

How Do Investors Respond to Green Company Awards in China?¹

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Thomas Lyon, Yao Lu, Xinzheng Shi, Qie Yin

Abstract

We find that firms winning Green Company Awards in China from 2008 to 2011 experienced on average insignificant and in some cases significantly negative effects on shareholder value. Various robustness checks suggest that these findings are not driven by the inefficiency of the Chinese stock market or a lack of perceived credibility of the award. In addition, we find important variation in the responses across firms: shareholders of firms in low-pollution industries and firms with primarily private ownership responded more negatively to award announcements. Furthermore, the peers of winning firms showed higher announcement returns than the award winners. Our results indicate that a key benefit of corporate environmentalism in China comes through building stronger relationships with government, and that otherwise the market generally discourages firms from environmental leadership.

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¹ Lyon, corresponding author, Professor of Business Economics, Stephen M. Ross School of Business and School of Natural Resources and Environment, University of Michigan, 701 Tappan Street, Ann Arbor, MI 48109, tplyon@umich.edu. Lu, Assistant Professor of Finance, School of Economics and Management, Tsinghua University, China, luyao@sem.tsinghua.edu.cn. Shi, Assistant Professor of Economics, School of Economics and Management, Tsinghua University, China, shixzh@sem.tsinghua.edu.cn. Yin, Graduate student, School of Economics and Management, Tsinghua University, China, yinq.10@sem.tsinghua.edu.cn. The authors have benefitted from helpful comments and suggestions from E. Han Kim, Eun-Hee Kim, John Maxwell, Bernard Yeung and participants at the 3rd Annual Conference of the Alliance for Research on Corporate Sustainability (ARCS) at the Wharton School of Business.

1. Introduction

Many firms in developed countries have decided that integrating sustainability into their business strategy is profitable. (Esty and Winston, 2006; Nidumolu et al., 2010) The business benefits of pro-active sustainability strategy are less clear in emerging markets, where environmental and social regulations may be lacking or poorly enforced, and demand for greener products may be virtually non-existent. (Arya and Zhang, 2009; Boehe et al. 2010; Blackman 2011)

Casual empiricism suggests that China, in particular, gives firms weak incentives to be environmentally and socially friendly. Tainted milk and pet food, toxic toys, suicides among mistreated workers, and an unsafe high-speed rail system have all been widely reported in the media, and give the impression of a country whose single-minded focus on economic growth has come at the expense of social and environmental protection. Nevertheless, despite its poor international reputation for product safety and environmental quality, China has begun taking measures to increase environmental fees, to increase reliance on renewable energy, and to tolerate environmental protests and non-governmental organizations (NGOs). (Mol and Carter 2006) Indeed, since 2005, Chinese leaders Hu Jintao and Wen Jiabao have frequently spoken of the need to create a “harmonious society,” emphasizing not just economic growth but also the other dimensions of social welfare. Do these changes mean that profits and welfare have been better aligned, so that it now pays to be green in China?

Even in developed countries, it is difficult to establish empirically whether firms profit from being more socially and environmentally responsible. Indeed,

scholars have debated whether better corporate social and environmental performance (CSEP) leads to better corporate financial performance (CFP) for years with remarkably limited success. After reviewing literally hundreds of academic studies, Margolis and Walsh (2001) conclude that it remains unclear whether being green really pays, or whether financially-successful firms simply have greater latitude to indulge their managers' whims at the expense of shareholders.² Furthermore, as King and Lenox (2001) have argued, there may be no "one size fits all" answer: being green may pay under some conditions but not others.

One way of circumventing the puzzle of causality is to focus on a discrete event that happens within a narrowly defined window of time, and that is expected to affect shareholder value. Work of this sort starts from the premise that financial markets have powerful incentives to rapidly incorporate all available information that may affect the future returns of listed companies. When news reaches the market, share prices will quickly reflect its effect on expected future returns. (MacKinlay 2007) Such financial "event studies" can identify the impact on profitability of good or bad environmental news. The challenges with this approach are quite different from those of work studying longitudinal correlations between CSEP and CFP. The biggest challenge is often identifying a well-defined event that occurs within a relatively narrow "event window" and could not be anticipated by informed insiders.

In this paper, we use the event study methodology to examine how financial markets responded when Chinese firms received awards for their environmental and

² Research that seeks intertemporal links between CSEP and CFP inevitably confronts two methodological quandaries. First, it is very difficult for the researcher to control for the autocorrelation of variables when seeking causal relations over time. Second, it is very difficult to find instrumental variables that allow the researcher to predict CSEP independently of CFP and vice versa.

social performance. It is well known that data on industrial and, more importantly, environmental performance are notoriously unreliable in China. However, stock prices are public by necessity and investors have strong incentives to make use of all available formal and informal information to assess whether being green pays in China. Thus, the event study approach can offer insights into the extent to which China's institutional system rewards environmental protection.

The emerging literature on environmental event studies has already begun to establish some important empirical regularities. First, environmental problems that are likely to generate regulatory penalties or legal liability are generally punished by the capital markets, in both developed and developing countries.³ (Muoghalu et al. 1990; Lanoie and Laplante 1994; Klassen and McLaughlin 1996; Lanoie, Laplante and Roy 1998; Dasgupta, et al. 2001; Karpoff, Lott and Wehrly 2005; Capelle-Blancard and Laguna 2010) Second, emissions of toxic chemicals, even unregulated ones, by firms in the U.S. are viewed negatively by investors. (Hamilton 1995; Konar and Cohen 2001; Khanna et al. 1998; Bettenhausen et al. 2010) Third, negative ratings by third parties reduce stock prices significantly both in the US and in India. (Gupta and Goldar 2005; Beatty and Shimshack 2010; Lyon and Shimshack 2011) Thus, there appears to be an emerging consensus that stock markets punish bad environmental news.

Much more controversial is the question of whether good environmental news is rewarded by financial markets. Indeed, some research finds good news that is a

³ Unanswered puzzles remain, however. For example, Karpoff et al. (2005) find that the penalties meted out by capital markets in the US simply reflect expected legal and regulatory penalties. However, Dasgupta et al. (2001) find that in several developing countries, share price penalties substantially exceed any reasonable estimate of likely regulatory or legal penalties.

function of corporate participation in environmental management systems (Wang and Yuan 2004; Alberton et al. 2009; Canon-de-Francia and Garces-Ayerbe 2009) or voluntary programs like the Carbon Disclosure Project (Kim and Lyon 2011) or Climate Leaders (Fisher-Vanden and Thorburn 2011) is not valued by the market, and may even meet a negative response. A neutral response may occur because external parties cannot distinguish “greenwash” (Lyon and Maxwell 2011) or “symbolic action” (Pfeffer 1981; Westphal and Zajac 1994; Delmas and Montes-Sancho 2010) from substantive action, while a negative response may occur because firms are pressured into taking action, so that what appears “voluntary” is really coerced, and hence should not be expected to be profitable. (Reid and Toffel 2009, Fisher-Vanden and Thorburn 2011)

Awards granted by credible third parties would appear to be a form of good news that is immune from the criticisms that they are simply greenwash on the part of firms trying to promote themselves, or the result of pressure from other stakeholders. However, the limited empirical evidence to date finds mixed results. Some studies find that environmental awards are greeted positively by the capital markets, both in the U.S. (Klassen and McLaughlin 1996) and in a number of developing countries (Dasgupta Laplante and Mamingi 2001). More recent work on U.S. firms (Jacobs, Singhal and Subramanian 2010) finds insignificant average market reactions to both self-reported corporate environmental efforts and to recognition granted by third parties for environmental performance; furthermore, the market reacted negatively to announcements of voluntary emissions reductions and awards from non-governmental sources, though the authors have little explanation for these surprising

results.

We present what is to our knowledge the first test of how markets respond to environmental awards in China. We find that these awards are not viewed positively by the market. Indeed, privately-owned firms and firms in low-polluting industries suffered significant negative impacts from winning environmental awards. We conduct a number of robustness checks that suggest these results are not due either to inefficiency of the Chinese stock market or to any perceived lack of credibility of the awards. Furthermore, the peers of the winning firms showed positive announcement returns, suggesting that the market viewed award winners as having unduly high costs. Our findings are surprisingly similar to those of Jacobs et al. (2010) given that the U.S. has a much older and presumably more developed and transparent system of environmental governance than does China. Our results suggest that in both countries the main incentives for firms to improve their environmental performance still come either directly or indirectly from the government, and that otherwise the market actually discourages firms from greening themselves unless they are in high-pollution industries that attract substantial public attention.

The remainder of the paper is organized as follows. Section 2 provides background information on the Annual China Green Companies Awards. Section 3 presents the data and sample construction. Section 4 describes the empirical strategy. Section 5 reports and discusses the main findings. Section 6 conducts several cross-sectional analyses. Section 7 estimates the effects of award announcements on peer firms that did not win awards. Section 8 concludes and provides some policy implications.

2. The Annual China Green Companies Awards

The Annual China Green Companies Awards were initiated by the China Entrepreneur Club in 2008⁴, and are presented each year at the Annual Summit of China Green Companies. The annual summit has received much attention from the public. More than one thousand insightful and innovative business leaders, political dignitaries, academic authorities, NGO representatives and mainstream journalists, from both the domestic and abroad, have attended the summits.⁵ Supporters for annual summits include United Nations Global Compact, United Nations Environment Program (UNEP), China Enterprise Confederation and China Enterprise Directors Association. The awards are intended to promote the development of sustainable business practices in China and cross-country cooperation and communications on the issues about sustainable business development. The process of selecting winning companies is methodical and the criteria used are transparent to the public. Two groups of researchers independently rate different aspects of corporate sustainability across the candidate firms. The rating system evaluates five principal aspects of corporate behavior: prospective corporate culture; business advantage; eco-friendly

⁴ The China Entrepreneur Club was launched in 2006 by 31 of China's most influential economists, such as Weiyang Zhang, the former Dean of Guanhua School of Management in Peking University, and Qiren Zhou, Dean of the National School of Development in Peking University, and businesspeople, such as Chuanzhi Liu, Chairman of Lenovo Group, and Yun Ma, founder of Alibaba Group. The complete list of the founders and other information of the Club and the Green Company Awards can be found at <http://www.daonong.com/English/index.htm>

⁵ See the following websites for more information about the summits: <http://www.daonong.com/green2011/news/2011aboutE.html>; http://www.daonong.com/English/2010_nianhui.html; http://www.daonong.com/English/2009_summit.html; <http://www.daonong.com/English/Conferences/20100715/20017.html>

operation; socially responsible practice; and driving force from innovation. Further details are provided in Appendix 1. After preliminary screening, more detailed investigations of candidate firms are conducted. Meanwhile, socially controversial issues associated with candidate firms are also investigated by the selection team. The selection criteria and process are overseen by a group of well-known non-governmental organizations (NGOs) and dozens of influential academic experts in the fields of economics and corporate social responsibility from all over the world.⁶ After the final selection, the results of the award are announced during the Annual Summit of China Green Companies each year, with substantial media coverage.

This award has been regularly issued for four years since 2008. In 2008 and 2009, there were 20 companies receiving the award each year, while in 2010 and 2011 the number of winners was increased to 100. Since we focus on the effect of winning the Green Companies Award on winners' stock values, only those winners with shares publicly listed on the Chinese stock exchange are included in the sample for analysis.

3. Data and Sample Construction

We collected primary data on the identity of the award-winning firms directly from the China Entrepreneur Club website, and supplemented it with data from a variety of other sources. Data on firms' industries were collected from the CSMAR Database; data on firms' ownership structures came from the Rasset Database, and data about firms' globalization levels were collected from the annual reports of each individual firm. We collected firms' stock prices and other characteristics from the

⁶ The name list of the involved experts can be found in <http://www.daonong.com/green100/>.

CSMAR Database and Yahoo Finance.

Table 1 provides summary statistics of the companies winning the Annual Green Companies Award. Panel A presents the sample by award-granting years. In total, there were 77 awards granted to firms listed on the Chinese stock exchange. As some companies received the award more than once, these 77 awards were granted to 48 unique firms. In 2008 and 2009, 6 and 7, respectively, out of 20 winning companies were domestically listed on the Chinese stock exchange. In 2010 and 2011, 36 and 28, respectively, out of 100 winners were domestically listed. The full list of the winning companies can be found in Appendix 2.

Panel B summarizes the sample by size, pollution intensity, ownership structure, market concentration, leverage and the degree of globalization of the award-winning firms. Firms with a market value of equity lower than the median are defined as small firms. Of the 77 awards in our sample, 58 were granted to firms belonging to low-pollution industries, as defined by the Ministry of Environmental Protection of China (MEPC); a list of all high-pollution industries is provided in Table 1. Fifty-six of the awards went to firms that were not state-owned enterprises (SOEs), that is, whose largest shareholder was not the state. Market concentration is measured by the Herfindahl-Hirschman Index (HHI), which is the sum of the squares of market shares of all firms in each industry. If an industry's HHI is higher than the median, it is defined as an industry with high concentration. In the sample, 39 firms are in industries with high concentration. A firm's leverage is measured by its total debt divided by total assets. Firms with leverage lower than the median are defined as having low leverage. There are 38 firms in the sample having low leverage. We proxy

for the extent of a firm's exposure to global markets using a dummy variable for whether the firm receives positive revenue from abroad; 47 awards went to firms with revenue from abroad.

Table 2 provides descriptive statistics for the sample firms and the correlation coefficient matrix of the explanatory variables used in our empirical analysis. All monetary values were adjusted by the Chinese consumer price index (CPI) using 2010 as the base year, and then converted to values in US dollars. The market value of a firm was measured as its value five trading days prior to the announcement date of the Green Company Award. The mean of the market value of winning firms was \$16.8 billion, and the median was \$5.914 billion.

The book value of total assets, leverage, market concentration, and return on equity (ROE)⁷ were measured at the end of the year prior to the announcement year. As shown in Panel A of Table 2, the mean book value of total assets was \$102.8 billion, the mean leverage was 0.597, the mean value of market concentration was 1500.24 and the mean ROE was 15.6 percent. When a firm belongs to a low-pollution industry, is not owned by the state, or has positive revenue from abroad, the corresponding indices in our tables are set equal to one; otherwise, these indices are equal to zero. Panel A of Table 2 shows that the mean values of the indices for the low-pollution industries, non-SOEs and the level of globalization were 0.779, 0.727 and 0.597, respectively. Panel B presents the correlation coefficients of the explanatory variables that we will use in later regressions. The index for non-SOEs is significantly negatively correlated with the index for globalization at the 5% level and

⁷ ROE was measured as net income divided by book value of total equity.

with the index for low-pollution industry at the 10% level. The index for high concentration is significantly positively correlated with the index for low-pollution industry and negatively correlated with the index for low leverage at the 1% level. In addition, the index for low leverage is also significantly positively correlated with the index for globalization at the 1% level. Finally, the correlation between ROE and the index for small firms is statistically significantly negative at the 5% level.

4. Empirical Strategy

In an efficient capital market, stock prices on any day fully reflect profits a firm is expected to earn in the future. (Fama, 1991) If the disclosed information about a firm's environmental performance diverges from investors' expectations and is perceived to affect the profitability of the firm, it will cause abnormal changes in the firm's stock price. This is the theoretical framework that underlies the method of event studies, as applied by Hamilton (1995), Khanna et al. (1998), Dasgupta et al. (2001), and others to examine the reaction of capital markets to environmental news. Following the same approach, in this paper we assess the impact of the announcement of environmental awards in China on the winning firms' stock prices.

A standard event study involves five steps: 1) identify the event of interest and define the event window; 2) select the sample used for the analysis; 3) predict a "normal" return during the event window in the absence of the event; 4) estimate the abnormal return within the event window, where the abnormal return is defined as the difference between the actual returns and predicted returns; and 5) test whether the abnormal return is statistically different from zero. When we estimate the predicted

“normal” returns in the third step, there are different models available. (MacKinlay, 1997) In our paper, we use the Capital Asset Pricing Model (CAPM).⁸

The Capital Asset Pricing Model can be expressed as:

$$R_{it} = R_{ft} + \alpha_i + \beta_i(R_{mt} - R_{ft}) + e_{it}. \quad (1)$$

Here, R_{ft} is the risk-free rate of return, R_{it} and R_{mt} are the return on security i and the market portfolio m respectively at day t , and e_{it} is an error term with mean equal to zero and variance equal to $\sigma_{e_i}^2$. Equation (1) is estimated using OLS over an estimation window prior to the event day.

In our paper, the risk-free rate, R_{ft} , is the daily adjusted one-year deposit rate in China. The return on the market portfolio, R_{mt} , is the daily weighted-average return of all stocks listed on the Chinese stock exchange. As mentioned above, all accounting data, stock prices and interest rates are obtained from the CSMAR Database.

Given the above definitions, the abnormal return for firm i on day t is defined as

$$AR_{it} = R_{it} - E(R_{it} | X_{it}), \quad (2)$$

where $E(R_{it} | X_{it})$ is estimated using Equation (1). MacKinlay (1997) shows that conditional on the market returns during the event window, the abnormal returns are jointly normally distributed with a zero mean and a variance of $\sigma^2(R_{it})$. MacKinlay (1997) also shows that as the period used for estimating the model grows large, $\sigma^2(R_{it}) \rightarrow \sigma_{e_i}^2$.

Thus, cumulative abnormal returns (CAR) for firm i over the event window from T1 to T2 can be calculated as follows:

⁸ We also estimate the Fama-French Three-Factor Model, and the results are consistent in most cases. Due to the space limitation, these results are not shown in the paper, but are available upon request.

$$CAR_i(T_1, T_2) = \sum_{t=T_1}^{T_2} AR_{it} . \quad (3)$$

The variance of CAR is thus given by

$$\sigma_i^2(T_1, T_2) = (T_2 - T_1 + 1)\sigma_{e_i}^2 . \quad (4)$$

In order to test the null hypothesis that the stock market does not respond to the event, the CARs first must be aggregated across all firms and then the cumulative average abnormal return (CAAR) is calculated as:

$$CAAR(T_1, T_2) = \frac{1}{N} \sum_{i=1}^N CAR_i(T_1, T_2) . \quad (5)$$

In addition to this equally-weighted CAAR, we also calculate a weighted CAAR in which the weight for each firm is the market value of its equity. A z-test can be applied to test the foregoing null hypothesis, and the z-statistic can be calculated as:

$$z = \frac{CAAR(T_1, T_2)}{\sqrt{(1 + \gamma) \text{var}(CAAR(T_1, T_2))}} \sim N(0, 1) , \quad (6)$$

where $\text{var}(CAAR(T_1, T_2)) = \frac{1}{N^2} \sum_{i=1}^N \sigma_i^2(T_1, T_2)$. γ in Equation (6) is an adjustment coefficient of the clustering effect of variances. (Ahlgren and Antell, 2011). A caveat to bear in mind is that, as MacKinlay (1997) points out, the normal distribution of z-statistics only holds asymptotically.

In an event study, it is essential to clearly identify the event day, the estimation window, and the event window. In this paper, the event day is defined as the day when the award is announced. If the stock market is closed on the day when the award is issued, then the next trading day on which the stock market is open is used as the event day.

The event day is denoted as Day 0. The other days are denoted by differences from the event day. For example, the day that is 3 days before the event date is

denoted as Day -3 and $[-3, 3]$ is used to denote the time period from 3 days before the event day to 3 days after the event day. The estimation window used in this paper is from 210 days to 11 days prior to the event day. For robustness, we explore a variety of different event windows, ranging in width from nine days to three days.⁹

5. Results

In this section we present our empirical results. We begin with our main results testing the direct impact of award announcements on shareholder value for the entire sample of firms. We then consider four robustness checks, one designed to address the potential concern that the Chinese stock market is inefficient, the second designed to address the possibility that the Green Companies Awards may not be viewed as credible, the third designed to check whether the announcements of Green Companies Awards are a surprise to the market, and the fourth designed to check how the stock market reacted to firms winning the award more than once. We conclude the section with a discussion of possible explanations for our findings.

5.1. Main Results

In this sub-section, we calculate cumulative average abnormal returns (CAARs) for different event windows using two alternative models, as presented in Table 3.¹⁰ One is the CAPM (shown in columns 1-2) and the other is the Fama-French Three-Factor Model (shown in columns 3-4). Panel A shows results for equally-

⁹ In our tables of results, we report on the windows $[-4,4]$, $[-3,3]$, $[-2,2]$, and $[-1,1]$. We also conducted analyses for the windows $[0,4]$, $[0,3]$, $[0,2]$, and $[0,1]$. However, the results were qualitatively similar, and for conciseness we do not report them. The full set of results is available upon request.

¹⁰ We drop two firms for which stock prices were not available; therefore table 3 shows the results estimated from the remaining 75 firms.

weighted CAARs for the full sample and Panel B shows results for equally-weighted CAARs for the sub-sample without contemporaneous financial announcements, as will be explained below.

As shown in columns 1-2 for the CAPM in Panel A of Table 3, equally weighted CAARs regarding various event windows are almost all negative. Furthermore, the CAARs over the event windows $[-4, 4]$ and $[-1,1]$ are significantly different from zero at least at the ten percent level, suggesting a significantly negative effect on the stock value of awarded companies. CAARs for the Three-Factor Model (columns 3-4) are negative for two out of four event windows in Panel A, but all CAARs are insignificant. Also, the difference between CAARs estimated using the CAPM and the Three-Factor Model is negligible, indicating that the results would not be seriously affected by the choice of model. For the most part, our findings in Table 3 cannot reject the null hypothesis that shareholders had no significant response to firms winning Green Company Awards. However, we do find significant negative responses for some event windows, so we believe our results are best viewed as indicating a non-positive response from shareholders.

One caveat about the event study methodology is that if any other events happened during the same period---such as announcements of a firm's financial policies---the estimated response of the stock market to the announcement of winning the Green Company Award might be contaminated. To address this issue, we check one by one to see whether there is any other event happening to each winning firm during the award announcement period. By excluding the award observations for firms that had other announcements during the Green Company Awards

announcement window, we obtained a sub-sample with 50 observations.

The results estimated with this sub-sample are reported in Panel B of Table 3. They are similar to those in Panel A. The equally-weighted CAARs are negative for most event windows estimated whether using the CAPM (columns 1-2) or the Three-Factor Model (columns 3-4). The results estimated for the $[-4, 4]$ event window are significantly different from zero at the one percent level for the CAPM (columns 1-2), and significantly different from zero at the five percent level for the Three-Factor Model (columns 3-4). In addition, the results estimated for the $[-1, 1]$ event window are significantly different from zero at the 5 percent level for the CAPM (columns 1-2). The Panel B results imply that the results in Panel A are not driven by the existence of other events during the Green Company Award announcement periods.

In summary, we find that the Chinese stock market had a non-positive response to announcements of firms winning Green Company Awards, which parallels the findings of Jacobs, Singhal and Subramanian (2010), but is inconsistent with some prior findings (Klassen and McLaughlin, 1996; Dasgupta et al. 2001). Before making a deeper dive into the factors that may explain our results, we conduct a series of robustness checks to ensure that our results are in fact meaningful.

5.2 Robustness Checks

In this section, we perform four kinds of robustness checks of our main findings. First, we explore whether the non-positive response to the Green Company Awards is driven by the inefficiency of the Chinese stock market. Second, we examine whether a lack of perceived credibility of the awards might be the reason for the non-positive

market response. Third, we estimate the abnormal daily volume during the event window to check whether the announcements are a genuine surprise. Fourth, we check whether the stock market reacted differently for firms awarded more than once.¹¹

5.2.1 Efficiency of the Chinese Stock Market

One might argue that the non-positive market response to the Green Company Awards could be due to the fact that the Chinese stock market is not efficient and thus the results estimated with Chinese stock prices are not reliable. To address this concern, we re-do the event study using data on award-winning firms listed on overseas markets. These firms received the Green Company Award and are listed on either the Hong Kong or the US stock markets. In this analysis, the prices provided by either the Hong Kong or the US stock markets are used.

We calculate the equally-weighted CAARs using the CAPM.¹² For firms listed on the Hong Kong stock market, we employ the Hengsheng Index as the market return and the daily-adjusted 1-year Hong Kong Interbank Offer Rate (HIBOR) as the risk-free rate. For firms listed on the US stock markets, the market return is the daily return of the NYSE or Nasdaq Index (based on where the firm is listed), and the risk-free rate is the daily adjusted yield of 1-year U.S. Treasury bills.

¹¹ Besides these four robustness checks, we also examine what the investors' responses would be if a previously awarded firm loses the Green Companies Award. Since we can only get 9 firms meeting this criterion, we do not illustrate the result in this section and only present it in the Appendix 3. Among the 9 firms, 7 of them are small firms, 6 of them are in low-pollution industries and 8 of them are non-SOEs. The results about CAARs suggest that if a previously awarded firm loses in the current year, its abnormal return on the announcement day would be non-negative or even significantly positive.

¹² Due to the lack of availability of some variables, we cannot estimate the Three-Factor Model.

Panel A of table 4 shows the distribution of firms in this sample. Twenty-two of the 31 firms in the sample were listed on the Hong Kong stock market, while 7 of the firms were listed on the NYSE and 2 firms were listed on Nasdaq. Twelve of the 31 firms won the green award in 2011, fourteen of them won it in 2010, two won it in 2009, and three won it in 2008.

Panel B shows the estimated CAARs using this sub-sample. CAARs estimated over all event windows are negative except for the event window $[-4, 4]$, but none are statistically significant. Overall, these results are similar to those shown in Table 3, suggesting that the non-positive response of the Chinese stock market to the announcement of winning the Green Company Awards is not driven by the inefficiency of the Chinese stock market.

5.2.2 Sample with Good Corporate Social Responsibility (CSR) Reports

A second concern is that investors might value firms' environmental performance, but they might not take the award as a credible indicator of good environmental performance. In order to explore this concern further, we collected data on the sample companies from Rankins CSR Ratings (RKS), which evaluates companies' CSR reports. If the winning companies earned high scores on their CSR reports, this would reinforce the validity of the Green Company Awards. Only the 2010 RKS reports are publicly available, so the number of sample firms having this report is limited.

Out of the 36 publicly listed companies that won the award in 2010, 31 have a record in the RKS evaluation system. Among these 31 firms, 25 are ranked in the top

50% of CSR reports according to the RKS evaluation system. As a robustness check, we exclude the 6 firms that were ranked in the bottom 50% of the CSR reports, and estimate CAARs using the CAPM and Three-Factor Model based only on the sub-sample of 25 firms that are listed and ranked in the top 50% according to RKS. The results are shown in Table 5.

From Table 5, we can see that the results based on this sub-sample of firms with good CSR reports are similar to the results using the full sample. The CAARs are more negative than those in Table 3, whether estimated using the CAPM or the Three-Factor Model. Additionally, those estimated over event window $[-1,1]$ are significant at the five percent level using the Three-Factor Model and significant at the ten percent level using the CAPM. We also conducted a similar analysis using this sub-sample but excluding those firms having contemporaneous financial announcements; the results are similar. These results are not shown in this paper, but are available upon request.

Based on the results above, we conclude that the Green Company Award is generally credible and that the negative responses of the stock market are not driven by investors' suspicion of the award itself.

5.2.3 Analysis of Abnormal Daily Volume

Some may argue that since most of the awarded firms have already been ranked in the top 50% of CSR reports, the non-positive abnormal returns during the event window would simply indicate that the information about CSR has previously been incorporated in stock prices. In order to rule out this possibility, we directly examine

the abnormal daily volume during the event window.

In order to make the abnormal volume for different firms comparable, we normalize the abnormal volume for each firm as the percentage of the deviation of the daily volume from the average level over the estimation period, which is from 210 days to 11 days prior to the event date. For any given event window, the average abnormal daily volume is measured by the mean of abnormal daily volumes of all firms over this event window. Besides the abnormal daily volume, we also compare volume shifts. Daily volume shift is defined as the volume change from one trading day to the next. To make different event windows comparable, we use the average of daily volume shifts over the event windows for our estimations.

Panel A of Table 6 shows the average abnormal daily volume (AADV) over different event windows. The average abnormal daily volumes for event windows [-4, 4], [-3,3], [-2,2] and [-1,1] are significantly positively, and measure 15.24%, 15.65%, 15.54% and 19.21%, respectively. The fact that the AADV for the event window [-1,1], i.e. the announcement day, is the highest suggests that the announcement news is indeed a surprise to the market. In terms of the volume shifts over the event windows, as shown in Panel B of Table 6, average daily volume shifts (ADVS) are also significantly positively over different event windows. Again, ADVS for the event window [-1,1] is the highest, which is consistent with the findings shown in Panel A in this table.

5.2.4 How Stock Markets Reacted for Firms Repeatedly Awarded

Being awarded repeatedly indicates a firm's commitment to conduct

environmental friendly activities. Even in an environment with loose enforcement on corporate social responsibilities, with the passage of time a firm's consistent adherence to a code of environmental improvement could make it stand out from the crowd, get attention and receive respect from the public. From this perspective, the stock market is expected to react more positively if a firm is awarded for the second or more time. On the other hand, being awarded repeatedly could suggest that substantial amounts of resources are being diverted from production, leading to a concern about the firm's profitability. From this perspective, the stock market might react more negatively if a firm is awarded for the second or the later time. Therefore, there is no clear theoretical prediction regarding how the stock market should react to firms receiving the award more than once.

In our sample, we identify 28 firms which were awarded repeatedly. Eighteen of them were awarded twice and 10 of them were awarded three times. We estimate the equally-weighted CAAR each time these firms were awarded. Table 7 presents the results. Panel A of Table 7 shows the results for firms awarded twice while Panel B of Table 7 shows the results for firms awarded three times. As shown in Panel A, the stock market reaction to the first award is negative but insignificant, and the stock market's reaction to the second award does not change much relative to the first time. The similarity between the market reaction to the first and second awards is also illustrated in Panel B. However, as shown in Panel B in Table 7, the investors' reactions to the third award are significantly positive during all event windows. This suggests that, even if the market does not react positively at the beginning, a firm's commitment to take on social responsibilities could be recognized by the market in

the long run. It also helps explain why firms persist in applying for this award even if they cannot get positive rewards at the beginning.

5.3 Possible Explanations for the Findings

Thus far, we have shown that shareholders of Chinese firms that won Green Company Awards did not respond positively on average when the award was announced. Assuming that maximizing firm value is the ultimate objective for rational shareholders of a company, any action diverging from this objective will not be appreciated. Although taking on social responsibilities may increase social welfare, it is inconsistent with the interest of shareholders who bear the costs of such actions but cannot receive immediate gains. Thus, Chinese firms appear to face a trade-off between better environmental management and better financial performance. Our evidence suggests that in China today the benefits of environmental management to a typical firm---such as avoiding regulatory penalties or increasing revenue from better employee morale or corporate reputation---are limited or non-existent.

Poor environmental management often results in non-compliance with government regulations, which may generate both regulatory penalties and a negative reaction from the financial markets. For example, Jarrell and Peltzman (1985) found product recalls provoked a negative market reaction. However, whether the converse is true, that is, whether superior environmental performance will increase firm value, depends upon both the costs and the benefits of CSEP.

In terms of costs, when government enforcement of environmental regulations is weak, the likelihood of being punished for poor environmental performance is low,

as is its cost. As a result, the value of superior performance is reduced. Empirical evidence indicates that there is indeed a large difference in the enforcement of environment regulations between China and industrialized countries (Lin 2007). In addition, in China the development of environmental public interest litigation is very slow.¹³ At the same time, since many environmental problems are derived from government's incentive to promote economic development, the government's environmental protection department may have little incentive to initiate environmental litigation. Although NGOs could also initiate such litigation, a lack of sufficient financing and a lack of knowledge of environmental laws may prevent them from conducting environmental lawsuits. In such settings, firms with poor environmental management can economize on the costs of good environmental management and still avoid punishment from the government. Hence, winning the award may send a signal that the firm has taken costly measures to reduce pollution, and hence is at a cost disadvantage relative to competitors. Indeed, according to the 2008 Corporate Social Responsibility Report conducted by the State-owned Assets Supervision and Administration Commission of State Council (SASAC), 56% of investigated companies think that taking social responsibilities will increase their operating costs or reduce their operating efficiency.¹⁴ The report of the SASAC in 2009 also stated that the general level of corporate social responsibility performance in China is low and that about half of Chinese companies take no actions in this field or have just begun to pay attention to corporate social responsibility.¹⁵

¹³ See: <http://www.daonong.com/green/policy/20110719/31163.htm>

¹⁴ See <http://www.daonong.com/g/7/cover/20100427/16613.html>

¹⁵ http://www.china.com.cn/economic/txt/2009-12/27/content_19139266.htm

To compound the lack of significant penalties for poor performance, only a few publicly listed firms publish reports on sustainability or corporate social responsibility, and the stock exchange in China does not provide any specific requirements regarding the content of such reports. Thus, ratings agencies and investment banks generally do not consider firms' social responsibility performance when they estimate the value of firms.¹⁶ Hence, weakly enforced environmental regulations and a general lack of awareness of firms' environmental performance could explain the non-positive response to the announcements of winning the Green Company Award in China.

Winning the award may impose an additional cost: by drawing the public's attention to a firm's sustainability performance, it raises public expectations for future improvements. If the firm cannot carry out its promises or continue performing well in this area, its public reputation may be seriously hurt.¹⁷ Thus, winning companies may need to spend more on social responsibility performance in the future, but without the expectation that they will be rewarded.¹⁸

In terms of benefits, since consumers benefit from a cleaner natural environment, firms may generate more revenue by building up their long-term reputation for caring about the social consequences of their production activities. However, this will happen only when consumers have recognized the importance of a clean environment and are willing to pay for it. As a developing country, China began

¹⁶ See: <http://www.daonong.com/green/policy/20110720/31201.html>

¹⁷ Zimmerman (2010) points out that this is a significant concern for US companies.

¹⁸ The website of the China Entrepreneur Club states that the Green Company Award is truly a meaningful commitment for winning companies since these companies will not be able to receive this award again if they violate their promise to practice social responsibility in the future. (<http://www.daonong.com/green/hot/20110530/29995.html>)

paying attention to environmental issues years later than industrialized countries. Thus, the commitment to protecting the environment on the part of people in China is still much weaker than in industrialized countries. This reduces the potential top-line benefits from firms' superior environmental performance and raises the relative costs of good environmental management. Thus, less appreciation of superior environmental performance by Chinese society could be another reason for the non-positive response to the announcement of the Green Company Award in China.

6. Heterogeneous Responses to the Announcements

The previous section showed that on average the stock market responds non-positively to the announcement that a firm received a Green Company Award. In this section, we investigate potential heterogeneity in responses to the announcement across different firms. We focus on six firm characteristics: firm size, pollution intensity, extent of government ownership, market concentration, firm leverage and exposure to globalization.

The cross-sectional analyses in this section are conducted based on the full sample of 75 firms using the CAPM. We also used the Three-Factor Model to estimate normal returns and do the same cross-sectional analyses except for the analysis regarding firm size (because the size effect has been controlled in the Three-Factor Model), and the results are generally robust.

6.1 Firm Size

We first calculated market value weighted CAARs over different event windows

using the CAPM. As shown in Panel A of Table 8, value-weighted CAARs are higher than the equally-weighted CAARs presented in Table 3. This suggests that the impact of the award announcement might vary with firm size. Specifically, the award announcement may more negatively affect smaller firms. We thus further divided our full sample into two groups based on firm size and estimated the equally-weighted CAARs for large firms and for small firms. The results are shown in Panel B of Table 8. We measure firm size according to the market value of equity at the end of the year before the announcement of winning an award.¹⁹ Large firms are defined as those in the 50th percentile and above for this variable and are shown in columns 1-2, while small firms are defined as those below the 50th percentile and are shown in columns 3-4. From the table, we can see that the CAARs of small firms are all negative and two of them are statistically significantly different from zero at least at the five percent level. However, none of the CAARs of the large firms are significant.

It is plausible that investors may expect large firms to take on greater levels of social responsibility, since such firms receive more public attention and legal enforcement attention than small firms. For large firms, social welfare and shareholder interests may be in less tension with one another. At the same time, large firms have more human and financial capital, so expenditures on socially friendly activities may be only a small percentage of their total costs. Therefore shareholder value will not be dramatically damaged from environmental expenditures. In contrast, for small firms which have lower visibility in the market, investors may be less

¹⁹ We also tried other variables, such as book value of total assets at the end of the year prior to the announcement year, to measure firm size. The results are similar and not reported, but are available upon request.

concerned about their social and environmental performance; hence there may be weaker incentives for small firms to undertake socially friendly activities. When a small firm wins an environmental award, this may simply imply to investors that the firm spends too many resources on social responsibilities, which may reduce its profitability. Moreover, since the capital of small firms is relatively limited, winning such an award may be especially undesirable. Therefore, shareholders may rationally tend to interpret small firms winning environmental awards as negative news and thus lower their expectations of firm values.

To explore this question further, we regress estimated CAARs on all of the factors discussed in our cross-sectional analyses—six dummies capturing the effects of small firms, firms in low-pollution industries, non-SOEs, firms in the industry with high market concentration, firms with low leverage and firms having positive revenues from overseas markets, respectively—and other control variables. The CAARs are estimated over the event windows $[-1,1]$, $[-2,2]$, $[-3,3]$ and $[-4,4]$. The indicator for small firms equals one if the firm's market value of equity is below the median. The control variables include the return on equity (ROE), a linear time trend, and a dummy for firms that received the award more than once. In the regressions, standard errors allowing for heterogeneity and auto-correlation are calculated.

The regression results are reported in Table 14. It shows that the coefficient on the small firm dummy is negative regardless of the choice of event window, but it is not precisely estimated. The regression results thus suggest there is no significant difference between the abnormal returns of large and small firms when we simultaneously consider the influence of other factors, such as pollution level,

governmental connection and globalization level.

6.2 Pollution Intensity

We next examine the possibility that shareholders differed in their responses depending on the extent to which a firm is a major polluter. To do so, we divide the full sample into two different groups – high-pollution industries and low-pollution industries – according to the pollution intensity of the firm’s industry and we report the equally-weighted CAARs for each group in Table 9.

Table 9 shows that CAARs for the low-pollution industry group are negative over all event windows, and statistically significant for some event windows. In contrast, the CAARs for the high-pollution industry group are positive but not significantly different from zero over most event windows. This suggests that the announcement of winning a Green Company Award is more likely to be regarded as negative information for firms in low-pollution industries than for those in high-pollution industries.

Moreover, the regression results shown in Table 14 confirm the findings in Table 9 that firms in low-pollution industries responded more negatively to award announcements than those in high-pollution industries, even when we control for all other factors. In Table 14, the coefficients of the indicator for low-pollution industries are significantly negative at the 5% level over event windows [-3,3] (in columns 3) and at the 10% level over the event window [-2,2] and [-4,4] (in column 2 and 4). In all the regressions, we calculate standard errors allowing for heterogeneity and auto-correlation.

Shareholders' different reactions to award announcements for low-pollution and high-pollution industry groups are consistent with the different characteristics of these two types of industries. Firms in high-pollution industries are under tighter legal supervision. If these firms do not perform well on social and environmental dimensions, they might face costly penalties in the future. However, if these firms undertake enough socially friendly activities to enhance their reputations, they may obtain real benefits, such as a more competitive position and greater market share, which may compensate for the costs of conducting these activities. Thus, after taking into account these possibilities, investors might think that firms in high-pollution industries will benefit financially from an environmental award that confirms their performance on social responsibility.

Our results suggest that firms in low-pollution industries have few reasons to undertake environmentally friendly activities, consistent with the notion that they face fewer regulatory constraints. For these firms, good social and environmental performance does not generate higher valuation of their stocks. Instead, an emphasis on social responsibility apparently is seen as indicating that the firm has incurred unnecessary costs. Furthermore, winning an environmental award may lead to more public attention on these firms' environmentally friendly activities, which will encourage them to make further expenditures on this field in the future. Both the existing and potential future costs of taking on more social responsibilities imply that shareholders of low-pollution firms may rationally react negatively to award announcements.

6.3 Government Ownership

In this section, we investigate whether the stock market responds differently to award announcements for firms with different levels of government connections. We use a simple proxy for government connections: whether the firm's largest shareholder is the state, i.e. whether the firm is a state-owned enterprise (SOE).

Table 10 shows estimated CAARs for firms whose largest shareholder is (in columns 1-2) or is not (in columns 3-4) the state. The CAARs are all negative for non-SOEs, and the CAARs over event windows $[-4, 4]$, $[-2, 2]$ and $[-1, 1]$ are significant at least at the 5% level. In contrast, the estimated CAARs for SOEs are insignificant for most event windows.

Similarly, the regression results in Table 14 show that the coefficient on the dummy for non-SOEs is negative and significant at least at the 5% level over event windows $[-4, 4]$, $[-2, 2]$ and $[-1, 1]$, after controlling for a variety of independent variables.

The above results suggest that the stock market responds significantly negatively to award announcements for firms without close government connections. One possible explanation is that SOEs tend to attract more public attention, and are under greater political pressure, and hence face stricter monitoring of environmental issues. Likewise, it is also possible that these firms will receive preferable treatment by the government if they receive an environmental award. In any event, the CAARs for state-owned enterprises tend to be less negative than firms without strong government connections, presumably due to some combination of lower future costs

and higher potential benefits.

For firms without significant government ownership, the potential benefits generated by superior environmental performance are likely to be low, due in part to the relatively low likelihood of monitoring and enforcement (Lin 2007). Therefore, receiving an environmental award for these firms may have no significantly positive effect on their stocks' value. On the other hand, an announcement of winning the award also leads to more public attention to their social responsibility performance, and hence these firms may have to spend more money on this issue. Due to few benefits and higher future costs, the award announcement seems to be negative news for firms without substantial state ownership, leading to the significantly negative CAARs estimated.

6.4 Market Concentration

In this section, we investigate whether the market reacted differently to the announcement of winning the award for firms in industries with different levels of market concentration. As described in Section 3, we use the HHI to measure market concentration, where a larger HHI means higher market concentration. We divided our sample into two groups: the high concentration group includes firms in industries with HHI greater than the median and the low concentration group includes firms in industries with HHI less than the median. We calculated the equally-weighted CAARs for each group as shown in Table 11. Except for the event window [-4,4], the CAARs for the high-concentration group are equally or more negative than those for the low-concentration group. However, the CAARs are not statistically significant over most

event windows.

Furthermore, the regression results confirm this finding. As shown in Table 14, the coefficients on the index for high market concentration are negative for all event windows except for [-4,4], but only the coefficient for the event window [-1,1] is statistically significant at even the 10% level. These results indicate that industry concentration did not have a significant impact on how the market responded to a firm receiving a Green Company Award.

6.5 Firm Leverage

We estimate the relationship between firm leverage and stock market reactions to award announcements in this section. We divide the sample into two groups based on firms' leverage level: firms having leverage higher than the median are assigned to the high leverage group, while firms having leverage lower than the median are assigned to the low leverage group. The equally-weighted CAARs for each group are shown in Table 12. It shows that firms with lower leverage have experienced more negative reactions than the firms with higher leverage. None of the CAARs for firms having higher leverage is significant, while CAARs over event windows [-4, 4] and [-1, 1] for firms having low leverage are significantly negative at the 1% level. As pointed out by Ross (1977), only high-quality firms can sustain a high level of leverage, so firms can signal quality by choosing a high leverage ratio. High leverage would then indicate that firms have adequate capital and thus these firms may experience less negative market reactions to the award announcement.

The OLS regressions shown in Table 14 indicate that whichever event window

is used, the coefficients on the dummy indicating firms with low leverage are all negative, though they are not precisely estimated. Thus, leverage does not appear to play a significant role in market responses to Green Company Awards once other factors are taken into account.

6.6. Degree of Globalization

In this section, we examine whether a firm's exposure to globalization affects investors' reactions to Green Company Award announcements. We collect data regarding firms' annual revenue distribution across different regions from sample firms' annual reports. More revenue raised from foreign markets relative to total revenue is considered to indicate a higher globalization level for a firm. We divide the full sample into two groups: firms with positive revenue from foreign markets and firms without revenue from foreign markets. Table 2 shows that roughly 60% of firms in our sample have positive revenue from abroad.

The results reported in Table 13 show that CAARs for the two groups of firms are similar. With the exception of the $[-1,1]$ window for firms with overseas revenues, neither group of firms has CAARs significantly different from zero. This indicates that a firm's globalization level does not appear to have a major effect on investors' reactions to green award announcements.

As in the previous sections, we go on to conduct regressions to explore the overseas revenue effect in the context of other variables, as reported in Table 14. As shown in all four columns of Table 14, the coefficient on the dummy for firms having positive revenue from overseas markets is consistently negative but never statistically

significant. This confirms the findings in Table 13 that the responses of firms with or without positive revenue from overseas markets are similar. One possible reason is that the index for positive revenue from abroad is statistically significantly correlated with the index for non-SOE, so it may be that the effect of exposure to globalization on abnormal returns has been absorbed by the effect of the index for non-SOEs.

In summary, based on cross-sectional comparisons of CAARs using different criteria and several kinds of multivariate regressions, we find that the effects of industry pollution level and government ownership are consistently significant under most event windows. Privately owned firms and firms in low-pollution industries are more likely to suffer from negative market reactions to Green Company Awards. These firms tend to receive less public attention, less enforcement supervision and may have less access to subsidized capital to undertake socially friendly activities, so such activities may cause greater conflicts with their shareholders' objective of maximizing firm value. Additionally, winning an environmental award may draw more public attention toward these firms, raising public expectations and leading to a further increase in costs. Government appears to remain a key driver of environmental improvement in China, with the market punishing privately-owned firms for investing in environmental improvement unless these firms are in high-pollution industries.

7. Announcement Effects for Portfolios of Peer Firms and Matched Pair Firms

In addition to the announcement effects on firms that win awards, it is possible that rival companies in the same industry would also be affected by the announcement

of the Green Company Awards. If the award is seen as a signal that a firm has high costs, then other firms in the same industry might be expected to benefit; if the award signals superior managerial ability or better preparedness for environmental risks, then rivals would be expected to suffer share price declines.

To explore these possibilities, we first estimate the CAARs for portfolios of industry competitors of the sample firms. Every winning firm is associated with one portfolio of peer firms, which contains all the other firms in the same industry. We use the industry classification system of the Chinese Securities Regulation Commission (CSRC), which identifies each industry using a capital letter between A and M followed by two digits. For each portfolio, we first calculate its daily weighted average raw returns over the estimation and event windows. The weights used are the market value of equity of firms in each portfolio prior to the estimation window. The industry name, industry code, pollution level, the number of rival firms and average market value of equity of each portfolio²⁰ are presented in columns 3 to 8 of Appendix 2. We estimate normal returns of portfolios of peer firms based on the CAPM Model. Then we calculate equally-weighted CAARs for peer portfolios over different event windows and compare the differences in CAARs between peer portfolios and those of awarded firms.

A potential concern is that firms in the same industry could still have different characteristics such as leverage, profitability and size. It is possible that these factors would also influence market reactions to the award announcements. For example, the

²⁰ The average market value of equity of each portfolio (column 8 in Appendix 2) is defined as the average market value of equity over all firms in the portfolio. It is adjusted by the Chinese consumer price index (CPI) using 2010 as the base year, and then converted to values in US dollars. The exchange rate is the rate on the day prior to the estimation window for each winning firm.

higher leverage of awarded firms might make these firms more responsive to the awards. To address this concern, we take a further step to calculate the CAARs for pair firms matched by industry, leverage, return on assets and total equity.

We find a paired firm for each winning firm in the following way. We first rank all listed firms in the same industry as the winning firm by their leverage at the end of the year prior to the winning year. Then we divide all the firms into three groups by leverage: top one third, middle one third, and bottom one third. We only keep the group to which the winning firm belongs. We repeat the above process, but replace leverage with return on assets measured at the end of the year prior to the winning year. In the last step, we repeat the same process again but using total assets measured at the end of the year prior to the winning year as the grouping variable. If there is only one firm left in the same group as the winning firm after some step, then we define this firm as the winning firm's matched pair firm. Otherwise, we use the firm which remained in the same group as the winning firm in the third step and whose total equity is the closest to that of the winning firm as the matched pair firm. At the end of this procedure we obtained 75 matched pair firms for 75 awarded firms. We then replicate the estimation in Section 5.1 to calculate the CAARs for matched pair firms over different event windows using the CAPM Model and compare the CAARs to the CAARs of awarded firms. In addition, we also divide the matched firms into two groups based on the market concentration of their industries and replicate the estimation in Section 6.4.

The results are presented in Table 15. Panel A indicates that the CAARs for peer portfolios are significantly positive over the event windows [-2,2] but

insignificant over other event windows. The CAAR for peer portfolios is significantly higher than the CAARs of awarded firms over the event window [-1,1].

The estimated CAARs for matched pair firms are shown in Panel B in Table 15. They are positive over event windows [-2,2] and [-1,1], but are not statistically significant. When compared to the CAARs of awarded firms, the CAAR of matched pair firms is significantly higher over the event window [-1,1], which is similar to the results in Panel A of Table 15.

Panel C of Table 15 shows CAARs estimated using the CAPM model and the sample of matched pair firms. Columns 1-2 show the results for firms in industries with high concentration while columns 3-4 show the results for firms in industries with low concentration. For firms in industries with high concentration, the CAARs are positive over all event windows. However, the CAARs for firms in industries with low concentration are mixed, negative over event windows [-4,4] and [-3,3] and positive over event windows [-2,2] and [-1,1]. None of the CAARs are significant, though, so concentration does not appear to explain peer effects.

In contrast to previous research which finds more negative abnormal returns of rival portfolios than firms with positive news (Fisher-Vanden and Thorburn, 2011), we find that the announcement effect for rival portfolios and matched pair firms is more positive than that for award-winning firms. This finding suggests that investors do not anticipate more intensive across-the-board enforcement of environmental regulations after the Green Company Award is issued. In contrast, since environmental enforcement tends to be persistently weak in China, the competitors of our sample firms may be able to cut costs on environmentally friendly activities and

obtain a competitive advantage relative to firms winning awards. Thus, investors in non-winning peer firms might rationally react positively to the announcement of the Green Company Award.

8. Conclusions

We have shown that firms winning the annual Green Company Awards in China from 2008 to 2011 experienced non-positive effects on shareholder value. Robustness checks suggest that these findings are not driven by the inefficiency of the Chinese financial market, a lack of perceived credibility of the award, or a lack of surprise of the announcements news to the market.

We conducted additional cross-sectional analyses to investigate heterogeneity in market reactions across different firms. The results show that shareholders of firms in low-pollution industries and firms whose largest owner is not the state responded more negatively to award announcements than their counterparts.

Estimation of announcement effects for portfolios of winning firms' rival companies and pair firms matched by industry, leverage, return on assets and equity illustrates that investors in competitors reacted more positively than did investors in award-winning firms, providing further support for the notion that investors view winning firms as having unduly high costs due to their environmental leadership.

Shareholders' non-positive responses to award announcements indicate that market forces provide limited incentive for environmental improvement in China. Nevertheless, firms in high-pollution industries are not penalized for environmental leadership, and three-time award winners actually receive significant positive

abnormal returns, so there is some evidence of positive incentives for environmental improvement. Furthermore, the market does not penalize environmental leadership by state-owned enterprises, indicating that the Chinese central government does indeed provide some incentives for environmental protection through exercising the control that comes with ownership.

Our results regarding state-owned enterprises offer a surprising parallel with results on environmental awards received by U.S. firms (Jacobs et al. 2010), which tend to generate negative abnormal returns for awards not granted by government. Although there is much talk of green consumers and green investors in the U.S., in both countries it appears that a key benefit of corporate environmentalism comes about through building stronger relationships with government.

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Appendix 1:
Appraisal Criteria of the Green Company Awards

Level 1 Criteria/Weight	Level 2 Criteria/Weight	Level 3 Criteria
1. Prospective Corporate Culture (10%)	Corporate Culture (50%)	Value and Internal Regulation
		Employee Participation
	Sustainable Strategy (50%)	Prospective
		Incorporate into Core Business Operation
Risk Identification (30%)	Overall Operation Risk Assessment and Response	
2. Business Advantage (15%)	Operating Performance (25%)	Main Finance Data
		Tax and Employment
	Rank within Industry (25%)	Market Share and Brand Influence
Green Growth (50%)		Eco-friendly Operation Effect
		“Green” Products and Services
3. Eco-friendly operation (30%)	Policy and System (40%)	Recognition and Initiative of Environmental Impacts
		Operation of Environment Improvement and Management System
		Tackling Climate Change
	Management Performance (60%)	Environmental Performance Index
		Life-cycle Management
		Supply Chain Management
4. Socially Responsible Practice (30%)	Stakeholders (60%)	Shareholders and Investors
		Employees
		Consumers
		Communities and NGOs
		Government and Industry Association
		Disadvantaged Group
	Philanthropy Activity and Donation (15%)	Environmental and Non-Environmental Events
	Information Disclosure (25%)	Corporate Responsibility Report
		External Communication
		Other Information Disclosure
5. Driving Force from Innovation (15%)	R&D Input (35%)	Proportion of R&D Input, Proportion of Clean Technology Input,
	Organizational System (25%)	Scale of Research Staffs and Distribution of Institutions
	Innovation Performance (40%)	The Number of Patents, Transformation of Scientific and Technological Achievements

Appendix 2:
List of A-share Listed Winning Companies

Announcement Date	Company Name	Industry Name	Industry Code	Pollution Level	Number of Peer Firms	Average Market Value of Peer Firms (\$billion)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
2008-4-23	Baoshan Iron and Steel Co.,Ltd	Ferrous Metals Smelting and Pressing	C65	High	30	3.017
2008-4-23	Beijing YanJing Brewery CO.,LTD	Beverage Production	C05	Low	21	1.523
2008-4-23	China Merchants Bank Co. Limited	Banking	I01	Low	7	40.498
2008-4-23	China Vanke Co., Ltd	Real Estate Development and Management	J01	High	85	1.050
2008-4-23	Qingdao Haier Co.,Ltd.	Electric Equipment Manufacturing	C76	Low	43	0.975
2008-4-23	Suning Appliance Co.,Ltd	Retailing	H11	Low	51	0.711
2009-4-23	China Cosco Holdings Company Limited	Water Transportation	F07	Low	10	2.543
2009-4-23	China Shenhua Energy Company Limited	Coal Mining and Processing	B01	High	20	4.368
2009-4-23	China Southern Airlines Company Limited Co.,Ltd.	Air Transportation	F09	Low	6	4.445
2009-4-23	Far East Industrial Stock CO.,Ltd	Garments and Other Fibers Production	C13	High	17	0.966
2009-4-23	Industrial And Commercial Bank Of China Limited	Banking	I01	Low	13	36.767
2009-4-23	Tsingtao Brewery Company Limited	Beverage Production	C05	Low	24	1.840
2009-4-23	Ufida Software Co. Ltd.	Computer Applications Services	G87	Low	32	0.599
2010-4-26	Baoshan Iron & Steel Co.,Ltd.	Ferrous Metals Smelting and Pressing	C65	High	30	2.317
2010-4-26	Beijing Tongrentang Co.,Ltd.	Medical and Pharmaceutical Production	C81	High	79	0.677
2010-4-26	Beijing Vantone Real Estate Co.,Ltd	Real Estate Development and Management	J01	High	97	1.362
2010-4-26	China Cosco Holdings Company Limited	Water Transportation	F07	Low	11	1.705
2010-4-26	China Merchants Bank Co. Limited	Banking	I01	Low	13	42.556
2010-4-26	China Minsheng Banking Corporation Limited Co.,Ltd.	Banking	I01	Low	13	42.556
2010-4-26	China Southern Airlines Company Limited Co.,Ltd.	Air Transportation	F09	Low	6	2.572
2010-4-26	China Vanke Co.,Ltd.	Real Estate Development and Management	J01	High	97	1.362
2010-4-26	Far East Industrial Stock CO.,Ltd	Garments and Other Fibers Production	C13	High	19	0.885

2010-4-26	Gree Electric Appliances,Inc.of Zhuhai	Electric Equipment Manufacturing	C76	Low	55	1.371
2010-4-26	Guangdong Midea Electric Appliances Co.,Ltd.	Electric Equipment Manufacturing	C76	Low	55	1.372
2010-4-26	Hainan Airlines Co.,Ltd.	Air Transportation	F09	Low	6	2.574
2010-4-26	Hisense Electric Co.,Ltd	Household Electronics Manufacturing	C55	Low	13	0.530
2010-4-26	Industrial And Commercial Bank Of China Limited	Banking	I01	Low	13	42.542
2010-4-26	Industrial Bank Co., Ltd.	Banking	I01	Low	13	42.556
2010-4-26	Jiangsu Hongdou Industry Co.,Ltd.	Garments and Other Fibers Production	C13	High	19	0.932
2010-4-26	Kweichow Moutai Co.,Ltd.	Beverage Production	C05	Low	24	1.548
2010-4-26	Neusoft Corporation	Computer Applications Services	G87	Low	34	0.596
2010-4-26	Ping An Insurance (Group) Company Of China,Ltd.	Banking	I11	Low	2	48.438
2010-4-26	Qingdao Haier Co.,Ltd.	Electric Equipment Manufacturing	C76	Low	55	1.371
2010-4-26	Sany High Industry Co.,Ltd.	Transportation Equipment Manufacturing	C75	Low	68	1.064
2010-4-26	Shanghai Fosun Pharmaceutical (Group) Co.,Ltd.	Medical and Pharmaceutical Production	C81	High	79	0.678
2010-4-26	Shanghai Metersbonwe Fashion & Accessories Co., Ltd.	Retailing	H11	Low	58	0.607
2010-4-26	Sichuan New Hope Agribusiness Co.,Ltd.	Food Processing	C01	Low	28	0.601
2010-4-26	Suning Appliance Co.,Ltd.	Retailing	H11	Low	58	0.607
2010-4-26	Tcl Corporation	Household Electronics Manufacturing	C55	Low	13	0.530
2010-4-26	Tianjin Tasly Pharmaceutical Co.,Ltd	Medical and Pharmaceutical Production	C81	High	79	0.677
2010-4-26	Tongwei Co.,Ltd	Farming and Forestry Services	A09	Low	2	0.860
2010-4-26	Tsingtao Brewery Company Limited	Beverage Production	C05	Low	24	1.549
2010-4-26	Ufida Software Co. Ltd.	Computer Applications Services	G87	Low	34	0.596
2010-4-26	Wanxiang Qianchao Co.,Ltd	Transportation Equipment Manufacturing	C75	Low	68	1.064
2010-4-26	Weichai Power Co.,Ltd.	Transportation Equipment Manufacturing	C75	Low	68	1.065
2010-4-26	Xinjiang Goldwind Science&Technology Co.,Ltd	Electric Equipment Manufacturing	C76	Low	55	1.371
2010-4-26	Yantai Changyu Pioneer Wine Company Limited	Beverage Production	C05	Low	24	1.549
2010-4-26	Youngor Group Co.,Ltd.	Garments and Other Fibers Production	C13	High	19	0.932
2010-4-26	Zte Corporation	Communication Equipment Manufacturing	G81	Low	37	0.420
2011-4-22	Baoshan Iron & Steel Co.,Ltd.	Ferrous Metals Smelting and Pressing	C65	High	27	1.865
2011-4-22	Beijing Tongrentang Co.,Ltd.	Medical and Pharmaceutical Production	C81	High	87	1.146

2011-4-22	Beijing Vantone Real Estate Co.,Ltd	Real Estate Development and Management	J01	High	97	1.106
2011-4-22	China Cosco Holdings Company Limited	Water Transportation	F07	Low	12	1.325
2011-4-22	China Merchants Bank Co. Limited	Banking	I01	Low	12	32.163
2011-4-22	China Minsheng Banking Corporation Limited Co.,Ltd.	Banking	I01	Low	12	32.163
2011-4-22	China Southern Airlines Company Limited Co.,Ltd.	Air Transportation	F09	Low	5	5.773
2011-4-22	China Vanke Co.,Ltd.	Real Estate Development and Management	J01	High	97	1.106
2011-4-22	Gree Electric Appliances,Inc.of Zhuhai	Electric Equipment Manufacturing	C76	Low	68	1.451
2011-4-22	Hainan Airlines Co.,Ltd.	Air Transportation	F09	Low	5	5.773
2011-4-22	Industrial And Commercial Bank Of China Limited	Banking	I01	Low	12	32.163
2011-4-22	Industrial Bank Co., Ltd.	Banking	I01	Low	12	32.162
2011-4-22	Kweichow Moutai Co.,Ltd.	Beverage Production	C05	Low	26	2.244
2011-4-22	Neusoft Corporation	Computer Applications Services	G87	Low	48	0.865
2011-4-22	Ping An Insurance (Group) Company Of China,Ltd.	Banking	I11	Low	2	53.195
2011-4-22	Qingdao Haier Co.,Ltd.	Electric Equipment Manufacturing	C76	Low	68	1.451
2011-4-22	Sany High Industry Co.,Ltd.	Transportation Equipment Manufacturing	C75	Low	83	1.237
2011-4-22	Shanghai Fosun Pharmaceutical (Group) Co.,Ltd.	Medical and Pharmaceutical Production	C81	High	87	1.146
2011-4-22	Sichuan New Hope Agribusiness Co.,Ltd.	Food Processing	C01	Low	30	0.736
2011-4-22	Suning Appliance Co.,Ltd.	Retailing	H11	Low	60	0.769
2011-4-22	Tcl Corporation	Household Electronics Manufacturing	C55	Low	14	0.677
2011-4-22	Tianjin Tasly Pharmaceutical Co.,Ltd	Medical and Pharmaceutical Production	C81	High	87	1.146
2011-4-22	Tsingtao Brewery Company Limited	Beverage Production	C05	Low	26	2.245
2011-4-22	Ufida Software Co. Ltd.	Computer Applications Services	G87	Low	48	0.865
2011-4-22	Wanxiang Qianchao Co.,Ltd	Transportation Equipment Manufacturing	C75	Low	83	1.237
2011-4-22	Weichai Power Co.,Ltd.	Transportation Equipment Manufacturing	C75	Low	83	1.237
2011-4-22	Xinjiang Goldwind Science&Technology Co.,Ltd	Electric Equipment Manufacturing	C76	Low	68	1.451
2011-4-22	Zte Corporation	Communication Equipment Manufacturing	G81	Low	42	0.558

Note: This table presents the name of A-share listed companies that won the Green Companies Award. There were 240 companies that won the award from 2008 to 2011, and 77 were listed on the A-share market.

Appendix 3

Analysis of Sub-sample of Firms Losing Previous Awards

Event Window	CAPM Model		Three-Factor Model	
	CAAR	Z-statistics	CAAR	Z-statistics
[-4,4]	0.010	0.528	0.042**	2.124
[-3,3]	0.009	0.534	0.030*	1.753
[-2,2]	-0.002	-0.168	0.018	1.208
[-1,1]	0.007	0.611	0.019*	1.699
Observations	9		9	
	Small Firms		Low-pollution	Non-SOEs
Observations	7		6	8

"*", "**", or "***" means that the estimate is statistically significant at the level of 10%, 5%, or 1%, respectively.

Note: There are 9 firms in our sample that were awarded for at least one time in previous years but lost the award in a certain year. This table reports equal-weighted CAAR of the sub-sample. In the CAPM model, the normal return is the expected return estimated by CAPM model established using data from the estimation window. In the Three-Factor model, the normal return is the expected return estimated by Three-Factor model established using data from the estimation window.

Table 1
Sample Description

Panel A: Grouping According to Different Award Granting Years						
Announcement Date	2008/4/23	2009/4/23		2010/4/26		2011/4/22
Observations	6	7		36		28
Panel B: Grouping According to Different Criteria						
	Small Size	In Low-pollution Industry	Non-SOE	High Concentration	Low Leverage	Positive Revenue from Abroad
Yes	38	58	56	39	38	47
No	39	19	21	38	39	30

Note: The sample contains 77 Chinese firms domestically listed on the Chinese stock exchange, which won The Green Company Award. If a firm was awarded more than once, it will be counted as different firms. Announcement date is the day when the information of being awarded was firstly announced to the public. The cut off value between small size and large size is according to the median of the market value of equity of sample firms. When the market value of equity of a firm is lower than the median, it is defined as small firm, otherwise it is large firm. The definitions of low-pollution industry and heavy-pollution industry are according to the standard of Ministry of Environmental Protection of China (MEPC). According to the official documents numbered 2003[101] & 2007[105] issued by MEPC, there are 14 kinds of heavy-pollution industries, which includes metallurgy, chemical, petrochemical, coal, thermal power, building materials, paper making, brewing, pharmaceutical, fermentation, textile, leather and mining industry. Otherwise, an industry is classified as a low-pollution industry. The definition of the state owned enterprise (SOE) and non-SOE is based on the largest shareholder of a firm. If the largest shareholder of a firm is the state, then the firm is classified as a SOE. Otherwise, the firm is defined as non-SOE. Market Concentration is estimated by the Herfindahl-Hirschman Index (HHI), which is the sum of the squares of percentage sales of all firms in each industry. When a firm's HHI is higher than the median, it belongs to the group with high concentration. Leverage is defined as total debts divided by total assets. When a firm's leverage is lower than the median, it is defined as firm with low leverage. Revenue from abroad is calculated based on the data of firms' annual reports.

Table 2
Descriptive Statistics and Correlation Coefficients

Panel A: Descriptive Statistics								
	In Low-pollution Industry	Non-SOE	Concentration	Leverage	Positive Revenue from Abroad	ROE	Market Value of Equity (\$billion)	Book Value of Total Assets (\$billion)
Mean	0.779	0.727	1500.242	0.597	0.597	0.156	16.830	102.803
Median	1.000	1.000	1144.359	0.598	1.000	0.160	5.914	4.575
Std Dev	0.417	0.448	1246.680	0.222	0.494	0.146	33.022	348.131
Minimum	0.000	0.000	349.585	0.084	0.000	-0.690	0.102	0.021
Maximum	1.000	1.000	8432.930	0.955	1.000	0.495	179.027	2032.196
Panel B: Correlation Coefficients								
	In Low-pollution Industry	Non-SOE	High Concentration	Low Leverage	Positive Revenue from Abroad	ROE	Small Firm	
In Low-pollution Industry	1.000							
Non-SOE	-0.196 [*]	1.000						
High Concentration	0.343 ^{***}	-0.157	1.000					
Low Leverage	-0.103	-0.038	-0.387 ^{***}	1.000				
Positive Revenue from Abroad	0.013	-0.267 ^{**}	-0.120	0.316 ^{***}	1.000			
ROE	0.079	0.144	-0.191	0.071	-0.092	1.000		
Small Firm	-0.103	0.140	-0.120	0.253	0.098	-0.279 ^{**}	1.000	

"*", "**", or "***" means that the estimate of coefficient is statistically significant at the level of 10%, 5%, or 1%, respectively.

Note: When a firm is in low pollution industry, "In Low-pollution Industry"=1; else=0. When a firm's largest shareholder is not the state, "Non-SOE"=1; else=0.

Concentration is defined by the Herfindahl-Hirschman Index (HHI), which is the sum of the squares of percentage sales of all firms in each industry. When a firm's HHI is higher than the median, "High Concentration"=1; else=0. Leverage is defined as total debts divided by total assets. When a firm's leverage is lower than the median, "Low Leverage"=1; else=0. When a firm has positive revenue from abroad, "Positive Revenue from Abroad"=1; else=0. ROE is net income divided by book value of total equity at

the end of the year prior to the announcement year. Book value of total assets is also the accounting data at the end of the year prior to the announcement year. Market value of equity is total market value of a company's domestically listed stocks five trading days before announcement date. Both book value of total assets and market value of equity are denominated in U.S. dollar and adjusted for the effect of inflation. Calculation of inflation is according to Consumer Price Index (CPI) with base year at 2010. When the market value of equity of a firm is lower than the median, "Small Firm"=1; else=0.

Table 3
Main Results of Cumulative Average Abnormal Return (CAAR)

Event Window	CAPM Model	
	CAAR	Z-statistics
Panel A: Full Sample		
[-4,4]	-0.013 **	-2.010
[-3,3]	0.000	-0.070
[-2,2]	-0.004	-0.919
[-1,1]	-0.006 *	-1.930
Panel B: Sub-sample Without Firms Having Contemporaneous Financial Announcements		
[-4,4]	-0.019 ***	-2.678
[-3,3]	-0.004	-0.644
[-2,2]	-0.006	-1.120
[-1,1]	-0.008 **	-2.042

"*", "**", or "***" means that the estimate is statistically significant at the level of 10%, 5%, or 1%, respectively.

Note: The full sample contains 75 firms having stock price data during the event window. Ruling out 25 firms that announced other information, such as financial instruments, change of capital structure, or dividend distributions, during the event window, we constructed a sub-sample with the remaining 50 sample firms.

Table 4
Evidence From Winning Firms Cross-listed on Overseas Stock Exchanges

Panel A: Sample Description				
Listed Market		Hong Kong	NYSE	Nasdaq
Observations		22	7	2
Announcement Date	2008-4-23	2009-4-23	2010-4-26	2011-4-22
Observations	3	2	14	12
Panel B: Equally-weighted CAAR				
Event Window	CAPM			
	CAAR	Z-statistics		
[-4,4]	0.014	0.875		
[-3,3]	-0.011	-0.787		
[-2,2]	-0.015	-1.270		
[-1,1]	-0.009	-1.021		

"*", "**", or "***" means that the estimate is statistically significant at the level of 10%, 5%, or 1%, respectively.

Note: There are 31 firms listed overseas that won Green Company Awards. If a firm won the award more than one time, it is counted as different firms. Results in Panel B specify the CAPM to obtain normal returns. Since there is not enough data about prices of all stocks listed on overseas stock markets, we do not calculate CAARs using the Three-Factor Model.

Table 5
Analysis of Sub-sample of High-CSR Firms

Event Window	CAPM Model	
	CAAR	Z-statistics
[-4,4]	-0.018	-1.444
[-3,3]	-0.015	-1.427
[-2,2]	-0.012	-1.316
[-1,1]	-0.013*	-1.922

"*", "**", or "***" means that the estimate is statistically significant at the level of 10%, 5%, or 1%, respectively.

Note: Based on Rankins CSR Ratings (RKS) for the year 2010, 31 firms in our sample have CSR ranks. Ruling out 6 firms that are ranked in the bottom 50% according to RKS, we construct a sub-sample of 25 firms that are listed and ranked in the top 50%. This table reports equally-weighted CAARs of the sub-sample.

Table 6
Analysis of Volumes during different Event Windows

Panel A: Average Abnormal Daily Volume (AADV)		
Event Window	AADV (%)	T-statistics
[-4,4]	15.243**	2.110
[-3,3]	15.653**	2.166
[-2,2]	15.537**	2.150
[-1,1]	19.212***	2.659
Panel B: Average Daily Volume Shifts (ADVS)		
Event Window	AADV (%)	T-statistics
[-4,4]	0.171**	2.105
[-3,3]	0.186**	2.284
[-2,2]	0.174**	2.145
[-1,1]	0.229***	2.817

"*", "**", or "***" means that the estimate is statistically significant at the level of 10%, 5%, or 1%, respectively.

Note: In order to make the abnormal volume for different firms comparable, we first calculate the average daily volume for each firm over the estimation period. Then, we define the abnormal daily volume at time t as the actual daily volume at time t divided by the average daily volume then minus one. For given event window [-t, t], the average abnormal daily volume is measured by the mean of abnormal daily volumes over event dates and firms. Daily volume shift is defined as the volume change from one day to the next. To make different event windows comparable, we calculate the average of daily volume shifts over the event windows.

Table 7
Analysis of Sub-samples of Firms Repeatedly Awarded

Panel A: Sum-sample Awarded for Two Times						
Event Window	First Time		Second Time			
	CAAR	Z-statistics	CAAR	Z-statistics		
[-4,4]	-0.019	-1.556	-0.001	-0.034		
[-3,3]	-0.012	-1.218	0.004	0.266		
[-2,2]	-0.008	-0.977	-0.009	-0.886		
[-1,1]	-0.008	-1.249	-0.009	-1.166		
Observations	18		18			
Panel A: Sub-sample Awarded for Three Times						
Event Window	First Time		Second Time		Third Time	
	CAAR	Z-statistics	CAAR	Z-statistics	CAAR	Z-statistics
[-4,4]	-0.026	-1.268	-0.023 [*]	-1.663	0.027 ^{**}	2.034
[-3,3]	0.004	0.239	0.000	-0.042	0.033 ^{***}	3.017
[-2,2]	0.004	0.281	-0.003	-0.373	0.024 ^{***}	2.783
[-1,1]	0.018 [*]	1.756	-0.021 ^{***}	-3.100	0.014 ^{**}	2.169
Observations	10		10		10	

"*", "**", or "***" means that the estimate is statistically significant at the level of 10%, 5%, or 1%, respectively.

Note: There are 18 firms in our sample that were awarded for two times and 10 firms that were awarded for three firms. This table reports equal-weighted CAAR of these sub-samples. The normal return is the expected return estimated by CAPM model established using data from the estimation window.

Table 8
Cross-sectional Analysis Regarding Firm Size

Panel A: Value Weighted CAAR-Weighted by Market Value of equity				
Event Window	CAAR		Z-statistics	
[-4,4]	0.012 **		2.144	
[-3,3]	0.008 *		1.801	
[-2,2]	0.003		0.694	
[-1,1]	0.001		0.493	
Panel B: CAAR-Grouping by Different Firm Sizes				
Event Window	Large Size		Small Size	
	CAAR	Z-statistics	CAAR	Z-statistics
[-4,4]	0.000	-0.006	-0.027 ***	-2.828
[-3,3]	0.004	0.487	-0.004	-0.583
[-2,2]	-0.003	-0.438	-0.005	-0.860
[-1,1]	-0.002	-0.395	-0.011 **	-2.329
Observations	37		38	

"*", "**", or "***" means that the estimate is statistically significant at the level of 10%, 5%, or 1%, respectively.

Table 9
Cross-sectional Analysis Regarding the Level of Pollution of Firm's Industry

Event Window	Heavy-pollution Industry		Low-pollution Industry	
	CAAR	Z-statistics	CAAR	Z-statistics
[-4,4]	0.004	0.326	-0.018 **	-2.422
[-3,3]	0.021 *	1.960	-0.007	-1.077
[-2,2]	0.013	1.548	-0.009 *	-1.821
[-1,1]	0.007	1.091	-0.010 ***	-2.722
Observations	17		58	

"*", "**", or "***" means that the estimate is statistically significant at the level of 10%, 5%, or 1%, respectively.

Table 10
Cross-sectional Analysis Regarding State Ownership

Event Window	State		Not State	
	CAAR	Z-statistics	CAAR	Z-statistics
[-4,4]	0.014	1.030	-0.024 ***	-3.152
[-3,3]	0.010	0.896	-0.004	-0.703
[-2,2]	0.013	1.451	-0.010 **	-2.117
[-1,1]	0.013 *	1.952	-0.014 ***	-3.691
Observations	21		54	

"*", "**", or "***" means that the estimate is statistically significant at the level of 10%, 5%, or 1%, respectively.

Table 11
Cross-sectional Analysis Regarding Industry Concentration (HHI)

Event Window	High Concentration		Low Concentration	
	CAAR	Z-statistics	CAAR	Z-statistics
[-4,4]	-0.005	-0.593	-0.021 **	-2.265
[-3,3]	-0.006	-0.839	0.006	0.755
[-2,2]	-0.009	-1.553	0.002	0.270
[-1,1]	-0.011 **	-2.465	-0.001	-0.243
Observations	37		38	

"*", "**", or "***" means that the estimate is statistically significant at the level of 10%, 5%, or 1%, respectively.

Table 12
Cross-sectional Analysis Regarding Firm Leverage

Event Window	High Leverage		Low Leverage	
	CAAR	Z-statistics	CAAR	Z-statistics
[-4,4]	-0.002	-0.211	-0.025 ***	-2.648
[-3,3]	-0.001	-0.096	0.000	-0.003
[-2,2]	-0.003	-0.512	-0.005	-0.789
[-1,1]	0.002	0.383	-0.014 ***	-3.135
Observations	37		38	

"*", "**", or "***" means that the estimate is statistically significant at the level of 10%, 5%, or 1%, respectively.

Table 13
Cross-sectional Analysis Regarding Globalization level

Event Window	Yes		No	
	CAAR	Z-statistics	CAAR	Z-statistics
[-4,4]	-0.014	-1.521	-0.012	-1.339
[-3,3]	0.000	-0.059	0.000	-0.038
[-2,2]	-0.004	-0.644	-0.004	-0.688
[-1,1]	-0.011 **	-2.362	0.000	0.048
Observations	45		30	

"*", "**", or "***" means that the estimate is statistically significant at the level of 10%, 5%, or 1%, respectively.

Table 14
OLS Regressions

Dependent Variable: CAR over Different Event Windows				
Event Window	[-1,1]	[-2,2]	[-3,3]	[-4,4]
Small Firm=1	-0.008 (0.010)	-0.003 (0.012)	-0.007 (0.015)	-0.020 (0.020)
In Low-pollution Industry=1	-0.015 (0.011)	-0.023* (0.012)	-0.029** (0.014)	-0.040* (0.022)
Non-SOE=1	-0.035*** (0.012)	-0.030** (0.015)	-0.020 (0.018)	-0.042** (0.018)
High Concentration=1	-0.024* (0.013)	-0.015 (0.016)	-0.009 (0.018)	0.010 (0.022)
Low Leverage=1	-0.019 (-0.013)	-0.006 (-0.016)	-0.003 (-0.018)	-0.016 (-0.022)
Having Positive Revenue from Abroad=1	-0.016 (0.015)	-0.007 (0.019)	-0.004 (0.021)	-0.006 (0.026)
ROE	-0.069 (0.074)	-0.056 (0.101)	-0.032 (0.105)	-0.058 (0.111)
Time Trend	-0.001 (0.008)	-0.002 (0.009)	-0.005 (0.010)	0.006 (0.014)
Firm Awarded More Than One Time=1	0.002 (0.015)	0.015 (0.019)	0.028 (0.021)	0.023 (0.029)
Constant	0.062* (0.033)	0.054 (0.039)	0.051 (0.045)	0.028 (0.052)
Observations	75	75	75	75
R ²	0.217	0.118	0.093	0.142
Adj-R ²	0.108	-0.005	-0.032	0.024

"*", "**", or "***" means that the estimate is statistically significant at the level of 10%, 5%, or 1%, respectively. Values reported in the parentheses are robust standard errors.

Table 15
Cumulative Average Abnormal Returns (CAARs) for Comparable Portfolios or Firms

Panel A: CAAR for Portfolios of Peer Firms				
Event Window	CAAR	Z-statistics	Difference in CAAR Comparing to Awarded Firms	Z-statistics
[-4,4]	-0.004	-0.979	0.009	1.027
[-3,3]	-0.005	-1.444	-0.005	-0.629
[-2,2]	0.005*	1.667	0.009	1.385
[-1,1]	0.003	1.382	0.010*	1.866
Numbers of Portfolios		75		75
Panel B: CAAR for Matched Pair Firms				
Event Window	CAAR	Z-statistics	Difference in CAAR Comparing to Awarded Firms	Z-statistics
[-4,4]	-0.013	-1.562	0.000	-0.017
[-3,3]	-0.004	-0.467	-0.003	-0.308
[-2,2]	0.003	0.547	0.007	0.865
[-1,1]	0.006	1.162	0.012*	1.788
Numbers of Pair Firms		75		75
Panel C: Cross-sectional Analysis Regarding Industry Concentration-CAPM A18Model				
Event Window	High Concentration		Low Concentration	
	CAAR	Z-statistics	CAAR	Z-statistics
[-4,4]	-0.008	-0.790	-0.018	-1.373
[-3,3]	-0.006	-0.653	-0.001	-0.067
[-2,2]	-0.007	-0.836	0.014	1.397
[-1,1]	-0.001	-0.131	0.012	1.613
Observations		37		38

"*", "**", or "***" means that the estimate is statistically significant at the level of 10%, 5%, or 1%, respectively.