Does corporate environmental responsibility affect investor future goal in the energy sector firms?

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Abstract. This study investigates the relationship between corporate environmental responsibility and firm’s financial performance by using a sample set of 2,241 firm-year observations representing 470 unique energy firms from 30 countries from 2013–2020. Supporting stakeholder theory, we find that firms with better environmental responsibility actions are associated with higher Tobin’s q, suggesting that the investors react positively to the firm's environmental initiatives. Overall, our findings suggest that firms in the energy sector should pay attention to corporate environmental responsibility practices to obtain a good response from the investors and achieve the firm’s long-term financial goals.

1. Introduction
Corporate environment responsibility reporting is crucial in today’s business companies. Firms’ awareness to inform their environmental responsibility activities to the public raise year to year. They seem to have realized that their environmental responsibility activities might affect their financial sustainability. In the year 2020, firms that acknowledge environmental responsibility in their annual report increase significantly. Around 28% of the N100 group (100 companies with the highest income in 49 countries) reported their climate change risk in their financial report in 2017. Three years later, the number of companies that publish their climate change risk increased to 43%. Among the G250 group (the 250 best companies listed in the Fortune Global 500 ranking), in 2020, over half the group (56%) report their climate change risk in their financial report. This rate increases 8% from the year 2017. From this report, oil and gas firms have become the highest firm in climate change risk reporting. These firms also lead in report their biodiversity risk [1].

The issues on corporate environmental responsibility are very closely related to the companies in the energy sectors such as oil and gas, coal, or renewable firms [2]. In the energy sector, producing goods without leaving negative impacts on the environment is almost impossible. Some of these responsible concerns are focus on energy and water use, waste management, recycling, emission, eco-friendly office, and business travel policies. Coal mining activities might contribute farmland, air, and water pollution to the local community. Oil spills and gas leaks can increase the risk of water pollution and mass fires that affect the surrounding community. Meanwhile, the public is waiting for renewable energy firms to provide new ways to cut carbon emissions.

The energy sector has long been under stakeholder pressure to limit the impact of environmental damage. Companies have realized the importance of environmental responsibility practices for their reputation. Stakeholder feedback might affect firm financial sustainability. In order to meet external stakeholders (society and government) and internal stakeholders (shareholders), the energy sector must
ensure that they will produce good financial feedback without violating government rules and ethics or minimize damaging the environment. Several scholars were growing up highlighting the relationship between CER and firm financial performance [2]; however, no many studies focus on the energy sectors. Hence, it is still an important question whether allocating money for CER activities can increase financial performance or it will only occur a cost.

Using large numbers of firms from 30 countries, this study's main objective is to provide evidence of the relationship between corporate environmental responsibility and the firm's future financial goals (market-based). This discussion will help financial managers make decisions on corporate environmental responsibility activities to maximize shareholder welfare. This paper is organized as follows. Section two describes the literature review of the link between corporate environmental responsibility and firm financial performance. Section three presents the model and data used. Section four presents the result and discussion, and section five summarizes the conclusion and draws further implications.

2. Literature review of the relationship between corporate environment responsibility and firm financial performance

There is a long debate on the relationship between corporate social responsibility and financial performance in a decade. Traditional literature on the relationship between CSR and financial performance is shareholder theory [3]. This theory, based on the main purpose of business, namely maximizing shareholder value, states that corporate social activities can only be done if this will improve shareholders' welfare or fulfill legal responsibilities [4]. Recently, many scholars adopt stakeholder theory [5] to explain the relationship between corporate environmental responsibility and firm financial performance. This theory reminds business organizations to link the companies’ goals and fulfill the legitimacy and all stakeholders’ expectations simultaneously.

Several of the previous studies have found a positive influence between CSR and Financial Performance. A study found a positive relationship on the effect of corporate responsibility to the external stakeholders on firm’s restaurant market value performance [6]. Other research investigates the relationship between CER and firm performance in financial sectors and found evidence that reducing environmental costs with maintaining CER will enhance ROA one or two years later [7]. Scholar founds that environmental responsibility is significantly positive on firm performance in the non-financial firm in Pakistan [8]. Lee [2] founds that environmental responsibility is positively associated with financial performance. In more detail, innovation and resource reduction have a positive effect on ROA and ROE. Unfortunately, emission reduction is not significantly increased ROA and ROE.

Meanwhile, Laskar N and Maji S G [9] showed the positive relationship between sustainability performance and firm performance (market to book ratio), presenting stakeholder expectations. Hongming et al [8] investigate the relationship of environmental responsibility on short firm profitability (ROA). The result found that environmental indicators, including water consumption and greenhouse gas emission scores, are crucial driving forces of the firm’s financial performance.

Based on stakeholder theory, company values and performance are influenced by the company's strategic actions to meet the expectations and interests of internal stakeholders (e.g., shareholders, employees, managers, and directors) and external stakeholders (e.g., consumers, government, suppliers, communities and the environment) [10]. A good environmental responsibility strategy implemented by companies will enhance the company's reputation [11] and ultimately enhance environmentally sensitive customer satisfaction [12]. It will increase the market value of the company's shares. Reputable firms will also lead consumers to buy their products; therefore, revenue will increase. With a good reputation, the company also attracts investors to buy their shares because investors only will buy the company’s shares which are predicted to be more stable in the future. A good reputation from the company will also increase the market value of the company's shares. Thus, we propose a hypothesis that firm investment in environmental responsibility increase firm’s future profitability.
3. Methods

3.1. Data
Our sample is based on secondary data collected from ESG ASSET4 Refinitiv for eight years from 2013 to 2020. This data consists of listed firms in the energy sector (i.e., oil and gas, coal, uranium, and renewable energy) from 30 countries worldwide. Data distribution based on country origin is shown in Table 1. The table explains that most firms that disclose their sustainability environment report come from developed economies such as the Americas and European countries. The US and Canada contributed the majority of data in this study.

3.2. Measurement of variables

3.2.1. Dependent variable. Firm financial performance is the dependent variable of this research, which is measured by Tobin’s-q. In order to represent the impact of corporate environmental responsibility to fulfill external stakeholders, this study uses market-based financial performance. Those firm’s initiatives to the environment will build the company’s image; hence, it will be very close to the firm’s market value. Following [13], Tobin’s-q is defined as:

\[ \text{Tobin's - q} = \frac{\text{Book Value of Asset} + \text{Market Value of Asset} - \text{Book Value of Equity}}{\text{Book Value of Asset}} \]

3.2.2. Explanatory variable. Corporate Environment Responsibility (CER) is the main explanatory variable in this research. We adopted [2] to measure CER using the environmental pillar score provided by the Environment, Social, and Governance (ESG) ASSET4 database. ESG ASSET4 provides the most comprehensive ESG database that covering over 80% of the global market cap. This value ranges from 0 to 100, where 100 is the highest value of the CER initiatives. In more detail, this score measures the effect of living and non-living natural systems such as the air, land, water, and complete ecosystem. This score represents the company’s ability to avoid environmental risk and capitalize on environmental opportunities to generate shareholder wealth. The environmental pillar score is a combined score from firm’s emission, resource use, and innovation.

3.2.3. Control variables. We control for the firm, time, and country characteristics on Tobin’s-q by including ln(total asset), leverage, ROE, log (GDP per capita), and country inflation by following [13]. LnTA (total asset) is the ln of the firm’s total asset. Leverage is the ratio of total debt divided by the value of shareholder equity multiplied by 100. ROE (return on equity) is a firm’s profitability ratio measured by dividing net income by total equity. GDP and inflation per capita measure each country’s economic development.

3.3. Empirical models
To ensure whether a firm’s financial performance is influenced by corporate environmental responsibility (CER), we regress CER score and control variables on Tobin's q. The basic regression model used is as follows:

\[ \text{Tobin's q}_{ij,t} = \sigma + \beta_1 \text{CER}_{ij,t} + \beta_2 \text{LnTA}_{ij,t} + \beta_3 \text{LEV}_{ij,t} + \beta_4 \text{ROE}_{ij,t} + \beta_5 \text{LGDPpc}_{ij,t} + \beta_6 \text{INF}_{ij,t} + n_{ij,t} + e_{ij,t} \]

Where Tobin’s q is firm financial performance measured by market-based, CER is corporate environment responsibility score/ index, LnTA (natural logarithm of total assets) is firm size, LEV is leverage, ROE (return on equity) is firm’s profitability based-on shareholder investment, LGDPpc is the logarithm of country’s GDP per capita, and INF is country’s inflation. n is an unobserved firm-specific effect in period t, and e is the error term.
Table 1. Data distribution by country.

| Country              | Frequency | Percent | Cumulative |
|----------------------|-----------|---------|------------|
| Australia            | 177       | 7.9     | 7.9        |
| Austria              | 11        | 0.49    | 8.39       |
| Brazil               | 30        | 1.34    | 9.73       |
| Canada               | 445       | 19.86   | 29.59      |
| Chile                | 10        | 0.45    | 30.03      |
| China (Mainland)     | 94        | 4.19    | 34.23      |
| Denmark              | 10        | 0.45    | 34.67      |
| France               | 37        | 1.65    | 36.32      |
| Germany              | 13        | 0.58    | 36.9       |
| Greece               | 12        | 0.54    | 37.44      |
| India                | 53        | 2.37    | 39.8       |
| Indonesia            | 33        | 1.47    | 41.28      |
| Italy                | 33        | 1.47    | 42.75      |
| Japan                | 41        | 1.83    | 44.58      |
| Luxembourg           | 17        | 0.76    | 45.34      |
| Malaysia             | 36        | 1.61    | 46.94      |
| Marshall Islands     | 12        | 0.54    | 47.48      |
| Netherlands          | 34        | 1.52    | 49         |
| New Zealand          | 15        | 0.67    | 49.67      |
| Norway               | 48        | 2.14    | 51.81      |
| Poland               | 31        | 1.38    | 53.19      |
| Qatar                | 10        | 0.45    | 53.64      |
| Russia               | 51        | 2.28    | 55.91      |
| South Africa         | 12        | 0.54    | 56.45      |
| South Korea          | 53        | 2.37    | 58.81      |
| Spain                | 29        | 1.29    | 60.11      |
| Switzerland          | 12        | 0.54    | 60.64      |
| Thailand             | 44        | 1.96    | 62.61      |
| United Kingdom       | 131       | 5.85    | 68.45      |
| United States        | 707       | 31.55   | 100        |
| **Total**            | **2,241** | **100** |            |

Source: ESG ASSET4 reinitiv database based on the environment pillar score data availability.

4. Results and discussion

Table 2 presents the descriptive statistics of all variables used. The mean value of the firm financial performance (Tobin’s-q) is 1.281. This outcome suggests that, on average, the market value of the companies is greater than the companies’ assets. In other words, on average, these companies have good long-term financial performance opportunities so that investors can use this consideration to invest. In terms of the corporate environment responsibility (CER) score, the mean score is 37.442. CER score represents that, on average, firms’ initiatives on environmental responsibility are rather low. Meanwhile, the average lnTA, leverage, ROE, GDP, and INF are 22.514, 0.799, 0.057, 4.552, and 1.80, respectively.

Figures 1, 2, and 3 provide corporate environmental responsibility score (index) by region, developed status country, and sub-industry classification of the energy sector. Firms from European countries region have the highest mean (53.65) corporate environmental responsibility score. This indicates that firms from those countries, on average, are more environmentally responsible than firms from Africa (44.32), America (28.81), Asia (51.27), or Oceania (26.24) countries (see Figure 1). In addition, there is surprising evidence that firms from developing economies countries (48.75) have better environmental initiatives than firms from advanced economies countries (34.71) (see Figure 2). This finding informs that although the number of firms’ environmental responsibility reporting in developing economies countries is not as much as advanced economies countries, the quality of their responsibility practices,
in average, is better than the quality of environmental responsibility practices in developed countries.
Meanwhile, in general, the average value of environmental responsibility in each sub-industry in the
energy sector has almost the same value except for sub-industry oil and gas drilling and oil and gas
exploration and production (see Figure 3). This is very easy to understand because these two sub-
industry are very closely related to the use of natural resources and the processing of natural resources,
which causes high CO2 emissions.

Table 2. Descriptive statistics.

| Variable | Definition | Obs  | Mean   | St.Dev. | Min   | Max   |
|----------|------------|------|--------|---------|-------|-------|
| Tobin,s q| The sum of the book value of asset + market value of equity – book value of total equity divided by book value of total asset. | 2,241 | 12.81  | 0.756   | 0.320 | 5.461 |
| CER      | Environment pillar score by ESG ASSET4 Refinitiv database | 2,241 | 37.45  | 27.57   | 0     | 92.79 |
| LnTA     | Natural logarithm of total assets a ratio of debt divided by total shareholder’s equity, multiplied by 100 | 2,241 | 22.524 | 1.644   | 18.518 | 26.553 |
| LEV      | Firm’s profitability ratio calculated by dividing a net income by total equity of common share | 2,241 | 0.799  | 0.927   | 0     | 6.252 |
| ROE      | Logarithm of country’s GDP per capita | 2,241 | 4.552  | 0.365   | 3.239 | 4.985 |
| LGDPpc   | Logarithm of country’s inflation | 2,241 | 1.769  | 1.324   | -0.900 | 7.800 |

All continuous variables are winsorized at the 1% and 99% levels to consider potential outlier problems or data errors.

Figure 1. Corporate environmental responsibility score by region country.
Table 3 reports the correlation matrix between Tobin’s q, corporate environmental responsibility, and other variables. Table 3 indicates that corporate environmental responsibility as an independent variable has relatively low correlations with other (control) variables.

|         | Tobinsq | CER   | LnTA  | LEV    | ROE    | LGDPpc | INF    |
|---------|---------|-------|-------|--------|--------|--------|--------|
| Tobinsq | 1       |       |       |        |        |        |        |
| CER     | -0.0739*** | 1     |       |        |        |        |        |
| LnTA    | -0.1614*** | 0.5716*** | 1     |        |        |        |        |
| LEV     | -0.0077   | 0.047** | 0.0261 | 1      |        |        |        |
| ROE     | 0.2075*** | 0.1170*** | 0.1715*** | -0.1362*** | 1     |        |        |
| LGDPpc  | 0.0476**  | -0.2551*** | -0.1980*** | 0.0529**  | -0.1581*** | 1     |        |
| INF     | -0.0161   | 0.0119  | 0.1050*** | -0.0768*** | 0.1285*** | -0.4193*** | 1     |

Notes: *, ** and *** denote statistical significance at 10, 5, and 1 percent, respectively.

To examine the effect of corporate environment responsibility on the firm's financial performance, we regress Tobin’s q on the CER index with control variables including firm, year, and country fixed effects (Table 4). The result of model 3 displays a significant positive relationship between CER and Tobin’s q at 0.10 level (p-value 0.051). We have examined endogeneity by employing Breusch-pagan and Hausman test and suggest that the fixed-effects model is preferable. This evidence is consistent with
our hypothesis (confirming stakeholder theory) [14] that firm investment to the external stakeholder (environment initiatives) leads firm long-term financial performance. This outcome is consistent with prior research [2,9]. The firm’s responsibility initiatives in reducing environmental emissions in the production process might reduce the society issue because they have managed and shown their effort to minimize the environmental impact on society. The firm’s commitment to using the material, energy, and water shows the public that they are efficient and effective in using the resources. The firm’s expenditure to support the research and development of eco-efficient services and products will satisfy sensitive environmental stakeholders. It can also reduce the environmental cost for its customers. Thus, all the good environmental commitment of the energy firm will create a good corporate brand image. It will improve the firm reputation too. Finally, a good public response will lead investors to invest their money in a reputable firm and enhance the firm's long-term financial goal (Tobin’s q). A good firm’s commitment to the environmental issue also will reduce the cost arising from government or society matters.

Table 4. Regression estimation.

| Variables | Model 1 Pooled OLS | Model 2 Random Effects Model | Model 3 Fixed Effects Model |
|-----------|--------------------|-----------------------------|-----------------------------|
| CER       | 0.0008             | 0.0015                      | 0.0025*                     |
|           | (0.0007)           | (0.0010)                    | (0.0013)                    |
| LnTA      | -0.0973***         | -0.2556***                  | -0.1279***                  |
|           | (0.0115)           | (0.0379)                    | (0.0260)                    |
| LEV       | 0.0227             | 0.0508***                   | 0.0007                      |
|           | (0.0167)           | (0.0168)                    | (0.0245)                    |
| ROE       | 1.1648***          | 0.5081***                   | 1.0976***                   |
|           | (0.0965)           | (0.0902)                    | (0.242)                     |
| LGDPpc    | 0.1035**           | -0.2808                     | -0.5754                     |
|           | (0.0481)           | (0.3524)                    | (0.4569)                    |
| INF       | -0.002             | -0.0369***                  | -0.0222                     |
|           | (0.0129)           | (0.0123)                    | (0.0155)                    |
| Constant  | 2.8916***          | 8.1914***                   | 6.6626***                   |
|           | (0.3393)           | (1.8503)                    | (2.1439)                    |
| Observations | 2,241             | 2,241                       | 2,241                       |
| R-squared | 0.0867             |                             | 0.1663                      |
| Overall R-squared | 0.1082            |                             |                             |
| Number of id | 470               | 470                         | 470                         |
| Firm effect | YES              |                             |                             |
| Year effect | YES              |                             |                             |
| Country effect | YES             |                             |                             |
| VIF mean | 1.29              |                             |                             |
| Breusch and Pagan test | 1131.02***     |                             |                             |
| Hausman test | 75.61***         |                             |                             |

This table displays the regression result of corporate environmental responsibility and Tobin’s q over the period 2013-2020.

*** Denote statistical significance at the 1% level.
** Denote statistical significance at the 5% level.
* Denotes statistical significance at the 10% level.
5. Conclusion
The main objective of this study is to examine the effect of corporate environmental responsibility on firm financial performance among firms in the energy sector. In this study, we interpret firm financial performance as firm market-based value (Tobin’s q). The sample consists of 472 firms from 30 countries provided by ESG ASSET4 Refinitiv database for 2013–2020. In total, our data consist of 2,241 firm-year observations. The finding of this study shows that corporate environmental responsibility is significant positively enhances Tobin’s q. This indicates that firm investment in environmental issues such as reducing CO2 emissions, energy material, and water use, and commitment to the eco-efficient products and service will affect firm market value. Supporting stakeholder theory, this evidence confirms that when companies fulfill the stakeholder needs, they will get positive feedback for their financial performance.

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