Government Environmental Audit Can Improve Company Performance

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Abstract. Environmental regulation could affect many aspects of production and operation of companies. Company performance is an important index to measure its operation. We use a quasi-natural experiment to explore how government environmental auditing influence company performance in China from 2003 to 2017. The results illustrate that environmental auditing could improve company performance. This effect is more significant in state-owned company and private company than in foreign and other company. It also influence more significantly on companies with low technical level than high technical level. The difference of internal control level of a company does not have significant influence on the impact of environmental auditing on company performance. We further examine the moderate impact of innovation. The result shows that under the supervision of government auditing, the performance of companies with high innovation ability would be better.

1. Introduction

Government regulation is very important to companies, which will have different impacts on companies. In general, it could influence company environmental governance, company environmental responsibility information disclosure and company environmental performance. For company environmental governance, the higher the intensity of government environmental auditing, the higher the level of environmental investment of companies (Cai Chun, Zheng Kaifang, & Wang Peng, 2021). Environmental auditing carried out by the National Audit Office could significantly improve the level of company environmental responsibility information disclosure and the quality of environmental responsibility information (Cai Chun, Zheng Kaifang, Chen Ye, & Wang Peng, 2019). For company environmental performance, government environmental audit has a significant positive impact on company environmental performance by playing the functions of disclosure, prevention and prevention (Yu Lianchao, Zhang Weiguo, Bi Qian, & Dong Jinting, 2020). In essence, government environmental audit is a more strict environmental regulation system than traditional audit, and it is the government's direct intervention in whether companies can fulfill the corresponding environmental indicators. This may have an impact on the operation of companies.

In the process of environmental auditing policy intervening in company production, companies may adopt corresponding ways to adjust their business model. For those companies with a strong sense of social responsibility, they adopt better environmental measures and are more likely to attract financial investors (Doh, 2010). This gives more chance for them to improve their performance. For those companies with no good reputation and environmental consciousness, in order to maintain superficial performance and environmental indicators, they may conceal or fail to disclose their business situation in a timely manner (Ji Jiadi, 2017). When the government strengthens environmental auditing, it will have a negative impact on the performance of these companies.

In this study, we will discuss how government environmental auditing influence the company performance and its theoretical mechanism. This study makes some contribution as follows. First, we explore the microeconomic impact of tighter government environmental policies on companies. Second, we use a quasi-natural experiment to prove our conclusion about the actual impact of government environmental auditing on company performance. Third, we analysis the influence of innovation regulation mechanism on it.

The remainder of this study is organized as follows. Section 2 reviews the relevant literature on government environmental auditing and company performance. Section 3 is about the mechanisms of how government environmental auditing influences the performance of companies. Section 4 illustrates the data and sample we use. Section 5 presents the results of this study and section 6 gives the conclusion.

2. Literature Review

In the existing literature, scholars have conducted a lot of research on environmental audit as follows. Environmental auditing affects environmental performance. Some scholars believe that with the...
development of government environmental audit, the performance of environmental management has been significantly improved. When auditing system including auditing intensity, penalty intensity and judicial intensity is strengthened, its impact is more significant (Yu Lianchao et al., 2020). Companies have better environmental performance if they use both the external environmental auditing and the internal one (Aslam, 2020).

Environmental auditing affects company information disclosure. Government environmental auditing could promote the fulfillment of company environmental information disclosure responsibility, which could be influenced by the level of legalization and media attention (Cai Chun, Zheng Kaifang, Chen Ye, & Wang Peng, 2019). Under the supervision of government environmental auditing, companies with higher internal control quality could pay more attention to environmental protection, which assume their own environmental responsibility, and take the initiative to disclose environmental information. Government environmental auditors could use media environmental supervision to promote the environmental information of the audited companies, so as to better manage the environment (Zhang Jijian, 2016).

Some scholars have found that there is a positive correlation between company financial performance like earnings per share and company environmental information disclosure (Sri, 2018). And other scholars believe that there is also a positive correlation between environmental performance and financial performance (Albertini, 2013).

In the existing literature, environmental policy and performance are usually analyzed by establishing regression models. For environmental auditing, some scholars measured whether a prefecture-level city had carried out a government environmental auditing in that year, which represents the environmental auditing (Zeng Changli & Li Jiangtao, 2018). Huang Rongbing (Huang Rongbing, 2013) measured whether the country carries out environmental audit as an indicator based on Environmental Audits Worldwide. They usually describe the impact of environmental auditing at the national and city levels at a macro level. For company performance, Zhang Xiangjian used return on asset, return on equity and return on sales to measure (Zhang Xiangjian, Xu Jin, & Xu Longbing, 2015). Some scholars used financial performance and human resource performance (employee satisfaction, employee productivity) as the standard to measure company performance (Jia Jianfeng, Tang Guiyao, Li Junpeng, Wang Wenjuan, & Shan Xiang, 2015). Wu Xiaobo measured company performance from five aspects: sales revenue, market share, profit before tax, profit after tax and return on investment (Wu Xiaobo, Chen Xiaoling, & Li Jingyan, 2015). Besides, he mentioned that both exploratory innovation and exploitive innovation have positive impact on company performance. Now, many literatures discuss the impact of environmental policies on the environmental performance of companies. But they mostly focus on green indicators such as energy conservation and emission reduction. There are not many literatures linking government environmental auditing with financial indicators such as company performance. In this study, we examine the influence of environmental auditing on company performance.

3. Theoretical rationale

Government auditing may directly influence the technology innovation ability of companies. Strengthening environmental regulation by local governments could significantly improve the innovation ability of companies. Through the increase of R&D investment and the mediating effect of financing constraints, companies could improve their innovation ability (Miao Miao, 2019). The relationship between environmental regulation and company technological innovation shows a dynamic characteristic of decline and then rise (Jiang Fuxin, 2013). Companies would improve their technology and pollution control levels in response to stricter environmental audits. However, excessive pollution control costs will crowed out other R&D income of companies, thus weakening technological innovation ability.

Government environmental auditing may improve the performance of companies through innovation ability. In company with high innovation level, its performance will be significantly improved. Innovation ability including both organizational innovation and technological innovation capability have a positive impact on company performance (Wang Xigang, 2016). The higher the intensity of innovation input, the higher the efficiency of innovation transformation, and the effective innovation output will be formed in a shorter time, which will have a positive impact on company performance. Such companies have a high level of innovation and will meet the government’s requirements for environmental auditing in a short period of time, thus it is more flexible. Some scholars believe that there is an inverted U-shaped relationship between innovation input and company performance. In a certain period of time, companies are affected by external environmental factors and increase their own investment in innovation so as to improve their performance. However, excessive investment in innovation will increase the operating cost of companies (Xu Zhaocheng & Hou Jingchuan, 2019).

4. Research method

4.1 Research setting

In order to strengthen the government's supervision of environmental policies, the National Audit Office issued “the Opinions of the National Audit Office on Strengthening the Audit work of Resources and Environment” in 2009. Environmental auditing is related to social responsibility auditing, which more emphasis on prior auditing. Environmental auditing is to check the efficiency of each unit's management and use of resources, and to put forward opinions and suggestions for the audit goal. The production and operation characteristics of heavy polluting companies are more important to
environmental problems, so we should take the lead in carrying out research and pilot work (Zhao Lu, Xu Linyu, & Wang Kai, 2017).

In this study, we use a unique event that “The Opinions of The National Audit Office on Strengthening the Audit Work of Resources and Environment” were promulgated to make government environmental auditing influence companies performance. We use the quasi-natural experiment to do a difference-un-difference analysis to study the influence of government environmental auditing on companies performance.

4.2 Data and Sample

In this section, we illustrate the data source and sample. All the data we collected are from the China Stock Market & Accounting Research (CSMAR) database. This study selects A-share industrial listed companies in Shanghai and Shenzhen stock markets from 2003 to 2017 as the research object. The selection of industrial listed companies refers to “Industrial Classification of National Economy” (GB/T4754-2011) and “Guidelines on Industry Classification of listed companies” (2012). It includes three kinds of industry, the mining industry, the manufacturing industry and electricity, heat, gas and water production and supply industry. At the same time, we eliminate the selected samples with some missing data and ST or ST* condition during the sample period from 2003 to 2017. In order to avoid the influence of extreme values on research results, all continuous variables mentioned in this study are indented 1% above and below.

4.3 Empirical Model

In order to study the influence of government environmental auditing on companies performance, we use a difference-in-difference method to build this model: 

\[ \text{ROA} = \alpha_0 + \alpha_1 \text{Treat} + \alpha_2 \text{After} + \alpha_3 \text{Treat} \times \text{After} + \mu X_j + \epsilon \]

The definition and description of variables in this article are as follows:

1. Company performance (ROA)
   ROA represents return on asset, which is calculated by dividing a company’s annual earnings by its total assets. It is used to measure how much net profit is generated per unit of assets and it is a useful indicator of a company’s profitability relative to its total assets.

2. Government environmental auditing (Treat \times Post)
   Treat is a dummy variable. As heavy polluting companies have a greater impact on environmental pollution during their operation, we select heavy polluting companies as the experimental group and non-heavy polluting companies as the control group. The heavy polluting companies are defined according to the “Classified Management Directory of Environmental Protection Verification Industry of Listed Companies”. If the data refers to heavy polluting companies, the value of Treat is 1. If the data refers to non-heavy polluting companies, the value of Treat is 0. Treat presents the difference in companies performance between each company which is affected by the environmental auditing or not.

Post is also a dummy variable. It presents whether “The Opinions of The National Audit Office on Strengthening the Audit Work of Resources and Environment” has been promulgated or not. The opinion was posted in 2009, so when the year of data is after 2009 or it is exactly 2009, the value of Post is 1. If the year of data is before 2009, the value of Post is 0. Post represents the change in companies performance that did not influenced by government environmental auditing after being affected by the auditing in 2009.

Treat \times Post is an interactive variable. It represents the differences in before and after the environmental auditing regulation in 2009 and differentiated in company performance between companies which are heavy polluting companies or non-heavy polluting companies. If the interactive variable is positive, it means government environmental auditing could improve the performance of companies. If it is negative, it means government environmental auditing could not improve the company performance.

3. Control variable(X_j)

Referring to Xie Dongming(Xie Dongming, 2020) related research, this study controls the following variables. ALR represents the asset liability ratio. It is the ratio of total ending liabilities to total asset, which is used to measure the ability of companies to carry out business activities with the funds provided by creditors. GROWTH represents the increase rate of main business revenue, which reflects the operating condition and market holding capacity of the companies. EMPLOYEE is the natural log of the number of employees in a firm, which represents the size of the company. EQUITYNATUREID represents the equity nature of the company’s property rights. State-owned companies take 1, private companies take 2, foreign-funded companies take 3 and other companies take 4. DUAL is duality, which represents whether the chairman and general manager of a companies are the same person. If it is for the same person, DUAL is 1. If not, it is 2. ARTO represents the turnover of account receivable, which is the ratio of net income from credit sales to the average accounts receivable balance in a certain period. It reflects company account receivable turnover speed and management efficiency of the index. LEV represents financial leverage. The level of corporate leverage can reflect the size of financial risk. EPS represents primary earnings per share, which reflects a company’s operating results. NASP represents net asset value per share, which is the ratio of shareholders’ equity to the total number of shares. This variable reflects the present value of assets held per share. Besides, \( \epsilon \) is the error term. We also added the year fixed effects to our model to reduce the influence of time trends on companies performance.
Table 1 Variable Definitions

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROA</td>
<td>The ratio of company’s annual earnings to total asset.</td>
</tr>
<tr>
<td>Treat</td>
<td>If the company is a high polluting company, Treat=1</td>
</tr>
<tr>
<td>Post</td>
<td>If year&gt;=2009, Post=1</td>
</tr>
<tr>
<td>ALR</td>
<td>The ratio of total ending liabilities to total asset</td>
</tr>
<tr>
<td>GROWTH</td>
<td>The increase rate of main business revenue</td>
</tr>
<tr>
<td>EMPLOYEE</td>
<td>The natural log of the number of employees</td>
</tr>
<tr>
<td>EquityNatureID</td>
<td>State-owned companies=1, private companies=2, foreign-funded companies=3, other companies=4</td>
</tr>
<tr>
<td>DUAL</td>
<td>If the chairman and general manager are the same person, DUAL=1</td>
</tr>
<tr>
<td>ARTO</td>
<td>The ratio of net income from credit sales to the average accounts receivable balance</td>
</tr>
<tr>
<td>LEV</td>
<td>The ratio of change in earnings per common share to change in earnings before interest and tax</td>
</tr>
<tr>
<td>EPS</td>
<td>The primary earnings per share</td>
</tr>
<tr>
<td>NAVPS</td>
<td>The ratio of shareholders’ equity to the total number of shares</td>
</tr>
</tbody>
</table>

5. Empirical results

5.1 Summary Statistics
Table 2 below shows the descriptive statistics of the main variables. There are 15159 samples in this study. In all these sample, the mean of Treat is 0.519, which illustrates that 51.9% of the observation are in the treatment group. 75.1 percent age of samples are under the environmental auditing regulation after 2009. The sample’s return on assets ranges from 0.00131 to 0.246 with an average of 0.0671 and a variance of 0.0464. The employees of the observation ranges from 2.398 to 13.22 with an average of 7.718 and a variance of 1.219. The primary earnings per share of the observation ranges from -0.903 to 17.90 with an average of 0.423 and a variance of 0.558. The net asset value per share of the observation ranges from 0.935 to 52.73 with an average of 4.647 and a variance of 0.558. The turnover of account receivable of the observation ranges from 0.918 to 146000000 with an average of 9822 and a variance of 1.219. The sample’s asset liability ratio ranges from 0.0495 to 0.843 with an average of 0.421 and a variance of 0.194. The increase rate of main business revenue of the observation ranges from -0.978 to 14883 with an average of 1.220 and a variance of 120.9. The sample’s duality ranges from 1 to 2 with an average of 1.763 and a variance of 0.425. The equity nature ID ranges from 1 to 4 with an average of 1.632 and a variance of 0.620.

5.2 Correlation Analysis
We did the correlation analysis on all our variables. Table 3 illustrates that the Pearson’s correlation coefficients between all the variables are low so that there is no collinearity between the chosen variables. Therefore, we can use them to measure our model.
Panel B

<table>
<thead>
<tr>
<th>Variables</th>
<th>(EPS)</th>
<th>(NAVPS)</th>
<th>(LEV)</th>
<th>(ARTO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPS</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NAVPS</td>
<td></td>
<td>0.650*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LEV</td>
<td>0.025*</td>
<td>-0.009</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>ARTO</td>
<td>0.001</td>
<td>0.003</td>
<td>0.000</td>
<td>1.000</td>
</tr>
<tr>
<td>ALR</td>
<td>-0.038*</td>
<td>0.121**</td>
<td>0.034*</td>
<td>0.011</td>
</tr>
<tr>
<td>GROWTH</td>
<td>0.008</td>
<td>0.001</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>DUAL</td>
<td>-0.004</td>
<td>0.035**</td>
<td>0.011</td>
<td>0.005</td>
</tr>
<tr>
<td>EquityNatureID</td>
<td>0.013</td>
<td>0.007</td>
<td>0.021*</td>
<td>-0.008</td>
</tr>
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</table>

Panel C

<table>
<thead>
<tr>
<th>Variables</th>
<th>(ALR)</th>
<th>(GROWTH)</th>
<th>(DUAL)</th>
<th>(EquityNatureID)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALR</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GROWTH</td>
<td>0.018</td>
<td>**</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>DUAL</td>
<td>0.145</td>
<td>***</td>
<td>-0.015*</td>
<td>1.000</td>
</tr>
<tr>
<td>EquityNatureID</td>
<td>0.284</td>
<td>0.005</td>
<td>0.223</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Notes: *** p<0.01, ** p<0.05, * p<0.1

5.3 Baseline Results

Table 4 illustrates the baseline results on the relationship between the government environmental auditing and the performance of companies. We use the year fixed effects and find that the coefficients of Treat×Post are positive and significant. The coefficient between Treat×Post and ROA is 0.005, which means that government environmental auditing can improve the performance of companies by 7.45%.[Based on the coefficient of Treat×Post on column 2 of Table 4, the improvement of company performance is 0.005/0.0671=7.45%]. Among all the control variables, ALR, GROWTH, DUAL, ARTO, LEV and NAVPS are negatively correlated with companies performance, and EMPLOYEE, EQUITYNATUREID and EPS are positively correlated.

In summary, the baseline results shows that the government environmental auditing in 2009 had a positive impact on improving the performance of companies. Besides, compared with those companies that do not influenced by environmental auditing, companies that can be influenced by environmental auditing have better company performance.

5.4 Heterogeneity Analysis

We divided companies into state-owned companies, private companies, foreign-funded companies and other companies to further study the influence of government environmental auditing on companies performance. In Panel A, we find that government environment auditing can significantly and positively influence state-owned company performance and private company performance while it has no obvious effect on foreign-funded company performance.

We also divided companies based on their industry technical level according to ISIC REV. 3 Technology Intensity Definition. It was divided into companies with higher technical level and companies with lower technical level. In Panel B, we find that environmental auditing can promote companies performace with lower technical level more significantly. Companies with low technological level usually have high energy consumption, high pollution and high emissions. Such companies are not very productive. When the government issues environmental regulation policies, these companies are more affected because of their backward structure and cannot adapt to the government's environmental policies. As a result, the outdated production methods of such companies will be regulated by the government and have more incentive to upgrade technology, thus boosting their performance. For companies with relatively high technological level, their own technology is advanced, and have low pollution and low emissions, so the
government environmental auditing has no significant impact on them. At last, we classified companies according to their internal control index. The companies with higher internal control level means that their internal control index is above average internal control index in our sample and the companies with lower internal control level means that their internal control index are lower than average internal control. In Panel C, we find that the high and low level of internal control do not have significant effect. The influence of government environmental auditing on company performance is not different because of the difference of internal control level.

Table 5 Heterogeneity Analysis

<table>
<thead>
<tr>
<th>Panel A Nature of Equity</th>
<th>VARIABLES</th>
<th>State-owned</th>
<th>Private</th>
<th>Foreign-funded</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treat×Post</td>
<td>0.004**</td>
<td>0.006**</td>
<td>0.010</td>
<td>0.013*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2.14)</td>
<td>(4.41)</td>
<td>(1.41)</td>
<td>(1.80)</td>
<td></td>
</tr>
<tr>
<td>ALR</td>
<td>0.063**</td>
<td>0.054**</td>
<td>0.103**</td>
<td>0.048**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-1.41)</td>
<td>(-13.26)</td>
<td>(-5.39)</td>
<td>(-3.06)</td>
<td></td>
</tr>
<tr>
<td>GROWTH</td>
<td>0.005**</td>
<td>0.000**</td>
<td>0.002</td>
<td>0.006</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2.73)</td>
<td>(-3.73)</td>
<td>(1.04)</td>
<td>(1.40)</td>
<td></td>
</tr>
<tr>
<td>EMPLOYEE</td>
<td>0.001</td>
<td>0.003**</td>
<td>0.011**</td>
<td>-0.000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.56)</td>
<td>(3.37)</td>
<td>(3.23)</td>
<td>(-0.10)</td>
<td></td>
</tr>
<tr>
<td>EquityNatureD</td>
<td>0.088**</td>
<td>0.032**</td>
<td>0.016**</td>
<td>0.016**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(13.19)</td>
<td>(7.55)</td>
<td>(2.11)</td>
<td>(2.36)</td>
<td></td>
</tr>
<tr>
<td>DUAL</td>
<td>-0.001</td>
<td>0.000</td>
<td>0.001</td>
<td>0.009</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-0.48)</td>
<td>(0.14)</td>
<td>(0.32)</td>
<td>(1.13)</td>
<td></td>
</tr>
<tr>
<td>ARTO</td>
<td>-0.000</td>
<td>-0.000</td>
<td>0.000**</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-1.29)</td>
<td>(-0.20)</td>
<td>(9.22)</td>
<td>(0.72)</td>
<td></td>
</tr>
<tr>
<td>LEV</td>
<td>-0.000</td>
<td>-0.001*</td>
<td>0.001**</td>
<td>-0.002</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-0.91)</td>
<td>(-1.87)</td>
<td>(-2.91)</td>
<td>(-1.33)</td>
<td></td>
</tr>
<tr>
<td>EPS</td>
<td>0.064***</td>
<td>0.080**</td>
<td>0.101**</td>
<td>0.040**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(3.90)</td>
<td>(4.02)</td>
<td>(2.47)</td>
<td>(5.58)</td>
<td></td>
</tr>
<tr>
<td>NAVPS</td>
<td>0.007**</td>
<td>0.007**</td>
<td>0.009**</td>
<td>0.008**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-8.51)</td>
<td>(-3.64)</td>
<td>(-5.05)</td>
<td>(-5.44)</td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>6,522</td>
<td>7,909</td>
<td>517</td>
<td>211</td>
<td></td>
</tr>
<tr>
<td>Number of Stkcd</td>
<td>797</td>
<td>1,438</td>
<td>125</td>
<td>49</td>
<td></td>
</tr>
</tbody>
</table>

Robust z-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Panel B Industry Technical Level

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>Higher technical level</th>
<th>Lower technical level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treat×Post</td>
<td>0.001</td>
<td>0.008***</td>
</tr>
<tr>
<td></td>
<td>(0.53)</td>
<td>(5.83)</td>
</tr>
<tr>
<td>ALR</td>
<td>-0.059***</td>
<td>-0.057***</td>
</tr>
</tbody>
</table>

Robust z-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Notes: We divide the chosen companies into state-owned companies, private companies, foreign-fund companies and other companies based on their nature of equity in Panel A. We divided companies into higher technical level and lower technical level based on the OECD classification in Panel B. We divide companies into higher internal control level and lower internal control.
level based on the median level of internal control in Panel C. Control variables and fixed effects are the same as the previous.

5.5 Robust Test
The company of government environmental auditing in 2009 are from the “Guidelines on industry classification of listed company”, which may result in a problem that the chosen samples in the treatment group are not random. Therefore, we use propensity-score-matching (PSM) method to redesign a control group from all samples which is more comparable. First, we build a regression model based on our variables: asset liability ratio (ALR), increase rate of main business revenue (GROWTH), the number of employees (EMPLOYEE), equity nature (EQUITYNATUREID), duality (DUAL), turnover of account receivable (ARTO) and financial leverage (LEV). According to the propensity score, we match the companies again in the treatment group to the company in the control group by using the nearest neighbor matching method. Finally, we have a sample of 13,810 observations, with 6,518 in the treatment group and 7,292 in the control group. Table 6 shows the coefficient of new $Treat \times Post$ is still significantly positive and it does not change too much than before. Therefore, our results are robust.

Table 6 PSM Analysis

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>newTreat×Post</td>
<td>0.006*** (4.70)</td>
</tr>
<tr>
<td>ALR</td>
<td>-0.058*** (-19.46)</td>
</tr>
<tr>
<td>GROWTH</td>
<td>0.001 (1.07)</td>
</tr>
<tr>
<td>EMPLOYEE</td>
<td>0.002*** (2.71)</td>
</tr>
<tr>
<td>EquityNatureID</td>
<td>0.002 (1.63)</td>
</tr>
<tr>
<td>DUAL</td>
<td>0.000 (0.00)</td>
</tr>
<tr>
<td>ARTO</td>
<td>0.000 (1.33)</td>
</tr>
<tr>
<td>LEV</td>
<td>-0.001 (-1.39)</td>
</tr>
<tr>
<td>EPS</td>
<td>0.071*** (4.76)</td>
</tr>
<tr>
<td>NAVPS</td>
<td>-0.007*** (-5.41)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.072*** (11.67)</td>
</tr>
<tr>
<td>Observations</td>
<td>13,810</td>
</tr>
<tr>
<td>Number of Stkd</td>
<td>2,156</td>
</tr>
</tbody>
</table>

Robust z-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Notes: We use 1:1 nearest neighbor matching approach to match each company in treatment group to control group. Control variables and fixed effects are the same with the previous.

5.6 Moderate Innovation
Since China implemented the environmental auditing policy in 2009, companies have been continuously developing new green production standards for their own technological progress. This may improve the competitiveness of companies in the market. Therefore, we introduce innovation variables into the base model to explore whether it will affect the impact of government environmental auditing on company performance. At present, many scholars have discussed the impact of innovation factors on company performance, but few literatures have analyzed both innovation variables and environmental audit variables under the same framework. Innovation represents the level of company innovation. According to Zhangjun’s research, the innovation level of an company in this study is measured by the number of patent applications (Zhang Jun, Xu Qingrui, & Zhang Suping, 2014). We add innovation triple cross-multiplication terms to our model as follow.

$$ROA = \beta_0 + \beta_1Treat + \beta_2After + \beta_3Treat \times After \times Innovation + \muX + \epsilon$$

If the coefficient of the triple cross-multiplication $\beta_3$ is positive, innovation level and environmental auditing have synergistic effect on company performance. It means when strengthening the intensity of environmental auditing on company with strong innovation ability, the improvement of company performance will be more obvious.

Table 7 show the results of the regression after adding the innovation variable. We find that the coefficient of the triple cross-multiplication $\beta_3$ is positive, which means the higher the innovation level of companies, the greater the positive impact of government environmental auditing on company performance.

Table 7 The effect of innovation on the model

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treat×Post×Innovation</td>
<td>0.008* (1.79)</td>
</tr>
<tr>
<td>ALR</td>
<td>-0.063*** (-19.52)</td>
</tr>
<tr>
<td>GROWTH</td>
<td>0.001 (1.22)</td>
</tr>
<tr>
<td>EMPLOYEE</td>
<td>0.003*** (3.81)</td>
</tr>
<tr>
<td>EquityNatureID</td>
<td>0.002* (1.68)</td>
</tr>
<tr>
<td>DUAL</td>
<td>-0.001 (-0.92)</td>
</tr>
<tr>
<td>ARTO</td>
<td>-0.000 (-1.58)</td>
</tr>
<tr>
<td>LEV</td>
<td>-0.000 (-1.24)</td>
</tr>
<tr>
<td>EPS</td>
<td>0.059*** (4.84)</td>
</tr>
<tr>
<td>NAVPS</td>
<td>-0.006*** (-6.39)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.067*** (9.56)</td>
</tr>
<tr>
<td>Observations</td>
<td>12,277</td>
</tr>
<tr>
<td>Number of Stkd</td>
<td>2,086</td>
</tr>
</tbody>
</table>

Robust z-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1
6. Conclusion

This study mainly researches the impact of environmental constraints on company production and management. We use natural experiments, and the basic model shows that government tightening of environmental auditing improves company performance based on some sample of listed companies which are regulated by the government environmental auditing every year since 2009. The result of PSM analysis are robust. We find that for state-owned companies and private companies, their company performance promoted by environmental auditing are more significant than foreign-funded companies and other companies. The impact of government environmental auditing on the performance of companies with low technical level are more significant than company with high technical level. Meanwhile, there is no significant difference in the influence of the company internal control level on the result. We also explore the moderating mechanism of innovation effect on the effect of government environmental auditing on company performance. We find that with higher innovation level, the promotion of the influence of environmental auditing on company performance are more significant. According to this study, we find that the government environmental auditing can promote business efficiency and improve company performance. While taking into account normal production and operation and fulfilling government environmental auditing targets, companies should strengthen their own innovation ability to better promote their company performance.

References

