How do investors respond to Green Company Awards in China?

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A B S T R A C T

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 suggest 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. Introduction

Many ﬁrms in developed countries have decided that integrating sustainability into their business strategy is proﬁtable (Esty and Winston, 2006; Ndumolou et al., 2009). The business beneﬁts of pro-active sustainability strategy are less clear in emerging and transition economies, where environmental and social regulations may be lacking or poorly enforced, and demand for greener products may be virtually non-existent (Blackman, 2010; Earnhart et al., 2013).

China is of particular interest since it combines elements of a market-based economy (e.g., in coastal export zones), a developing economy (e.g., in rural regions), and a transition economy (e.g., with the privatization of state-owned enterprises). News reports suggest China 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, China has begun taking measures to increase environmental fees, to increase reliance on renewable energy, and to tolerate environmental protests and non-governmental organizations (Mol and Carter, 2006). 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 leads to better corporate ﬁnancial performance 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.

One way of cutting through the tangle of causality is to focus on a discrete event that occurs 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, 1997). Such ﬁnancial “event studies” can identify the impact on proﬁtability of good or bad environmental news.

In this paper, we use the event study methodology to examine how ﬁnancial markets responded when Chinese ﬁrms received awards for their environmental and social performance. Data on industrial and, more importantly, on environmental performance are notoriously

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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 begun to establish some empirical regularities. First, environmental problems that are likely to generate regulatory penalties or legal liability are punished by capital markets, in both developed and developing countries (Capelle-Blancard and Laguna, 2010; Dasgupta et al., 2001; Karpoff et al., 2005; Klassen and McLaughlin, 1996; Lanoie and Laplante, 1994; Lanoie et al., 1998; Muoghalu et al., 1990). Second, emissions of toxic chemicals, even unregulated ones, by U.S. firms are viewed negatively by investors (Bettenhausen et al., 2010; Hamilton, 1995; Khanna et al., 1998; Konar and Cohen, 2001). Third, negative ratings by third parties reduce stock prices significantly both in the U.S. and in India (Beatty and Shimshack, 2010; Gupta and Goldar, 2005; Lyon and Shimshack, 2012). Thus, there appears to be an emerging consensus that stock markets punish bad environmental news.

Whether good environmental news is rewarded by financial markets is much more controversial. Some research finds that corporate participation in environmental management systems (Cañón-de-Francia and García-Ayerbe, 2009; Wang and Yuan, 2004) 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) from substantive action; 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 (Fisher-Vanden and Thorburn, 2011; Reid and Toffel, 2009).

Awards granted by credible third parties would appear to be immune from the criticisms that they are simply greenwash on the part of self-promoting firms, 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 developing countries (Dasgupta et al., 2001). More recent work on U.S. firms (Jacobs et al., 2010) finds insignificant average market reactions to both self-reported corporate environmental efforts and recognition granted by third parties for environmental performance; however, the market reacted negatively to announcements of voluntary emissions reductions and awards from non-governmental sources.

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-pollution 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 incompetence 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 China, the main incentives for firms to improve their environmental performance are transmitted through state ownership, and that otherwise the market actually discourages firms from greening themselves.

The remainder of the paper is organized as follows. Section 2 provides background information on the 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 explores heterogeneity in winning firms’ treatment by investors. 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 2008,1 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 business leaders, political dignitaries, academic authorities, NGO representatives and mainstream journalists, from China and abroad, have attended the summits.2 Supporters include the 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 communication on issues of 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 operation; socially responsible practice; and driving force from innovation. 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.3 After the final selection, the results of the award are announced during the Annual Summit of China Green Companies, 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 firms with shares publicly listed on the Chinese Stock Exchange are included in our sample.

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 Resset 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 CSMAR Database and Yahoo Finance.

In total, there were 77 awards granted to firms listed on the Chinese Stock Exchange. As some companies received the award more than

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1 The China Entrepreneur Club was launched in 2006 by 31 of China’s most influential economists, such as Weiying Zhang, the former Dean of Guanhu 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.


3 The name list of the involved experts can be found in http://www.daonong.com/green100/.
once, these 77 awards were granted to 48 unique firms. Table 1 provides descriptive statistics for the sample firms. All monetary values were adjusted by the Chinese Consumer Price Index (CPI) using 2010 as the base year, and then converted to values in U.S. 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.

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 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 this approach, 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).4

The Capital Asset Pricing Model can be expressed as:

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

Here, $R_{ft}$ is the risk-free rate of return, $R_{m}$ and $R_{mt}$ are the return on security $i$ and the market portfolio $m$ respectively at day $t$, and $\epsilon_{it}$ is an error term with mean equal to zero and variance equal to $\sigma^2$. Eq. (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.

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 Eq. (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, $\sigma^2(R_{it}) \rightarrow \sigma^2$.

Thus, cumulative abnormal returns (CAR) for firm $i$ over the event window from $T_1$ to $T_2$ can be calculated as follows:

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

The variance of CAR is thus given by

$$\sigma^2_i(T_1, T_2) = (T_2 - T_1 + 1)\sigma^2. \quad (4)$$

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:

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

where $\text{var}(\text{CAAR}(T_1, T_2)) = \frac{1}{N} \sum_{i=1}^{N} \sigma^2_i(T_1, T_2)$. In Eq. (6), $\gamma$ is an adjustment coefficient of the clustering effect of variances (Abghen 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 day 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 9 days to 3 days.5

5. 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 three robustness checks, one testing whether the award announcements are a surprise to the market, the second addressing the potential concern that the Chinese stock market is inefficient, and the third addressing the possibility that the Green Companies Awards may not be viewed as credible. We conclude the section with a discussion of possible explanations for our findings.

5.1. Main Results

We calculate cumulative average abnormal returns (CAARs) for different event windows using the CAPM, as presented in Table 2.6 Panel A shows results for equally-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 Panel A, equally weighted CAARs regarding various event windows are negative for three of the four event windows

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4 We also estimate the Fama and French (1992) Three-Factor Model, and the results are consistent in most cases. Due to space limitations, these results are not shown in the paper, but are available upon request.

5 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.

6 We drop two firms for which stock prices were not available; therefore Table 3 shows the results estimated from the remaining 75 firms.
The Ministry of Environmental Protection of China (MEPC) identifies 14 high-pollution industries, including metallurgy, chemical, petrochemical, coal, thermal power, building materials, paper making, brewing, pharmaceutical, fermentation, textile, leather and mining industry. An industry is classified as a low-pollution industry if it is not one of these 14.

Table 1

<table>
<thead>
<tr>
<th>In low-pollution industry</th>
<th>Non-SOE</th>
<th>Industry concentration (HHI)</th>
<th>Leverage</th>
<th>Positive revenue from abroad</th>
<th>ROE</th>
<th>Market value of equity ($ billion)</th>
<th>Book value of total assets ($ billion)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>0.779</td>
<td>0.727</td>
<td>1500.242</td>
<td>0.597</td>
<td>0.597</td>
<td>0.156</td>
<td>16.830</td>
</tr>
<tr>
<td>Median</td>
<td>1.000</td>
<td>1.000</td>
<td>1144.359</td>
<td>0.598</td>
<td>1.000</td>
<td>0.160</td>
<td>5.914</td>
</tr>
<tr>
<td>Std Dev</td>
<td>0.417</td>
<td>0.448</td>
<td>1246.680</td>
<td>0.222</td>
<td>0.494</td>
<td>0.146</td>
<td>33.022</td>
</tr>
<tr>
<td>Minimum</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.064</td>
<td>0.000</td>
<td>-0.690</td>
<td>0.102</td>
</tr>
<tr>
<td>Maximum</td>
<td>1.000</td>
<td>1.000</td>
<td>8422.930</td>
<td>0.955</td>
<td>1.000</td>
<td>0.495</td>
<td>179.027</td>
</tr>
</tbody>
</table>

Notes:

- The Ministry of Environmental Protection of China (MEPC) identifies 14 high-pollution industries, including metallurgy, chemical, petrochemical, coal, thermal power, building materials, paper making, brewing, pharmaceutical, fermentation, textile, leather and mining industry. An industry is classified as a low-pollution industry if it is not one of these 14.
- When a firm's largest shareholder is not the state, “Non-SOE = 1; else = 0.
- Concentration is defined by the Herfindahl-Hirschman Index (HHI). When a firm's industry 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 equity at the end of the year prior to the announcement. Calculation of inflation is based on the 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.

The results estimated with this sub-sample are reported in Panel B of Table 2. They are similar to those in Panel A. The equally-weighted CAARs are negative for all event windows estimated. The results estimated for the [-4,4] event window are significantly different from zero at the 1% level, and the results estimated for the [-1,1] event window are significantly different from zero at the 5% level. 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. Before diving deeper 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

We present three kinds of robustness checks of our main findings. First, we estimate the abnormal daily volume during the event window to check whether the announcements are a genuine surprise. Second, we explore whether the non-positive response to the Green Company Awards is driven by the inefficiency of the Chinese stock market. Third, we examine whether a lack of perceived credibility of the awards might be the reason for the non-positive market response.

5.2.1. Analysis of Abnormal Daily Volume

One possible explanation for the non-positive abnormal returns during the event window is that the information about firms' environmental and social performance had already been absorbed by the market and 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 use the percentage deviation of the daily volume from the average level over the estimation period. For any given event window, the average abnormal daily volume is measured as the mean of abnormal daily

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7 Although not reported here, 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.

8 We also conducted other robustness checks, which we do not present here due to space concerns. We tested whether the stock market reacted differently for the 28 firms that won the award more than once. Winners of a second award received negative but insignificant responses from the market, much like firms winning the award for the first time. We also examined how investors responded to the 9 winning firms that subsequently failed to win again. Estimates using the CAPM produce insignificant CAARs, but the Three-Factor Model produces positive and significant CAARs for three of the four event windows examined, confirming our main finding that the market responds non-positively to firms that win the award.
volumes of all firms over this event window. Besides the average 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 calculate the average of daily volume shifts over the event windows.

5.2.2. Efficiency of the Chinese Stock Market

One might worry that our results are unreliable because the Chinese stock market is not efficient. To address this concern, we re-do the event study using data on award-winning firms listed on either the Hong Kong or the U.S. stock markets. In this analysis, the prices provided by either the Hong Kong or the U.S. stock markets are used.

We calculate the equally-weighted CAARs using the CAPM. 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 U.S. 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.

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. CAARs estimated using this sub-sample of firms are negative for most event windows, but none are statistically significant. Due to space constraints we do not present the results here, but overall they are similar to those in Table 2, 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.

5.2.3. Sample with Good Corporate Social Responsibility (CSR) Reports

A third concern is that investors might value firms’ environmental performance, but not take the award as a credible indicator of good environmental performance. In order to explore this concern, we collected data on the sample companies from Ranksin 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.

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 based only on the remaining sub-sample of 25 firms. The results based on this sub-sample of firms are similar to, though more negative than, the results using the full sample. 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.

5.3. Possible Explanations for the Findings

Shareholders of Chinese firms that won Green Company Awards did not respond positively on average when the award was announced. Our evidence suggests that in China today investors perceive that 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. Hence, the award may simply signal that the firm has taken unnecessary and costly measures to reduce pollution, and hence is at a cost disadvantage relative to competitors.

These findings comport with available information on the institutional environment in China. Local governments often prioritize protecting local economic interests over environmental quality; they often lack authority, organizational capacity and resources; and they often face powerful business interests that try to undermine environmental enforcement actions (van Rooij and Lo, 2010). In addition, the development of environmental public interest litigation has been very slow. 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.

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. Thus, winning companies may need to spend more on social responsibility performance in the future, but without the expectation that they will be rewarded.

In terms of the benefits of being green, since consumers benefit from a cleaner natural environment, firms may increase sales by building a

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


12 Zimmerman (2010) points out that this is a significant concern for U.S. companies.

13 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).
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. There is little evidence that incomes and attitudes in China have reached this point. Overall, then, it appears that the markets do not reward environmental improvement 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.

6.1. Sources of Heterogeneity

We consider six possible sources of heterogeneity: firm size, industry pollution intensity, state ownership, industry concentration, firm leverage ratio, and firm export exposure (the operational definition of each term can be found in the notes to Table 1).

6.1.1. Firm Size

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. Large firms also have more human and financial capital with which to invest in socially friendly activities.

6.1.2. Industry Pollution Intensity

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. Hence, investors might believe firms in high-pollution industries will benefit financially from an environmental award that confirms their performance on social responsibility.

6.1.3. State Ownership

State-owned enterprises (SOEs) tend to attract more public attention, and hence may face stricter monitoring of environmental issues. It is also possible that these firms receive more public attention and hence may face stricter performance on social responsibility.

6.1.4. Industry Concentration

Firms in relatively unconcentrated industries might benefit more from a Green Company Award because it increases their perceived differentiation relative to competitors. Alternatively, firms in concentrated industries might benefit more from an Award because it complements their existing brand image.

6.1.5. Leverage Ratio

As pointed out by Ross (1977), only high-quality firms can sustain a high level of leverage (total debts divided by total assets) 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.

6.1.6. Export Exposure

Firms with significant exposure to export markets may face greater pressure for good environmental and social performance.

6.2. Analysis of Firm Heterogeneity

To conduct our analysis, we regress estimated CAARs on the six dummy variables discussed above, along with other control variables: 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 CAARs are estimated over the event windows $[-1,1]$, $[-2,2]$, $[-3,3]$ and $[-4,4]$.

The regression results are reported in Table 4. 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.

The coefficients on the low-pollution dummy are significantly negative at the 5% level over event window $[-3,3]$ and at the 10% level over the event windows $[-2,2]$ and $[-4,4]$. This indicates 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. For these firms, an emphasis on social responsibility apparently is seen as indicating that the firm has incurred unnecessary costs.

The coefficients on the non-SOE dummy are negative for all event windows, and statistically significant at the 5% level or better for all windows except $[-3,3]$. With few short-run benefits and higher future costs, the award announcement seems to be bad news for firms without substantial state ownership.

The coefficients on the high-concentration dummy 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. The coefficients on the low-leverage dummy are all negative.

<table>
<thead>
<tr>
<th>Event window</th>
<th>$[-1,1]$</th>
<th>$[-2,2]$</th>
<th>$[-3,3]$</th>
<th>$[-4,4]$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small firm</td>
<td>-0.008</td>
<td>-0.003</td>
<td>-0.007</td>
<td>-0.020</td>
</tr>
<tr>
<td>Low-pollution industry</td>
<td>-0.015</td>
<td>-0.023*</td>
<td>-0.029*</td>
<td>-0.040*</td>
</tr>
<tr>
<td>Non-SOE</td>
<td>-0.035***</td>
<td>-0.030*</td>
<td>-0.020</td>
<td>-0.042***</td>
</tr>
<tr>
<td>High concentration</td>
<td>-0.024*</td>
<td>-0.015</td>
<td>-0.009</td>
<td>0.010</td>
</tr>
<tr>
<td>Low leverage</td>
<td>-0.010</td>
<td>-0.006</td>
<td>-0.003</td>
<td>-0.016</td>
</tr>
<tr>
<td>Having positive revenue from abroad</td>
<td>-0.016</td>
<td>-0.007</td>
<td>-0.004</td>
<td>-0.006</td>
</tr>
<tr>
<td>ROE</td>
<td>-0.089</td>
<td>-0.056</td>
<td>-0.032</td>
<td>-0.058</td>
</tr>
<tr>
<td>Time trend</td>
<td>-0.001</td>
<td>-0.002</td>
<td>-0.005</td>
<td>0.006</td>
</tr>
<tr>
<td>Firm awarded more than once</td>
<td>0.002</td>
<td>0.015</td>
<td>0.028</td>
<td>0.023</td>
</tr>
<tr>
<td>Constant</td>
<td>0.063*</td>
<td>0.054</td>
<td>0.051</td>
<td>0.028</td>
</tr>
<tr>
<td>Observations</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>75</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.217</td>
<td>0.118</td>
<td>0.093</td>
<td>0.142</td>
</tr>
<tr>
<td>Adj-$R^2$</td>
<td>0.108</td>
<td>-0.005</td>
<td>-0.032</td>
<td>0.024</td>
</tr>
</tbody>
</table>

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

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14 The definitions of low-pollution industry and heavy-pollution industry come from the Ministry of Environmental Protection of China (MEPC). According to the official documents numbered 2003 [101] and 2007 [105] issued by MEPC, there are 14 kinds of heavy-pollution industries, including 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.
though they are not precisely estimated. Finally, the coefficient on the dummy for firms having positive revenue from overseas markets is consistently negative but never statistically significant.

In summary, we find that 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 are also 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). 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. 15 We estimate normal returns of portfolios in the third step and whose total equity is the closest to that of the winning firm. At the end of this procedure we obtained 75 matched pair firms for 75 awarded firms. We then replicated the estimation in Section 5.1 to calculate the CAARs for matched pair firms over different event windows using the CAPM and compared the CAARs to the CAARs of awarded firms. In addition, we also divided the matched firms into two groups based on the market concentration of their industries and replicated the estimations.

The results are presented in Table 5. Panel A indicates that the CAARs for peer portfolios are significantly positive over the event window [−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 5. 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 5.

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 a lack of surprise of the announcement news to the market, the inefficiency of the Chinese financial market, or a lack of perceived credibility of the award.

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.

<table>
<thead>
<tr>
<th>Table 5</th>
<th>Cumulative average abnormal returns (CAARs) for comparable portfolios or firms.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Event window</td>
<td>CAAR</td>
</tr>
<tr>
<td>Panel A: CAAR for portfolios of peer firms</td>
<td></td>
</tr>
<tr>
<td>[−4,4]</td>
<td>−0.004</td>
</tr>
<tr>
<td>[−3,3]</td>
<td>−0.005</td>
</tr>
<tr>
<td>[−2,2]</td>
<td>0.005*</td>
</tr>
<tr>
<td>[−1,1]</td>
<td>0.003</td>
</tr>
<tr>
<td>Numbers of portfolios</td>
<td>75</td>
</tr>
<tr>
<td>Panel B: CAAR for matched pair firms</td>
<td></td>
</tr>
<tr>
<td>[−4,4]</td>
<td>−0.013</td>
</tr>
<tr>
<td>[−3,3]</td>
<td>0.004</td>
</tr>
<tr>
<td>[−2,2]</td>
<td>0.003</td>
</tr>
<tr>
<td>[−1,1]</td>
<td>0.006</td>
</tr>
<tr>
<td>Numbers of pair firms</td>
<td>75</td>
</tr>
</tbody>
</table>

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

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15 The average market value of equity of each portfolio 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 U.S. dollars. The exchange rate is the rate on the day prior to the estimation window for each winning firm.
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 still provide limited incentive for environmental improvement in China. Nevertheless, firms in high-pollution industries are not penalized for environmental leadership, 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 findings are consistent with the notion that the Communist Party leadership in China is torn between a desire to strengthen environmental protection, and a fear of taking any action that might reduce GDP growth rates (Li, 2012). This fear stops the central government from reforming the incentives faced by local government authorities, who still mostly perceive GDP growth as the overriding measure of success and thus hesitate to enforce environmental laws. Our results suggest the central government may be using state ownership to promote stronger environmental management within SOEs, without risking changes in the incentives of local government authorities.

Our findings on the importance of state ownership offer a 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 the firm’s relationship with government.

Acknowledgments

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References