by a very strong correlation with the rank metric. Coefficients on overall green score become small with standard errors approximately 3 to 20 times greater than estimated coefficients when both rank and overall green score are included as explanatory variables. In contrast, rank coefficients are roughly similar in magnitude to those in Table 4. As plausibly expected with strong multicollinearity, rank is no longer statistically significant at conventional levels. Nevertheless, these results suggest that *Newsweek* ranking affected abnormal

Table 7. Information Format Results: Regressions of Cumulative Abnormal Returns on Various Performance Ratings

	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)	(4a)	(4b)	(5a)	(5b)	(6a)	(6b)
	3-day CAR	4-day CAR	3-day CAR	4-day CAR	3-day CAR	4-day CAR	3-day CAR	4-day CAR	3-day CAR	4-day CAR	3-day CAR	4-day CAR
Rank	—	—	–0.0023 (0.0015)	–0.0015 (0.0017)	—	—	–0.0023 (0.0018)	–0.0015 (0.0021)	—	—	–0.0022** (0.0007)	–0.0020** (0.0009)
Overall score	0.028** (0.011)	0.028** (0.013)	–0.001 (0.022)	0.008 (0.025)	—	—	—	—	—	—	—	—
Policy score	—	—	—	—	0.015** (0.006)	0.014** (0.007)	–0.001 (0.014)	0.004 (0.016)	—	—	—	—
Impact score	—	—	—	—	—	—	—	—	–0.002 (0.006)	0.000 (0.007)	–0.001 (0.006)	0.000 (0.007)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	490	490	490	490	490	490	490	490	490	490	490	490
F-statistic	3.01**	2.88**	2.98**	2.76**	3.06**	2.89**	2.98**	2.76**	2.61**	2.60**	2.99**	2.76**
Prob > *F*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: Standard errors in parentheses. * and ** indicate statistical significance at the 10% and 5% levels, respectively.

returns, whereas the less prominent and more difficult-to-interpret overall green score did not do so independently.

Results from specifications (3a) and (3b) indicate that coefficients on a disaggregated measure, green policies score, are significantly positive when included alone. After conditioning on industry and firm characteristics, a ten-point increase in green policies score is associated with a 0.15% increase in cumulative abnormal returns over the event week. However, as with the overall green score, the results from specifications (4a) and (4b) suggest that the impact of green policies score is driven by a very strong correlation with the more prominent rank metric. Coefficients on green policies score become small with large standard errors, whereas coefficients on rank remain similar to originally estimated coefficients in Table 4.

Of course, Table 3 highlighted that rank, overall green score, green policies score, and reputation score are highly collinear. Perhaps, the best test, then, of the impact of disaggregated score metrics is the relatively uncorrelated environmental impact score. However, results from specifications (5a), (5b), (6a), and (6b) suggest that environmental impact has no significant influence on cumulative abnormal returns during the event window. Environmental impact score coefficients are not statistically significant, even when included alone. Collectively, the results of this subsection suggest that only the prominent and easy-to-interpret aggregate measure rank affected abnormal returns; more subtle, less actionable, and less prominently displayed disaggregated measures had no impact, even when they may have contained novel information.[17]

Channels of Influence

The authors turn now to exploring the various channels through which the ratings may have had their influence on share prices. Recall that we categorize the possible mechanisms linking environmental disclosure with financial outcomes into four broad channels: input market channels, output market channels, private politics (activist pressure) and public politics (regulator pressure) channels, and managerial information channels. As with other papers in this literature, we are unable to determine precisely the mechanism(s). Nevertheless, the exploratory analysis that follows sheds light on the likely relative importance of alternative channels in our context. This exploration may also provide a starting point for future environmental disclosure mechanism research.

Several of disclosure channel estimations take the form of

$$CAR_{ij} = \alpha + \theta_j + \beta RATING_{ij} + \lambda Z_{ij} + \delta RATING_{ij} \times Z_{ij} + \varepsilon_{ij} \quad (8)$$

where *CAR* are cumulative abnormal returns; α, β, λ, and δ are coefficients; θ_j is a vector of industry fixed effects; *Z* are firm-level characteristics; and ε are the usual idiosyncratic error terms. Our key interest in this section is the interaction term $RATING \times Z$ and its coefficient δ. A statistically significant δ indicates that the impact of the *Newsweek* rating on cumulative abnormal returns varies with the value of the firm-level characteristic *Z*. Full interaction results are presented in Table 8 and interpretation is discussed in the text below.

An empirical implication of input market channels, especially channels related to investor preferences, is that the most novel disclosed information is predicted to have the most financial market impact. Information that is not novel to investors themselves may still cause investors to revise their expectations about profitability, but ensuing financial market outcomes reflect investor beliefs about the impact of the disclosed information on other (less informed) stakeholders. As noted in the preceding section, we detect no independent statistical relationship between the most novel information data component (the TruCost environmental impact score) and cumulative abnormal returns during the event week. Other data sources were widely available to investors and highly correlated with one another.[18] Although input market channels may be important in some contexts, we believe they may not systematically explain any significant link between *Newsweek* ratings and market outcomes.

An empirical implication of output market channels, especially channels related to final consumers, is that environmental disclosure is predicted to have the most significant impact for companies with high consumer orientation. It is not clear that *Newsweek*'s environmental ratings disclosure should have significantly affected expected firm profitability through consumer channels as many of the 500 rated companies are not household names, many rated firms produce goods not sold directly to final consumers, and many of even the most familiar ranked firms make a wide variety of products not marketed under the parent company's name. Nevertheless, we empirically explored if the rankings had a larger impact for companies with high consumer orientation. Researchers commonly assume that advertising proxies for a company's consumer orientation (Arora & Cason, 1995; Beatty & Shimshack, 2010; Khanna & Damon, 1999). We therefore explored the interaction of advertising per dollar of sales and *Newsweek* environmental performance ratings. A large and statistically significant negative coefficient on the interaction between rank and advertising—and/or a large and statistically

Table 8. Channel Explorations: Regressions of Cumulative Abnormal Returns on Ratings Interactions

	(1a)	(1b)	(1c)	(1d)	(2a)	(2b)	(2c)	(2d)	(3a)	(3b)	(3c)	(3d)
	3-day CAR	4-day CAR	3-day CAR	4-day CAR	3-day CAR	4-day CAR	3-day CAR	4-day CAR	3-day CAR	4-day CAR	3-day CAR	4-day CAR
Rank	–0.005**	–0.005**	—	—	–0.001	–0.001*	—	—	–0.004**	–0.003*	—	—
	(0.0018)	(0.0021)			(0.0008)	(0.0010)			(0.0016)	(0.0018)		
Top 100	—	—	0.802	0.493	—	—	0.678**	0.666**	—	—	0.551	–0.499
			(0.554)	(0.637)			(0.291)	(0.342)			(0.582)	(0.680)
ADV	–2.784	0.505	9.416	9.321	—	—	—	—	—	—	—	—
	(7.958)	(9.161)	(7.126)	(8.186)								
ADV × Rank	0.060	0.046	—	—	—	—	—	—	—	—	—	—
	(0.041)	(0.047)										
ADV × Top100	—	—	–5.10	–0.858	—	—	—	—	—	—	—	—
			(10.08)	(11.58)								
SIZE					0.0133**	0.0088	0.003	0.002	—	—	—	—
					(0.0049)	(0.0057)	(0.004)	(0.004)				
SIZE × Rank					–.00004**	–0.00003	—	—	—	—	—	—
					(0.00002)	(0.00002)						
SIZE × Top100					—	—	0.003	–0.001	—	—	—	—
							(0.006)	(0.007)				
TOBIN					—	—	—	—	–0.285	–0.160	–0.089	–0.139
									(0.253)	(0.297)	(0.148)	(0.173)
TOBIN × Rank				—	—	—	—	—	0.001	0.001	—	—
									(0.001)	(0.001)		
TOBIN × Top100	—	—	—	—	—	—	—	—	—	—	0.160	0.698*
											(0.312)	(0.365)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	201	201	201	201	490	490	490	490	490	490	490	490
F-statistic	2.33**	1.65*	1.83**	1.24	3.34**	3.06**	3.01**	2.90**	2.96**	2.92**	2.91**	3.09**
Prob > *F*	0.01	0.08	0.05	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: Standard errors in parentheses. * and ** indicate statistical significance at the 10% and 5% levels, respectively. ADV, advertising per dollar of sales; SIZE, firm size as measured by sales revenue. TOBIN, book to market value as measured by Tobin's Q.

significant positive coefficient on the interaction between top 100 rank and advertising—would suggest that disclosed performance had a greater market impact for firms with greater consumer orientation. Results in specifications (1a), (1b), (1c), and (1d) of Table 8, however, reveal no such statistical relationship. Interaction coefficients are not statistically significant. So although final consumer preference channels may be important in some contexts, we believe they may not systematically explain the significant link between *Newsweek* ratings and market outcomes.

An empirical implication of public politics (regulator pressure) and private politics (activist pressure) channels is that environmental disclosure is predicted to have the most significant impact for companies that are especially likely to be targets of enforcement actions, inspections, protests, boycotts, letter writing campaigns, and so on. We empirically explored if the rankings had a larger impact for companies with high "politics" visibility. For our first approach, we note that researchers indicate that bigger firms may be more likely to become targets of environmental boycotts, environmentally oriented proxy votes, and regulator actions (Gray & Shimshack, 2011; Gupta & Innes, 2009; Lenox & Eesley, 2009). We explored the interaction of size and *Newsweek* environmental performance ratings. A large and statistically significant negative coefficient on the interaction between rank and size—and/or a large and statistically significant positive coefficient on the interaction between top 100 rank and size—would suggest that disclosed performance had a greater market impact for bigger firms. Results in specifications (2a) and (2b) of Table 8 provide suggestive, but not definitive, evidence that bigger firms are indeed more sensitive to environmental performance disclosure. The negative interaction of size and rank is statistically significant at the 5% level for an event window lasting 3 days and nearly significant at the 10% level for an event window lasting 4 days. These results may indicate that public and private politics channels remain credible candidates to explain the link between *Newsweek* ratings and market outcomes.

An additional exploration to see if rankings had a larger impact for companies with high "politics" visibility begins by noting that business strategy scholars often posit that firms with powerful brands are more likely to become targets of NGO actions because activist campaigns may reduce both sales and value embodied in the brand (Baron, 2002; Conroy, 2007). Firms with high brand asset values may be especially favorable targets for public regulators as well, as public penalties may indirectly leverage private politics pressures for high visibility firms. Thus, we explored the interaction of Tobin's Q and *Newsweek* environmental performance ratings.[19] Recall that Tobin's Q is the

ratio of the firm's market value to its book value, and values of Q above one indicate substantial intangible firm value that may be attributable to brand value.[20] A large and statistically significant negative coefficient on the interaction between rank and Tobin's Q—and/or a large and statistically significant positive coefficient on the interaction between top 100 rank and Tobin's Q—would suggest that disclosed performance had a greater market impact for firms with higher Tobin's Q. Results in specifications (3c) and (3d) of Table 8 provide suggestive, but not definitive, evidence that firms with higher Tobin's Q are more sensitive to environmental performance disclosure. The positive interaction of Tobin's Q and top 100 rank is statistically significant at the 6% level (3% level with robust standard errors) for an event window lasting 4 days. These results may again indicate that public and private politics channels remain credible candidates to explain the link between *Newsweek* ratings and market outcomes.

An empirical implication of the managerial information channel, where environmental disclosure signals general management ability, is that disclosure is predicted to have the most significant impact for companies that are not yet perceived as having strong management. We empirically explored if the rankings had a larger impact for companies with possibly poorer management intangibles. To do so, we revisited the interaction of Tobin's Q and *Newsweek* environmental performance ratings. Recall again that Tobin's Q is the ratio of the firm's market value to its book value, and values above one indicate substantial intangible firm value that may be attributable to beliefs about overall managerial ability. A large and statistically significant positive coefficient on the interaction between rank and Tobin's Q—and/or a large and statistically significant negative coefficient on the interaction between top 100 rank and Tobin's Q—would suggest that disclosed performance had a greater impact for firms with lower Tobin's Q. However, as noted above, results in specifications (3a), (3b), (3c), and (3d) of Table 8 provide no support for this hypothesis. Firms with low Tobin's Q are less sensitive to ratings. So although managerial information channels where environmental disclosure signals general management ability may be important in some contexts, we believe they may not systematically explain the link between *Newsweek* ratings and market outcomes.

An empirical implication of the managerial information channel, where environmental disclosure signals correctable production inefficiencies, is that disclosure is predicted to generate higher cumulative abnormal returns for poor performers than for good performers. Poor performers may have the greatest opportunities for future cost savings. However, our basic results in

Table 4 refute this hypothesis. This article's key finding is that highly rated firms had abnormal returns following the event that were significantly higher than the returns of poorly rated firms. So although managerial information channels where environmental disclosure signals correctable production inefficiencies may be important in some contexts, we believe they may not systematically explain the link between *Newsweek* ratings and market outcomes.

Discussion and Conclusion

This article analyzes the impact of a prominent, media-generated environmental rankings scheme for the largest companies in the United States. We find strong evidence that *Newsweek*'s 2009 Green Rankings had a significant impact on rated firms' capital market performance, with firms in the top 100 obtaining abnormal returns that were 0.6%–1.0% greater than those of the bottom 400. These are meaningful differences. A back of the envelope calculation suggests that the top 100 firms experienced a change in market value during the event week that was approximately US$10.8 billion higher than the change in market value during the event week for 100 average firms ranked outside of the top 100, all else equal.[21]

Our detected market response, while broadly consistent with a growing empirical literature on environmental information disclosure, was not necessarily expected a priori. First, this was an unusual event. The 2009 *Newsweek* rankings were administered on a much larger scale than previous media-generated environmental ratings, and the information release reached an unusually diverse immediate audience. Second, the social influence of traditional newsweeklies was thought to be waning. Third, and perhaps most noteworthy, the data underpinning the ratings were already largely available to investors concerned about environmental issues. This suggests that an interesting direction for future research entails comparing cumulative abnormal returns around the *Newsweek* release date to cumulative abnormal returns around the release dates of KLD, Trucost, and Corporate Register data.

One implication of the strong detected response is that market participants continue to believe environmental performance is important to at least some stakeholders. Investors also appear to believe that traditional media sources remain influential. Finally, markets evidently remain highly uncertain as to which firms are good environmental performers and which firms are poor environmental performers. If investors believed that all stakeholders had complete and accurate information, it is unlikely that the *Newsweek* ratings could have any effect at all.

This article goes beyond characterizing market impacts alone; the authors also analyze how the format of the information disclosure affected market responses. Few existing studies address this issue in detail. We find strong evidence that only the aggregate ranking had any impact on share prices. The underlying metrics, including the more novel environmental impact score, had no direct effect. Apparently, market response was a function of the ultimate horse race of the rankings themselves, rather than a nuanced assessment of the details lying beneath the rankings.

We also contribute early evidence on the channels through which disclosure operates. This is the most glaring gap in the disclosure literature, and without this knowledge, it will be impossible for governments, third-party organization, and firms themselves to design environmental disclosure schemes for maximum impact. Our investigations provide suggestive evidence that private politics (activist pressures) and public politics (regulator pressures) channels may best explain the link between *Newsweek* rankings and market response. Although we make no claim about which channels apply in other settings, our analysis provides provocative results for one prominent setting and suggests a roadmap for future mechanism research. And future study that makes progress on understanding disclosure channels will be valuable indeed.

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Notes

1. The date printed on the magazine's cover is September 28, 2009. This date, however, indicates the newsstand "pull" date and not the publication date.
2. This article is less closely related to the literature on the effects of voluntary disclosure. This research area has received less empirical attention, perhaps because of self-selection problems when analyzing data. Much of the related work aims to explain the extent of attention to environmental matters in corporate annual reports, corporate social responsibility reports, and 10Ks (Clarkson, Li, Richardson, & Vasvari, 2008; Patten, 1991, 2002). The effects of voluntary disclosure on financial performance are especially poorly understood and are complicated by

the fact that what appears to be "voluntarily" disclosed may really be coerced (Fisher-Vanden & Thorburn, 2011; Reid & Toffel, 2009).

3. All of these mechanisms have found at least some support in the literature. For example, Teisl, Roe, and Hicks (2002) provides evidence on output market pressures; Turban and Greening (1996) provide evidence on input market pressures; Muoghalu, Robinson, and Glascock (1990), Blacconiere and Patten (1994), Decker (2003), García et al. (2009), and Powers (2010) provide evidence on private politics (activist pressure) and public politics (regulator pressure) channels; and Blackman et al. (2004) and Powers et al. (2011) provide evidence on managerial information mechanisms. These papers make important contributions, yet none systematically evaluated which of these many possible channels is the most important for the particular setting.
4. See Terrachoice Group Inc.'s http://sinsofgreenwashing.org/ for more information on changes in the extent of "green" labeling over time.
5. Tobin's Q is a common measure of market value to book value. We calculated Tobin's Q as [(price of common stock × common stock outstanding) + (the liquidating value of preferred stock) + (total liabilities)] / total assets. As total liabilities were not reported for several firms in the Compustat database, we followed the literature and calculated liabilities as total assets – total common equity. Using Compustat variable names, our complete Tobin Q calculation is [(prcc_f*csho) + pstkl + (at – ceq)] / at.
6. The eight omitted firms are Schering Plough, ConAgra, Wyeth, Affiliated Computer Services, Lorillard, Virgin Media, McCormick, and Hewitt Associates.
7. Results are robust to the use of simple arithmetic returns calculated as $(close_t - close_{t-1}) / close_{t-1}$.
8. As discussed later, results are also robust to different estimation and event windows.
9. The authors know of no obvious disadvantage of this index for calibration during the estimation window. The index may be endogenous, but this poses no problems when the regression is used for prediction rather than causal inference. We discuss the implications of an endogenous index for other aspects of our overall research design in a later robustness section.
10. Our four greatest outliers were financial firms: XL Group, Lincoln National Corporation, CB Richard Ellis Group, and Principal Financial Group. If the market closed up (down) 1% on a given day during our estimation window, these four firms closed up (down) more than 2.5% that same day.
11. High and low ratings should have opposing effects, so perhaps this concern is not important in practice. Nevertheless, it is inappropriate to simply assume that the middle of the pack received zero abnormal returns.

12. The existing literature offers suggestive results. The evidence consistently finds that firms with publicly disclosed poor environmental records are punished (Beatty & Shimshack, 2010; Gupta & Goldar, 2005; Hamilton, 1995; Khanna et al., 1998; Klassen & McLaughlin, 1996; Konar & Cohen, 1996). Evidence definitively demonstrating that firms with publicly disclosed positive environmental records are rewarded is comparatively rare (King & Lenox, 2001; Klassen & McLaughlin, 1996).
13. In our main analyses, the dependent variables are generated from market model estimations. Generated regressands inflate standard errors, so uncorrected standard errors are overestimates of the true standard errors. This implies that it will be more difficult to detect relationships between environmental ratings and market performance, and our results will be conservatively skewed toward failing to reject the null.
14. We are unable to obtain firm-level characteristics for 2 of our 492 firms, so relevant analyses omit these companies.
15. We implement these estimators using STATA's robreg routine, written by Ben Jann. See also Rousseeuw and Yohai (1984) and Verardi and Croux (2009).
16. As an additional sensitivity test, we also replicated the results using the Wilshire 5000 index, which measures the average performance of all traded firms with regularly available price data. This is the broadest index possible, although it may still be endogenously determined as it contains the 500 firms rated by *Newsweek*. Results with this index are also nearly identical to those presented in Table 4.
17. Specifications that simultaneously include rank, overall green score, and the three disaggregated score metrics generate no statistically significant coefficients due to significant multicollinearity. Nevertheless, point estimates on rank remain reasonably robust. Signs remain negative and rank coefficient magnitudes are 40%–70% of Table 4 rank coefficient magnitudes.
18. KLD, the source of the green policies scores, has been providing data on corporate environmental performance since 1988; indeed, KLD is the most widely used source of information for socially responsible investment funds. Many of the ratings from Corporate Register, the source of the reputation score, were also available ahead of time.
19. An alternative approach would be to examine the interaction of brand value measures and environmental performance ratings. However, common brand valuation tools (Interbrand, Young and Rubicam, and Millward-Brown) are only appropriate measures of firms' consumer orientation for mono-brand and business-to-consumer companies. These restrictions exclude most of the 500 largest U.S. firms included in the *Newsweek* rankings.
20. Other factors, like managerial ability, human capital, or intellectual property may also contribute to intangible value and therefore Tobin's Q. However, if

Tobin's Q is capturing human capital or intellectual property, we see no reason to expect a significant interaction effect between Q and *Newsweek* ratings. We discuss the managerial ability interpretation of Tobin's Q in the next subsection.

21. The average firm in this study's sample had a 2009 market value of approximately US$18 billion, so the market value of 100 average firms was US$1,800 billion; 0.6% of US$1,800 billion is US$10.8 billion.

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