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Article

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International Journal of Energy Economics and Policy

Provided in Cooperation with:
International Journal of Energy Economics and Policy (IJEEP)

Reference: Rokhmawati, Andewi/Gunardi, Ardi et. al. (2017). How powerful is your customers' reaction to carbon performance? : linking carbon and firm financial performance. In: International Journal of Energy Economics and Policy 7 (6), S. 85 - 95.

International Journal of Energy Economics and Policy

ISSN: 2146-4553

available at http: www.econjournals.com

International Journal of Energy Economics and Policy, 2017, 7(6), 85-95.

How Powerful is Your Customers' Reaction to Carbon Performance? Linking Carbon and Firm Financial Performance

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ABSTRACT

This study aims to examine the effect of greenhouse gas (GHG) emissions on return on sales (ROS) that is moderated by customers' response to firm activities to reduce GHG emissions. The moderating regression analysis with cross-sectional data was utilized to examine the effects. The sample comprised 102 listed manufacturing firms listed in the Indonesian capital market in 2011. Sampling was based on the availability of firms' financial reports in 2011, annual reports in 2014 and the availability of data of firm about the types and amounts of fossil fuels, as well as the amount of electricity, consumed by the firms in 2011. Surprisingly, the results showed that CO_2e intensity has a positive significant effect on ROS. Customers' response to the firm effort to reduce GHG emission has a positive and significant effect on ROS. Finally, customers' responses strengthen the effect of CO_2e intensity on ROS. The finding of the positive significant effect of CO_2e intensity on firm financial performance contrasts with the findings of previous studies carried out in several developed countries. The finding of the research is that the mediating variable of customers' responses strengthens the effect of CO_2e intensity on ROS. The positive significant effect found in this study has been explained with reference to Indonesia's particular circumstances as a developing country.

Keywords: Greenhouse Gas Emissions, Return on Sales, Instrumental Stakeholder Theory, Indonesian Listed Manufacturing Firms
JEL Classifcations: G3, L6, M1, Q5

1. INTRODUCTION

In recent years, there is a growing interest in research on greenhouse gas (GHG) emissions as such emissions may have a significant effect on the change of the global climate (Jones, et al., 2017). The Intergovernmental Panel on Climate Change (IPCC) stated that the increase in global temperature is the result of the increased atmospheric concentrations of GHG emissions (IPCC, 2007). The increased concentrations of GHG emissions result in the increased intensity of natural disasters such as extreme storms, droughts and floods, rising sea levels and the acidification of seawater (Solomon et al., 2007).

IPCC (2007) states that preventing global temperatures from rising no more than 2°C will reduce disaster risk associated with climate change. Stern projected that under the Business as Usual (BAU) scenario in the absence of mitigation measures, by the end of this century, global temperatures may exceed 2–3°C due to the increased concentrations of GHGs in the atmosphere. The increased concentrations of GHGs in the atmosphere can increase the likelihood of climate change drastically and on a large scale. The delay to reduce the concentration of GHGs in the atmosphere will make it difficult for experts to calculate the losses caused by climate change (Stern, 2007). Swiss Re (one of the global reinsurance firms) claimed that Hurricane Katrina, Wilma and Rita resulted in insurance claims of more than $ 100 billion in 2005 (Greil, 2011). Further, in the next century, global temperatures are expected to rise by 5–6°C. This increase in global temperatures could reduce the global gross domestic product (GDP) by an average of 5–10%, where poor countries would suffer more because these countries bear the cost of more than 10% of their GDP (Stern, 2007). Therefore, the IPCC calls on developed countries to reduce their CO_2 emissions by 60% (relative to 2007 CO_2 emissions levels) by 2050. The IPCC also calls on developing countries to control their emissions by 2030.

This research focuses on Indonesia for several reasons. Indonesia experiences the problem of natural resource exploitation and environmental pollution in recent years (Gunardi et al., 2016). From 2006 to 2015, Indonesia's GDP grew an average of 5.62% (BPS, 2012) and Indonesia's energy consumption increased by 5.9% in 2016, having doubled over the last 20 years (BP-Statistical-Review-of-World-Energy, 2016). The level of consumption of oil and electricity is expected to continue to increase in line with economic growth. From 2009 to the present, the industrial sector becomes the highest energy customer, followed by the household and transportation sectors. This upswing in economic growth has resulted in the increased GHGs from the energy and industrial sectors by 5.7% per year (The-Indonesian-Ministry-of-Environment, 2010). The National Council on Climate Change of Indonesia (2009) stated that the manufacturing sector accounts for more than 40% of GHG emissions when the output from power plants is included. Responding to the challenge of reducing GHG emissions, the Indonesian Government has ratified the Kyoto Protocol and is committed to reduce GHG emissions by 26% by 2020 without international support or 41% with international support (Yudhoyono, 2009).

Parallelized with the growing interest of the worldwide community on GHG emission issues have implications for business in Indonesia. GHG emissions are one of the relevant factors to be considered in making strategic decisions, especially for manufacturing firms for the following reasons. In line with the increasing concern of the Indonesian government on climate change and as a form of government commitment to reduce GHG emissions, the Indonesian Government has stipulated Government Regulation PP No. 70/2009, named "energy management." The introduction of carbon regulation would increase costs and risk to firm operations (Busch and Hoffmann, 2011). Secondly, firm stakeholders such as shareholders, creditors, customers, trading partners, employees, and governments, become much concerned about the issues of climate change (Brinkman et al., 2008). To be successful in the long run, firms have to pay attention to the interests of stakeholders in managing their business. Thus, climate change issues become relevant to be considered in their strategic decisions (Kolk and Pinkse, 2005). Ignoring the interests of stakeholder groups would make it difficult for the firm to achieve its goals (Jensen, 2001).

The growing concerns of the global community on GHG emission issues motivated many researchers in the field of corporate financial management to examine the impact of GHG emissions on firm financial performance but the results of the studies are still mixed (Busch and Hoffmann, 2011; Delmas and Nairn-Birch, 2010; Hatakeda et al., 2012; Iwata and Okada, 2011; Lee, 2012; Rokhmawati and Gunardi, 2017; Rokhmawati et al., 2015; Wang et al., 2013).

Furthermore, from those studies only Iwata and Okada (2011) and Rokhmawati and Gunardi (2017) tried to capture how customers respond to the firm GHG emissions that ultimately affect firm financial performance. Iwata and Okada (2011) used return to sales (ROS) to capture customers' responses to the firm's efforts. The authors claimed that ROS could capture the response of stakeholders to the firm's efforts. However, they did not provide the logical thinking how the different measures of financial performances can capture the responses of stakeholders to firm efforts.

Rokhmawati and Gunardi (2017) followed what Iwata and Okada (2011) had done, used ROS to capture stakeholder responses to firm efforts. The specific difference between the two studies lies in the way data collection is used in GHG measurements. Iwata and Okada (2011) used secondary data accessible to the public. In contrast, due to the non-availability of publicly accessible GHG emissions data, Rokhmawati and Gunardi (2017) collected data on the firm consumption of fossil fuels and electricity through interviews. Then, the firm-consumption data of fossil fuels and electricity were converted into CO_2 emission equivalent. The result was in opposite to the result of Iwata and Okada (2011) in which Iwata and Okada (2011) provided that the GHG emissions affect negatively on ROS. Rokhmawati and Gunardi (2017) provided that GHG emissions have a positive effect on ROS.

Based on ınstrumental stakeholder theory, Rokhmawati and Gunardi (2017) explained the logical thinking of how ROS can be used as an indicator of the stakeholders' response to the firm's efforts. ROS indicates the efficiency of a firm in achieving optimum sales while simultaneously minimizing costs (Brealey et al., 2001; Pendlebury and Groves, 1999). ROS indicates the evaluation by customers and trading partners. When they respond positively to the firm effort to reduce GHG emissions, they may purchase their products more often and in more quantity; and accordingly, the sales will increase. However, Rokhmawati and Gunardi (2017) did not test statistically how the response of customers influences the effect of GHG emission reduction effort on ROS.

Thus, the research will develop research conducted by Rokhmawati and Gunardi (2017) that is to test the impact of GHG emission reduction on firm financial performance by entering the variable of customers' responses to the firm effort in reducing GHG emission as a moderating variable. This gap will be bridged by this research. Based on the explanation, this research, therefore, proposes the question "how is the effect of firm GHG emission on ROS moderated by customers' response to the firm effort to reduce GHG emissions?"

2. CONCEPTUAL FRAMEWORK

2.1. GHG Emissions

The Climate Change Declaration in Copenhagen (Center-for-Climate-and-Energy-Solutions, 2009) has legally bound the developed countries that ratified the declaration. They are required to reduce their GHG emissions. Developing countries are not required to reduce GHG emissions but are required to control their GHG emissions. To reduce GHG emissions in the manufacturing sector, the Indonesia Government has stipulated Government Regulation PP No. 70/2009 on energy management. Government Regulation PP No. 70/2009 requires firms that consume more than 6,000 TOE fossil fuels to conduct energy audits (APEC, 2012). Firms that have an effort to reduce energy audits and successfully reduce fossil fuel consumption will receive financial incentives.

Meanwhile, firms that fail to conduct energy audits will be grouped into disincentive groups. Incentives will be given by the Indonesian government to the successful firms to implement the energy management. While firms that fail to implement energy audits, they will be given disincentive.

In this study, GHG emissions were measured by CO_2e intensity. The GHG emission calculations produced by the firms follow the guidelines provided by the DEFRA (2012); however, this study only includes CO_2e from Scope 1 and Scope 2. This study eliminates emissions from Scope 3 as the emission of Scope 3 is indirect emissions for the firms since the emissions result from outsourcing activities that are not under the control of the firm (CDM, 2008). CO_2e intensity is measured as the ratio of kilogram CO_2e divided by net assets. The intensity measures how efficient each unit currency of net asset produces GHG emissions; the higher the CO_2e intensity, the lower the firm efficiency in consuming fossil fuels and electricity.

2.2. Firm Financial Performance

Firm financial performance refers to the financial outcomes of business operations. To measure firm financial performance, many scholars use ROS (Elsayed and Paton, 2005; Hart and Ahuja, 1996; Iwata and Okada, 2011; Rokhmawati and Gunardi, 2017). ROS indicates the efficiency of a firm in achieving optimum sales while simultaneously minimizing costs (Brealey et al., 2001). ROS measures the percentage of sale revenues retained as profit (Carton and Hofer, 2006). According to Rokhmawati and Gunardi (2017), ROS demonstrates customers' evaluation of the efforts undertaken by firms. When they respond positively to the efforts of the firm, they will increase their demand of the firm's products so that the firm's sales will increase. ROS shows the firm's efficiency in sales by minimizing costs (Brealey et al., 2001). ROS measures the percentage of net income from sales.

2.3. Customers' Responses to Firm Effort to Reduce GHG Emissions

In general the customers' response referred to in the literature is represented by the levels of awareness of customers concerning environmental and sustainability issues and how active they are in pushing for a change in behavioral trend in the industrial environmental (Sharma and Henriques, 2005). Customers can influence or can be influenced by the achievement of organizational goals (Jones, 1995). The failure of firms to meet the expectations of customers will make the firm difficult to achieve its goals. This is because the disappointment of customers to the firm's efforts will be responded negatively by them. This negative response will ultimately have an impact on the rising costs or reducing revenues that must be borne by the firm. Conversely, the success of the firm in meeting the expectations and interests of customers will be responded positively by them. This positive response will have an impact on the decrease in firm costs or increase in revenues, which ultimately will affect the firm's financial performance.

In developing countries, customers generally are concerned to get a quality product at a low price regardless of the environmental damage caused by the production process of the product. However, there are some customer groups that concentrate on the environment; these customer groups pay high attention to the environment. Strategic network theory suggests that firms consist of a set of interdependent variable forming a circular relationship among suppliers, customers, and other entities (Gulati et al., 2000). Exporting to developed countries from developing countries and selling/buying products to/from local MNE subsidiaries are ways of firms in developing countries to establish relationships with developed-country firms by exporting to developed countries and selling to local MNE subsidiaries. Firms with a highly embedded relationship with developed country customers' supply chains are likely to have much pressure to reduce their GHG emissions as their environmental responsibility (Abrahamson and Rosenkopf, 1993; Kraatz, 1998). Customers coming from the developed countries usually pay great attention to the environment. The developed countries such as developed countries in Europe, Japan, America, require products that have environmental certificates, for example, ISO 14001 or Eco-Management and Audit Scheme proving that the firm's operations have met the environmental safety standards they expect. Thus, firms that do not comply with environmental regulations will experience constraints to export their goods to these countries (Epstein and Roy, 2007).

3. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

3.1. The Effect of GHG Emissions on ROS Moderated by Customers' Response

Instrumental stakeholder theory (Jones, 1995) says that if a company wants to succeed in the long run, managers must pay attention to the interests of stakeholders. If a firm does not care about their interests it will make the company difficulty in achieving its objectives because the negative responses from stakeholders on the company's efforts will have an impact on the rising costs to be borne by the company, and vice versa.

In developing countries, the customers' expectation of the firm is to provide customers with the required product at an affordable price as people in developing countries have low level income (Sarumpaet, 2005). Richer customers or developed country customers may also want products that are environmentally friendly, even though the price may be more expensive, such as electronic products that are more energy efficient. More energy-efficient products with competitive prices can only be provided by firms that are able to work efficiently, including efficient in consuming energy. Efficient firms will be able to lower costs (Ambec and Lanoie, 2008). Although firms may not be able to apply low prices on quality products that are more energy efficient or environmentally friendly, the firm can apply a competitive price that is applying the price in accordance with the quality. Thus, customers who are concerned with the environment may respond positively to the firm's efforts in reducing GHG emissions. In turn, customers will be loyal and will increase purchases environmentally friendly products, which will eventually increase the firm's sales. Conversely, customers will respond negatively if investor expectations are not responded by the firm. Firms that have export orientation must meet certain qualifications to be able to enter the overseas market. Among them are the requirements of obedience to efforts to reduce global warming. The firm

must have ISO 14001 certificate. It has been suggested that the proximity to the customers is an important factor in influencing the environmental pro-activity of a firm (González-Benito and González-Benito, 2006). So the proposed hypothesis is:

H_a: GHG emissions have a significant effect on ROS
H_b: Customers' responses have a significant effect on ROS
H_c: Customers' responses moderate the effect of GHG emissions on ROS.

4. METHODS

4.1. Data

The population in this study is all 134 listed manufacturing firms in Indonesia at 31 December 2011. The rationale for choosing the listed manufacturing firms is supported by the following arguments: Firstly, the firms are listed on the Indonesia stock exchange (IDX), which means that they provide publicly accessible financial reports and annual reports. Secondly, manufacturing firms are often related to social, environmental and GHG emission issues. As public firms, the listed manufacturing firms have to deal with societal concerns as well as environmental issues, including GHG emissions. Thirdly, Regulation No. 40/2007 obliges manufacturing firms to conduct a social responsibility. Further, based on Decree No. 61/2011, 71/2011 and 47/2012, manufacturing firms have an important role to play in reducing GHG emissions. Lastly, manufacturing firms contribute significantly to GHG emissions, so these firms are vulnerable to regulatory changes associated with climate change.

In this study, the sample firms are selected based on: Firstly, the availability of audited financial reports of the firms for 2010 and 2011. 2-year data were used to compute financial ratios used in this research due to mathematical reason. The denominator of the financial ratios is calculated as an average value in the year of 2010 and 2011. This research chooses the year 2011 because of the necessity to allow time for firms to adjust to the Indonesian Government Regulation PP No. 70/2009 regarding "energy management" so that the issue of GHG reduction became familiar to them. The second is the availability of annual reports of the firms for 2011. The third is the availability of face-to-face interview feedback about the types and amounts of fossil fuels, as well as the amount of electricity consumed by the firms in 2011.

4.2. Variables and Operationalizations

4.2.1. Return on sales (ROS) dependent variables

ROS demonstrates a firm efficiency to achieve optimal sales while minimizing costs (Brealey et al., 2001; Pendlebury and Groves, 1999). Measuring the percentage of sales revenue is maintained as a profit (Carton and Hofer, 2006). ROS reflects the evaluation of customers and trading partners on the firm's efforts to reduce its GHG emissions (Iwata and Okada, 2011). ROS is measured with Equation 1 where ROS is ROS; NI is net income; NS is net sales; i is firm i.

$$ROS_i = \frac{NI_i}{NS_i} \quad (1)$$

4.2.2. GHG emissions as independent variable

In this study, the main independent variable is GHG emissions measured as kilogram CO_2e intensity. To convert raw data of firms' consumptions on fossil fuels and electricity, this research used the system developed by the DEFRA (2012). This research only includes CO_2e generated from activities scope 1 and scope 2 and excludes scope 3. The exclusion is because the emission of scope 3 is indirect emissions for the firm. The emissions result from outsourcing activities that are not under the control of the firm (CDM, 2008). CO_2e intensity is measured as the kilogram ratio of CO_2e divided by net assets.

$$\text{Intensity of } CO_2e = \frac{\text{Kilogaram } CO_2e}{NA} \quad (2)$$

Where,
NA: Net assets measured as the total asset - net working capital;
Net working capital: Measured as current assets - current liabilities.

4.2.3. Customers' response as a moderating variable

Customer responses are measured based on content analysis of information related to the firm's GHG emissions. Questions are developed under the guideline of the sustainability report index that specifically covers GHG emissions and firm handling in customers. These questions can reflect how customers will respond to the firm's efforts to reduce its GHG emissions.

This research does not disseminate questionnaire to customers because this research uses cross-data and uses regression to analyze the data. The regression analysis requires paired data so that if the writer spreads the questionnaires to explore the customer's preference in purchasing a product, the writer must spread the questionnaires to the customers to assess each firm. The circumstances underlie the author to carry out an assessment based on the availability of firm information on handling customers, responsible products, service complaint and also information on GHG emissions. The existence of this information will probably reflect customers' responses to firm effort to reduce GHG emissions.

Furthermore, customer-response assessments are based on the judgment of the researcher based on the quality of information. Assessments range from 1 to 6. Complete information on the firm's efforts to reduce GHG emissions and the ownership of ISO 14001 and PROPER certificates will place the firm on level 1. If the firm does not provide information on GHG emissions will be placed at the level 6. Small scoring for firms with comprehensive information on GHG emissions is due to the adjustment for GHG emission measurements. The higher the CO_2e intensity means the lower the performance of GHGs reduction and vice versa. So with the same logical thinking, the lower the value of customers' response means the more positive the customers' response to the firm's performance in reducing GHG emissions. Conversely, the higher the value of customers' response means the more negative the customers' response to the firm's performance in reducing GHG emissions.

4.3. Control Variables

Three control variables used in this study are firm size, leverage, and capital intensity, which successive variables. Firm size is

recommended to be a control variable (Hillman and Keim, 2001; Prado-Lorenzo et al., 2009; Honggowati et al., 2017). Firm size is a determinant affecting the ability and inclination of firms to perform voluntary GHG disclosure (Freedman and Jaggi, 2005). This argument has evolved from a proposition that large firms are able to invest in clean technologies to reduce their pollution. Firm size is calculated with Equation 3 in which Ln is natural log; NS is net sales, and i is Firm i.

$$\text{Firm Size}_i = \text{Ln (Net Sales)} \quad (3)$$

Firms risk (leverage). Previous research has suggested that it is important to control risk (Hillman and Keim, 2001). Taking into account the risks as a control variable, this study ensures that the difference in ROS also includes the effect of different risk levels. As suggested by Hillman and Keim (2001), this study uses the firm's leverage ratio as a proxy for firm risk. Leverage measures the extent to which a firm's assets are financed by debt. Leverage is calculated using Equation 4 with D is total debt; TA is total assets, and i is Firm i.

$$\text{Leverage}_i = \frac{D_i}{TA_i} \quad (4)$$

Capital intensity is the amount of money invested to receive a dollar of output. This is measured as the ratio of assets to sales (Pedersen and Thomsen, 1999). Firms that are considered more capital-intensive produce the same production units but require more capital invested. A high ratio shows firms with high capital intensity. A capital-intensive firm is considered beneficial in terms of managing value-oriented environments (Schaltegger and Figge, 2000). In the Indonesian context, where many manufacturing firms still use old machines, capital-intensive firms may face difficulties in reducing their GHG emissions. With old machines, capital-intensive firms may have a negative effect on financial performance. Nevertheless, some environmental firms have invested in green and energy-saving technologies. Such firms may be able to improve their financial performance. Capital intensity can be calculated with Equation 5 where, TA is donated for total assets; NS is net sales; i is firm i.

$$\text{Capital Intensit}_i = \frac{TA_i}{NS_i} \quad (5)$$

4.4. Analysis Techniques

The main purpose of this study is to examine the effects of GHG emissions on firm firm financial performance moderated by customers' response to firms' effort to reduce GHG emissions. By following previous studies, some other determinants that may have effects on financial performance are also included in the research model as explanatory variables to financial performance. This research uses moderated regression analysis with cross sectional data that the basic model is expressed as follows:

$$ROS_{i,t} = \beta_0+\beta_1 CO_2eIntensity_{i,t}+\beta_2 Customers' Response_{it}+\beta_3 CO_2eIntensity_{i,t}*Customers' Response_{it}+\beta_4 Firm size_{i,t}+\beta_5 Firm leverage_{i,t}+\beta_6 Capital intensity_{i,t}+\varepsilon_i$$

where, β_0 indicates a constant variable, β_1, β_2, β_3, β_4, β_5, β_6 donates as regression coefficients, i donates as firm name, t represents time, and Ɛ donates as the error term. Before running the regression, the model has to be checked from the classical assumptions, i.e.,: Normality of residuals, multicolinearity, and heteroscedasticity. Autocorrelation test is not performed in this research because the test is only conducted if the data is time series data. Since this research only involves cross sectional data the autocorrelation test is not necessarily conducted.

5. RESULTS AND DISCUSSION

5.1. Results

5.2.1. Descriptive statistics

The number of firms used in this research is 102 firms. The minimum value of ROS is -3.22400. It means that there are any firms that experiences loss profit. The average value of ROS is 0.021255. CO2eIntensity has a mean value of 0.000343. It means that each one Indonesian Rupiah of net asset utilized by firms produces 0.000343 kilogram CO2e. The summary of descriptive statistics for the samples can be seen in Table 1.

5.2.2. Regression analysis

The data that are used to to run the regression have been tested from the classical assumption. The result of the statistical test is provided in the Appendix. Some treatments to normalize the residuals of the regression are conducted. The treatments are such as transforming the data of independent variables into the logarithm natural and omitting some data due to outliers. Hence, there are 89 firms left from 102 firms. Table 2 presents the estimation results using the sample that already tested from classical assumption.

Based on statistical results in Table 2, the regression model can be seen as follows:

$$ROS_i = -0.157+0.009Ln\_CO_2eIntensity_i+0.019Ln\_Customers\_Response_i+0.120Ln\_CO_2eIntensity_i*Ln\_$$

Table 1: Descriptive statistics of each variable

	Statistic				
	N	Minimum	Maximum	Mean	SD
ROS	102	−3.22400	0.70349	0.021255	0.369205
CO_2eIntensity	102	0.0000023	0.0099827	0.000343	0.0010773
Customers_Response	102	3.2000	113.2000	40.151	28.25954
CO_2eIntensity*Customers_Response	102	0.0001	0.9004	0.02029	0.09556
Firm_size	102	21.6664	32.7221	27.9148	1.86024
Firm_Leverage	102	0.0019	3.1246	0.58261	0.43987
Capital_Intensity	102	0.2813	5.7220	1.19702	0.84836
Valid N (listwise)	102				

Table 2: Regression statistics results

Model summary[b]					
Model	**R**	**R^2**	**Adjusted R^2**	**Standard error of the estimate**	**Durbin-Watson**
1	0.698[a]	0.487	0.449	0.04986298	2.225

[a]Predictors: (Constant), Ln_ Firm_size, Ln_Capital_Intensity, Ln_Firm_Leverage, Ln_CO_2eIntensity, Ln_Customers_Response, Ln_CO_2eIntensity*Ln_Customers_Response. [b]Dependent variable: ROS

ANOVA[a]					
Model	**Sum of squares**	**df**	**Mean square**	**F**	**Significant**
1					
Regression	0.196	6	0.033	13.109	0.000[b]
Residual	0.206	83	0.002		
Total	0.402	89			

[a]Dependent variable: ROS, [b]Predictors: (Constant), Ln_ Firm_size, Ln_Capital_Intensity, Ln_Firm_Leverage, Ln_CO_2eIntensity, Ln_Customers_Response, Ln_CO_2eIntensity*Ln_Customers_Response

Model	**Unstandardized coefficients**		**Standardized coefficients**	**t**	**Significant**
	B	**Standard error**	**β**		
1					
Constant	−0.157	0.097		−1.620	0.109
Ln_CO_2eIntensity	0.009	0.004	0.200	2.004	0.048
Ln_Customers_Response	0.019	0.007	0.246	2.635	0.010
Ln_CO_2eIntensity*Ln_Customers_Response	0.120	0.067	0.181	1.798	0.076
Ln_Firm_size	0.007	0.004	0.171	1.790	0.077
Ln_Firm_Leverage	−0.047	0.011	−0.363	−4.324	0.000
Ln_Capital_Intensity	−0.014	0.011	−0.107	−1.280	0.204

[a]Dependent variable: ROS

$Customers\_Response_i + 0.007 Ln\_Firm\_Size_i - 0.047 Ln\_Firm\_Leverage_i - 0.014 Ln\_Capital\_Intensity_i$

5.3. Discussions

5.3.1. Influence of CO_2e intensity on ROS

The influence of CO_2eIntensity on ROS can be seen from the value of Beta CO_2eIntensity (0.009) and statistically, the relationship is significant. These results confirm the hypothesis (H_a) that CO_2eIntensity has a significant effect on ROS. The beta value of 0.009 means that one unit increase in CO_2eIntensity will result in an increase of ROS by 0.009 units and the increase is significant. Conversely, any decrease in one unit of CO_2eIntensity will result in a decrease in ROS by 0.009 units.

The result of this study differs from the study of Busch and Hoffmann (2011), which used carbon intensity as a measure of environmental performance. Busch and Hoffmann (2011) hypothesized that the improvement of carbon performance is followed by the improvement of firm financial performance. Environmental performance-based firm refers to the firm's ability to meet the expectations and demands of stakeholders related to the firm's environment (Asmeri et al., 2017). Firms with high environmental performance can benefit from their compliance with regulations so that costs associated with regulatory compliance will decline. Costs associated with not-complying with regulations include: Fines, sanctions, costs due to a decrease in firm reputation and due to an increase in litigation risks. In addition, the ability of a firm to reduce GHG emissions without having to reduce production levels reflects that the firm is able to work efficiently in consuming fossil fuels and electricity. Lowering these costs will result in the improvement of financial performance. Furthermore, the research results are also inconsistent with Iwata and Okada (2011) findings, which found that GHG emissions have a significant and negative effect on financial performance.

The results of this study are in line with Hatakeda et al. (2012) which conducted research in Japan and found that GHG emissions have a significant and positive effect on profitability. They claim that the effect of GHG emissions on profitability is positive because the firm's additional cost to reduce GHG emissions is higher than the additional benefit of reducing GHG emissions. These results indicate that firms tend to respond conservatively to GHG emission problems when GHG emission reduction is voluntary based activities (Hatakeda et al., 2012). In addition, the results are in line with Wang et al. (2013), which conducted research in Australia and found that GHG emissions have a significant and positive effect on Tobin's q. This result surprised because Australia has implemented a carbon tax. Wang et al. (2013) argued that GHG emissions have a positive effect on financial performance as measured in Tobin q because the Australian economy is heavily dependent on mining. This industry accounts for 89% of total emissions from scope 1 and scope 2 produced by Australia. Furthermore, at that time, the mining industry experiences a high financial performance and growth due to the increased exports of Australian mining products due to the increased international demand (Wang et al., 2013). The increase in financial performance and high growth of this industry was appreciated by the market, so the market price of this industrial stock increased. This study is also in line with the results of Delmas and Nairn-Birch (2010) research, which suggested that firms with lower carbon footprints have lower ROA than firms with higher carbon footprint. They argued that carbon regulations have not been enacted in the US, so firms with high GHG emissions can still generate more profits (Delmas and Nairn-Birch, 2010). Under such circumstances, firms are able to

increase their revenues by increasing their GHG emissions as the higher carbon emissions mean the higher production rates. A high level of production increased financial performance. This increase occurs because firms are not internalized costs associated with carbon emissions. In addition, there are no financial incentives provided for firms to reduce their GHG emissions (Delmas and Nairn-Birch, 2010).

The reasons behind the positive effects of GHG emissions on ROS in this study can be explained as follows. In Indonesia, there are financial incentives provided for firms that are successful in reducing their GHG emissions, but these incentives may be much lower than the cost of reducing their GHG emissions. This may be because Firstly, the Indonesian Government enacted Regulation PP No. 70/2009 on "energy management" which calls for the industrial sector to contribute to reducing GHG emissions. However, the regulation appears to be ineffective in forcing firms to reduce their emissions and many firms still have not seriously complied with the regulation (Rahmawati, et al., 2017). According to the directorate of energy conservation, most firms participating in 'energy management' are reluctant to comply with energy audit recommendations due to the need for expensive investments (APEC, 2012). Secondly, many large firms use coal to run their electric generators. This is because coal prices are much lower than other types of fossil fuels. However, coal produces more GHG emissions than other types of fossil fuels (Rubin, 2009; The-Indonesian-Ministry-of-Energy-and-Mineral-Resources, 2012). According to de Gouw et al. (2014), coal generates about twice as much CO_2 from natural gas for each unit of measurement. Thirdly, many Indonesian firms are still using machines with old technology that is not environmentally friendly (APEC, 2012). Nevertheless, fossil fuels do not appear to significantly affect production costs as these costs only contribute around 2.69% (Sitepu, 2013).

5.4. The Effect of Customers' Response to ROS

As explained before, the coefficient (β_2) of Customers' response is numbered at 0.019. The statistical result means that as the independent variable of Customers on the GHG produced by the firm currently has a positive and significant influence on ROS. The increase in the value of customers' responses will increase firms' ROS.

ROS shows the efficiency of a firm in achieving optimal sales while minimizing costs (Brealey et al., 2001; Pendlebury and Groves, 1999). According to Iwata and Okada (2011), ROS shows an evaluation by customers. When they respond positively to the firm, they can buy their products more often and in more quantities; and sales will increase. The significant positive effects of GHG emissions on ROS can be defined as customers (especially Indonesian customers) who have a preferential price than the environment. When total manufacturing costs are not very sensitive to rising costs associated with GHG emissions, firms can consume more fossil fuels and electricity without worrying that it will significantly affect the price of their products. As a result, firms can still offer products at competitive prices.

The current situation of Indonesia is described as that there is a low penalty for those who disobey Regulation no. 70/2009, but the law enforcement for low disobedience is still low. This implies that firms may still think that under current conditions in Indonesia, efforts to reduce GHG emissions would be useless as efforts to reduce fossil fuels and energy consumption require large investment. When the benefits of complying with these regulations are not immediately accepted and punishment for noncompliance is also affordable, firms may prefer to run their BAU rather than make risky changes. From the customers' perspective, a significant and positive effect of customers' response to firm efforts to reduce GHG emissions can be interpreted as follows. Since customers are more interested in competitive products, firms try to meet customers' needs at competitive prices and not try to reduce GHG emissions. Therefore, firms tend to pay attention to how they can produce products at lower prices rather than pay attention to how they should reduce their GHG emissions.

5.5. The Effect of CO_2eIntensity on Investment Moderated by Customers' Response

The coefficient (β_3) of the multiplication variable between CO_2eIntensity and customers' response is 0.120 and has a positive sign which is statistically significant at 90% confidence level. The increase in CO_2eIntensity value leads to the decrease in the firm's performance in reducing GHG emissions. Furthermore, from the statistical result, it can be seen that as a moderating variable, the variable of the customers' response is able to strengthen the influence of CO_2eIntensity on ROS. This result indicates that customers are still sensitive to price changes. Customers' decision to buy products are not based on green products (environmentally friendly products) but customers' buying decisions still highly depend on price. As explained earlier that GHG emission reduction requires expensive investment. This expensive investment will increase the component of the firm's production costs due to the increase of firm fixed costs. The increased costs will be transferred to customers so that the price of the product will increase (Khoiruman & Haryanto, 2017). The increase of GHG emissions due to the increase in the production level is a positive response from customers because the firm does not implement the policy of reducing emissions since the reducing GHG emissions will even raise the price of the product.

The statistical result indicates that customers may disagree to the government regulations that require firms to reduce their GHG emissions that is felt to incur additional costs for customers. These additional costs may be perceived by the customer that it will increase the price of the product. With the existence of the regulation, firms must invest in technology and energy-efficient machines to reduce their GHG emissions. The increased investment without accompanied by a sufficient increase in revenues to cover the additional cost of capital on the firm's investment will only result in the lowering firm earnings. In order to maintain the profit margin, the firm may increase the selling price so that the increased costs that exceed the increased revenue can be covered by the increase of selling price. The condition of the economy in Indonesia is not strong enough and the level of peoples' income is still low, making the efforts to reduce GHG emissions is difficult to achieve. Thus, in order to the government regulation on GHG emission reduction to be achieved, the government needs to ensure that the firm will not transfer the losses resulted from the policy

PP No. 70/2009 to customers. The transfered loss can be avoided if the government provides tax incentives for firms.

5.6. The Effect of Control Variables on ROS

From Table 2, it is seen that firm size has a positive and significant effect on ROS at the degree of freedom 90%. The direction of the effect is as predicted. Larger firms have more ability to improve their ROS. Firm leverage has a negative and significant effect on ROS at the degree of freedom 95%. The direction of the effect is as predicted. Firms with large amount of debt will reduce the ability of firms to earn higher sales. Finally, capital intensity has insignificant effect on ROS. This result confirms the statement of the directorate of energy conservation that most firms participating in "energy management" reluctant to comply with energy audit recommendations due to the need for expensive investments (APEC, 2012).

6. CONCLUSION AND IMPLICATION

From the discussion, it can be concluded that CO_2e intensity has a significant and positive effect on ROS. In addition, it is also concluded that as independent variables, customers' responses have a positive and significant impact on ROS. Finally, the customers' response as a moderating variable has a positive and significant influence on the impact of CO_2e intensity on ROS. It means that the customers' responses strengthen the effect of CO_2e intensity on ROS. The result implies that in current Indonesian conditions of carbon policy, customers do not seem to pay enough attention to GHG emissions. They appear to be more concerned about the availability of products at a low price than an environmentally friendly product.

The result of this study has implication for Instrumental Stakeholder Theory. The results of this study indicate that under current Indonesian conditions (ineffective regulation, weak law enforcement, low penalties for disobedient firms, and poor attention of customers toward GHG emissions), in order to satisfy the interests of the customers, the firm can maintain their relationship with customers by conducting the BAU.

This result also has implications for policy. This research may help the Indonesian Government and policy makers to support manufacturing industries to deal with the GHG emissions, particularly to deal with Regulation PP No. 70/2009. The main objective of the regulation is to encourage this industry to be actively involved in the initiative of the government to reduce GHG emissions without destroying their competitiveness. Win-win solution is the main purpose of the initiative. The reduction targets of GHG emissions can be achieved while the industries' competitiveness is still able to be maintained and be enhanced. Besides strong law enforcement, a powerful and influential regulation can be a critical driver for achieving this goal. Therefore, it is important for the Indonesian government and policy makers to develop a powerful and influential regulation.

The result of this research has some implications for future research. Firstly, although the result is new to the existing literature, there is a caution to the 1 year data in 2011. A 1-year period may not capture the long-term effects of GHG emissions. This is because the Indonesian government had just started to pay attention to GHG emissions in the industrial sector, which is manifested by the introduction of Regulation PP No. 70/2009 about "energy management." The 2-year lag was intended to give firms time to adjust their business practices. Using a longer panel data may improve the weakness of this research. Time series data will provide the trend of GHG emissions produced by firms. Secondly, future studies may conduct comparisons of before and after the Regulation PP No. 70/2009 was released. Comparing different periods will provide information regarding whether there has been a reduction of GHG emissions after the implementation of the regulation. Thirdly, the study only covers customers as a firm stakeholder, while the company's stakeholders include not only the customers, but also include investors, creditors, employees. So that further research may include other stakeholders with different research methods. For example, with structural equation modeling.

REFERENCES

Abrahamson, E., Rosenkopf, L. (1993), Institutional and competitive bandwagons: Using mathematical modeling as a tool to explore innovation diffusion. Academy of Management Review, 18(3), 487-517.

Ambec, S., Lanoie, P. (2008), Does it pay to be green? A systematic overview. Academy of Management Perspectives, 22(4), 45-62.

Asmeri, R., Alvionita, T., Gunardi, A. (2017), CSR disclosures in the mining industry: Empirical evidence from listed mining firms in Indonesia. Indonesian Journal of Sustainability Accounting and Management, 1(1), 16-22.

APEC. (2012). Peer Review on Energy Efficiency in Indonesia. Jakarta: Asia-Pasific Economic Cooperation.

BPS. (2012), Trends of Selected Socio-Economic Indicators of Indonesia. Jakarta: Badan Pusat Statistik Indonesia.

BP-Statistical-Review-of-World-Energy. (2016), Statistical Review of World Energy. Available from: https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy/country-and-regional-insights/indonesia.html.

Brealey, R.A., Myers, S.C., Marcus, A.J. (2001), Fundamentals of Corporate Finance. New York: McGraw-Hill.

Brinkman, M.W., Hoffman, N., Oppenheim, J.M. (2008), How climate change could affect corporate valuations. McKinsey Quarterly, 29, 1-7.

Busch, T., Hoffmann, V.H. (2011), How hot is your bottom line? Linking carbon and financial performance. Business and Society, 50, 233-265.

Carton, R.B., Hofer, C.W. (2006), Measuring Organizational Performance: Metrics for Entrepreneurship and Strategic Management Research. Massachusetts: Edward Elgar Publishing, Inc.

CDM. (2008), Carbon Disclosure Project S&P 500. Elmsford, NY: Jam Printing.

Center-for-Climate-and-Energy-Solutions. (2009). Fifteenth Session of the Conference of the Parties to the United Nations Framework Convention on Climate Change and Fifth Session of the Meeting of the Parties to the Kyoto Protocol; 2017. Available from: https://www.c2es.org/international/negotiations/cop-15/summary. [Last retrieved on 2017 Aug 26].

de Gouw, J.A., Parrish, D.D., Frost, G.J., Trainer, M. (2014), Reduced emissions of CO_2, Nox, and SO_2 from U.S. Power plants owing to switch from coal to natural gas with combined cycle technology. Earth's Future, 2, 75-82.

DEFRA. (2012), Guidelines to Defra/DECC's GHG Conversion Factors

for Company Reporting. London: The Department for Environment, Food and Rural Affairs.
Delmas, M.A., Nairn-Birch, N.S. (2010), Is the Tail Wagging the Dog? An Empirical Analysis of Corporate Carbon Footprints and Financial Performance. California: UCLA.
Elsayed, K., Paton, D. (2005), The impact of environmental performance on firm performance: Static and dynamic panel data evidence. Structural Change and Economic Dynamics, 16, 395-412.
Epstein, M.J., Roy, M.J. (2007), Implementing a corporate environmental strategy: Establishing coordination and control within multinational companies. Business Strategy and the Environment, 16, 389-403.
Freedman, M., Jaggi, B. (2005), Global warming, commitment to the kyoto protocol, and accounting disclosures by the largest global public firms from polluting industries. The International Journal of Accounting, 40, 215-232.
Ghozali, I. (2011), Aplikasi analIsis Multivariate Dengan Program SPSS 19. Semarang: Badan Penerbit Universitas Diponegoro.
González-Benito, J., González-Benito, Ó. (2006), A review of determinant factors of environmental proactivity. Business Strategy and the Environment, 15, 87-102.
Greil, A. (2011), Swiss Re: 2011 Industry Lossess from Disasters at $108B, Newswires.
Gulati, R., Nohria, N., Zaheer, A. (2000), Strategic networks. Strategic Management Journal, 21(3), 203-215.
Gunardi, A., Febrian, E., Herwany, A. (2016), The implication of firm-specifc characteristics on disclosure: The case of Indonesia. International Journal of Monetary Economics and Finance, 9(4), 379-387.
Hart, S.L., Ahuja, G. (1996), Does it pay to be green? An empirical examination of the relationship between emission reduction and firm performance. Business Strategy and the Environment, 5, 30-37.
Hatakeda, T., Kokubu, K., Kajiwara, T., Nishitani, K. (2012), Factors influencing corporate environmental protection activities for greenhouse gas emission reductions: The relationship between environmental and financial performance. Environ Resource Economics, 53, 455-481.
Hillman, A.J., Keim, G.D. (2001), Shareholder value, stakeholder management, and social issues: What's the bottom line? Strategic Management Journal, 22, 125-139.
Honggowati, S., Rahmawati, R., Aryani, Y. A., Probohudono, A. N. (2017). Corporate governance and strategic management accounting disclosure. Indonesian Journal of Sustainability Accounting and Management, 1(1), 23-30.
IPCC. (2007), Climate Change 2007: Synthesis Report. Valencia, Spain: IPCC.
Iwata, H., Okada, K. (2011), How does environmental performance affect financial performance? Evidence from Japanese manufacturing firms. Ecological Economics, 70, 1691-1700.
Jensen, M.C. (2001), Value maximization, stakeholder theory, and the corporate objective function. Journal of Applied Corporate Finance, 14, 1-17.
Jones, T.M. (1995), Instrumental stakeholder theory - A synthesis of ethics and economics. Academy of Management Reviews, 20, 404-437.
Jones, P., Wynn, M., Hillier, D., Comfort, D. (2017), The sustainable development goals and information and communication technologies. Indonesian Journal of Sustainability Accounting and Management, 1(1), 1-15.
Khoiruman, M., Haryanto, A.T. (2017), Green purchasing behavior analysis of government policy about paid plastic bags. Indonesian Journal of Sustainability Accounting and Management, 1(1), 31-39.
Kolk, A., Pinkse, J. (2005), Business responses to climate change: Identifying emergent strategies. California Management Review, 47, 6-20.
Kraatz, M.S. (1998), Learning by association? Interorganizational network and adaptation to environmental change. Achademy of Management Journal, 41(6), 64-81.
Lee, S.Y. (2012), Corporate carbon strategies in responding to climate change. Business Strategy and the Environment, 21, 33-48.
Pedersen, T., Thomsen, S. (1999), Econimic and systematic explanations of ownership concentration among European's largest companies. International Journal of the Economics of Business, 6, 367-381.
Pendlebury, M., Groves, R. (1999), Company Accounts: Analysis, Interpretation and Understanding. London: International Thomson Business Press.
Prado-Lorenzo, J.M., Rodriguez-Dominguez, L., Gallego-Alvarez, I., Garcia-Sanchez, I. (2009), Factors influencing the disclosure of greenhouse gas emissions incompanies world-wide. Management Decision, 47, 1133-1157.
Rahmawati, R., Rispantyo, R., Djamaluddin, S. (2017), Mentoring function and quality of supervisor auditor relationship: Organizational justice as a mediation. Indonesian Journal of Sustainability Accounting and Management, 1(1), 40-48.
Rokhmawati, A., Gunardi, A. (2017), Is going green good for profit? Empirical evidence from listed manufacturing firms in Indonesia. International Journal of Energy Economics and Policy, 7(4), 181-192.
Rokhmawati, A., Sathye, M., Sathye, S. (2015), The effect of GHG emission, environmental performance, and social performance on financial performance of listed manufacturing firms in Indonesia. Procedia Social and Behavioral Sciences, 211, 461-470.
Rubin, E.S. (2009), Coal Initiative Reports. Performance Standards Approach to Reducing CO_2 Emissions from Electric Power Plants. Arlington: Pew Center on Global Climate Change.
Sarumpaet, S. (2005), The relationship between environmental performance and financial performance of indonesian companies. Jurnal Akuntansi dan Keuangan, 7, 89-98.
Schaltegger, S., Figge, F. (2000), Environmental shareholder value: Economic success with corporate environmental management. Eco-Management and Auditing, 7(1), 29-42.
Sharma, S., Henriques, I. (2005), Stakeholder influences on sustainability practices in the canadian forest products industry. Strategic Management Journal, 26, 159-180.
Sitepu, R. (2013), Policy Paper: Subsidi Energi dan BBM Pengaruhnya Terhadap Industri. Jakarta: KADIN Indonesia.
Solomon, S., Qin, D., Manning, M., Chen, Z., Marquis, M., Averyt, K.B., Miller, H.L. (2007), Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge.
Stern, N. (2007), The Economics of Climate Change: The Stern Review. Cambridge: Cambridge University Press.
The-Indonesian-Ministry-of-Energy-and-Mineral-Resources. (2012), Handbook of Energy and Economic Statistics of Indonesia. Jakarta: Pusdatin Kementrian Sumber Daya dan Mineral.
The-Indonesian-Ministry-of-Environment. (2010), Second National Communication of Indonesia to the UNFCCC. Jakarta: Pusdatin The Indonesian Ministry of Environment.
The-National-Council-on-Climate-Change-of-Indonesia. (2009), Opsi-Opsi Pembangunan Rendah Karbon untuk Indonesia: Peluang dan Kebijakan Pengurangan Emisi Sektor Manufaktur. Jakarta: Dewan Nasional Perubahan Iklim.
Wang, L., Li, S., Gao, S. (2013), Do Greenhouse Gas Emissions Affect Financial Performance? An Empirical Examination of Australian Public Firms. Business Strategy and the Environment, 23(8), 505-519.
Yudhoyono, S.B. (2009), Speech at The UNFCCC Copenhagen. Jakarta.

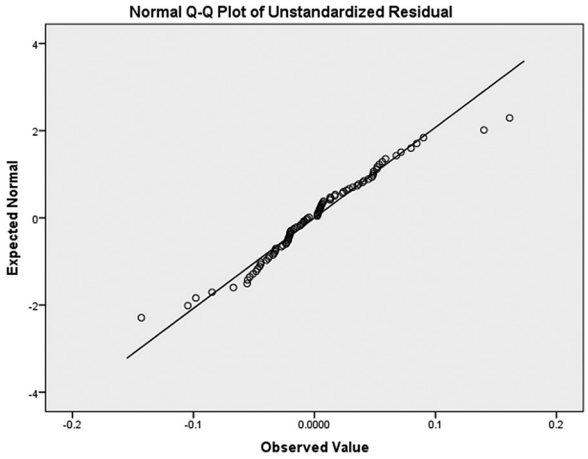
APPENDIX

Appendix: Classic Assumption Tests

The classical assumption test underlying multiple regression models is used to obtain an accurate model. The classical assumption test in this study consisted of residual normality, multicolinearity, and heteroscedasticity (Ghozali, 2011).

Checking normality test for the residuals

With QQ plots



The residual data spread alongside by following the diagonal line. The residuals appear to be normal.

With colmogorov smirnov test

One-sample Kolmogorov-Smirnov test	
???	**Unstandardized residual**
N	90
Normal parameters[a, b]	
Mean±SD	0.0000007±0.04815288
Most extreme differences	
Absolute	0.094
Positive	0.094
Negative	−0.068
Kolmogorov-Smirnov Z	0.888
Asymp. Significant (two-tailed)	0.410

[a]Test distribution is normal. [b]Calculated from data. The value of Asymp. Significant is more than 0.05. It means that the data is normal

Checking Multicollinearity with VIF

Coefficients[a]							
Model	Unstandardized coefficients		Standardized coefficients	t	Significant	Collinearity statistics	
	B	Standard error	β			Tolerance	VIF
1							
Constant	−0.157	0.097		−1.620	0.109		
Ln_CO_2eIntensity	0.009	0.004	0.200	2.004	0.048	0.620	1.614
Ln_Customers_ Response	0.019	0.007	0.246	2.635	0.010	0.707	1.414
Ln_CO_2eIntensity*Ln_ Customers_Response	0.120	0.067	0.181	1.798	0.076	0.608	1.646
Ln_Firm_size	0.007	0.004	0.171	1.790	0.077	0.676	1.478
Ln_Firm_Leverage	−0.047	0.011	−0.363	−4.324	0.000	0.878	1.140
Ln_Capital_Intensity	−0.014	0.011	−0.107	−1.280	0.204	0.889	1.125

[a]Dependent variable: ROS. The VIF of each variable is less than 10 meaning that there is no multicollinearity detected

Checking heteroscedasticity with glejser test

Coefficients[a]					
Model	Unstandardized coefficients		Standardized coefficients	t	Significant
	B	Standard error	β		
1					
Constant	0.015	0.061		0.240	0.811
Ln_CO_2eIntensity	0.005	0.003	0.250	1.868	0.065
Ln_Customers_Response	0.006	0.005	0.160	1.281	0.204
Ln_CO_2eIntensity*Ln_Customers_Response	−0.073	0.042	−0.232	−1.722	0.089
Ln_Firm_size	0.002	0.002	0.100	0.781	0.437
Ln_Firm_Leverage	0.002	0.007	0.039	0.349	0.728
Ln_Capital_Intensity	0.009	0.007	0.145	1.301	0.197

[a]Dependent variable: AbsRes. The significant value of each variable is more than 0.05 meaning that there is no hetersoscedasticity detected