

The Effect of ESG Rating on Credit Rating

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Abstract

This research aims to evaluate the relationship between Environment, Social and Governance (ESG) rating and firm credit rating. The study focuses on listed companies in Indonesia and tries to examine the relationship using ordered probit regression model to reach conclusion of this study. The findings show from three pillars of ESG, only environment and governance significantly affect firm credit rating. Specifically, firm credit ratings are negatively associated with environment pillar and positively related with governance pillar. This research also documents that individual categories of each ESG pillar possess different significance and effect. This research results show that resource use, emission, human rights, management, and shareholders significantly affect firm credit rating. However, only emission and management possess positive effect. The overall research shows ESG rating as a non-financial information plays a huge role in creditworthiness assessment.

Keywords

Sustainability, Environment Social and Governance (ESG), Socially Responsible Investing, Credit Rating.

1. Introduction

Socially Responsible Investment (SRI) as an investment nature that considers environment, social and governance (ESG) factors to generate long-term return and positive impact to the society have increased rapidly over the last few years. More than one out of every four dollars investment was invested in sustainable investing strategies and a 38% growth rate in sustainable investing from 2016 to 2018 (US SIF, 2019). To cope with the increasing trend of sustainable investing, Financial Service Authority (OJK) in Indonesia released a regulation no.51/POJK.03/2017 on sustainability report obligations for financial services, listed and public companies to assure that they meet sustainability-related criteria to attract wider investors.

Sustainable and Responsible Investment KEHATI (SRI KEHATI), United Nation Principles of Responsible Investment (UNPRI), The Forum for Sustainable and Responsible Investment (US SIF), Global Reporting Initiative (GRI), European Sustainable investment (Eurosif) and many others are all indicators in addressing sustainability in financial market in order to create a better and sustainable future. All these development of initiatives, indicators and values are pushing the way companies need to operate to become more sustainable. In countries like Indonesia for example where sustainability reports become an obligation, it is crucial for every business to address ESG in their operations. Since ESG as a sustainability aspect is now required to be integrated with corporate's operation and become something they need to consider in conducting their businesses, it is reasonable to assume that ESG as a sustainability factor affects their financial performance.

Even though there is already an excess amount of literature and research on the sustainability aspect, especially its relationship with firm performances that yields contradicting results. The effect of sustainability aspect on credit rating has not been developed much. One thing to underline is that previous research tends to be on the advanced countries, while the research on developing countries is still very limited. This is due to the allocation of resources that focus more on operating efficiency rather than values like socially responsible investment. Even though Indonesia is categorized as a developing country, Indonesia is becoming more aware as the regulation on sustainability report become an obligation for the company and its assertiveness in dealing with ESG violations on the court.

ESG factors have been proven to be the judgement for the risk perspective. The risk of ESG violation as their sustainability aspect will result in substantial penalty to cover the violations cost and the damage corporations have

made. We have seen all those violations committed by the corporation result in substantial and long-impact financial loss. ESG violations in Indonesia on environment aspect where PT Merbau Pelalawan Lestari carrying out illegal logging in forests covering an area of 5.590 hectares and environmental destruction on an area of 1.873 hectares in Riau results in fines of Rp16,2 trillion as one of the largest settlement cost in Indonesia when its total asset is only Rp1 trillion (Ministry of Environment and Forestry, 2017) and bad governance can have domino effect on corporation like what happened with Garuda Indonesia after violating financial statements procedures and responsible to pay the fines of Rp1,25 billion and requiring all of its board of director to pay Rp100 million each (CNN Indonesia, 2019). To sum up, ESG controversies wiped over companies value and its ability to pay their obligations.

Since a lot of corporations who violate ESG as a sustainability aspect had a substantial price within, the probability of default is higher for those companies with ESG violation with long term impact and financial loss on their financial performance. It is reasonable to assume that ESG factors can affect default risk that'll affect the credit rating. Companies with lower ESG should pay a higher cost of capital and should pay a lower cost of capital if they have a higher ESG rate on their financial performance. This is why it is important to prioritized a sustainable corporation and finance the right project that considers ESG as one of important aspect in conducting their business. It is also the primary reason why it is interesting and important to analyze these variables as the effect of ESG rate on credit rating that has not been put into much attention. Whereas we are in the time when sustainability has become one of the world's greatest concern and one of the top priorities on the global agenda, but have not yet been standardized. In the hope that this research can be used as a basis for investors, debtors, credit rating agencies and corporations for further decision making.

2. Literature Review

2.1. ESG Rating

2.1.1. *The Environmental Pillar*

The categories covered in 'E' (Environment) on ESG rating is the company's emission, innovation level and resource use. The emission category measures emission, waste, biodiversity, and environmental management system. The innovation category measures a company's product innovation level, its ability in creating revenue or managing capital expenditure that benefits the environment. The resource use category measures the decrease of water, energy and other material used in operating their business, also including sustainable packaging for their product and their ability in implementing environmental supply chains (Refinitiv, 2020, p.10).

(Leis-erowitz et al. 2018).

For the effect of environmental aspect to credit risk, there has not been much literature investigated in this topic. Hock (2020) proves that firms with more environmentally sustainable have lower credit risk with higher creditworthiness compared to firms with bad environmental implementation. This is aligned with Bauer & Hann (2010) who provide support that environmental concerns firms are assigned a lower credit rating and higher cost of debt and proactive environmental firms are assigned with lower cost of debt. Recent study by Dorfleitner (2019) shows that higher environmental sustainability firms have better credit rating. This is due to the fact that firms with better environmental sustainability have lower risk of being fined for environmentally damaging action.

The perception of environmental issues has changed leading to an increased public awareness and media coverage (Leis-erowitz et al. 2018). Hence, many customers have become more sensitive to ecological issues and punish environmental misconduct by avoiding products from environmentally unfriendly companies, which can lead to a severe reduction in sales and harm profits. Additionally, other companies do not want to be associated with environmental sinners and thus are likely to cut off business dealings with polluters, which could have a negative impact on the whole supply chain.

Focusing more on external effect, firms with lower environmental sustainability are having higher chance of environmental misconduct and facing more reputational risks since customer awareness increases towards sustainability. Align with Leiserowitz (2018) that shows public perception towards environmental misconduct has changed as media coverage and public awareness increases. As the consequences, customers are avoiding firm with environmental issue as a punishment for not comply with environmental regulation by not purchasing their product and services which leads to damage in profitability of the company that'll effect the firm's credit rating. Given these positive findings, researcher pose the following hypothesis concerning environmental aspect on firms credit rating:

Hypothesis 1 (H1). *There is a significant positive relationship between environment pillar and firm credit rating*

2.1.2. *The Social Pillar*

The categories covered in 'S' (Social) on ESG rating is the community development and involvement, human rights, product responsibility and workforce conditions. The community category measures company's respect towards business ethics and protecting public health. Human rights measures a company's ability to respect fundamentally human rights. Product responsibility category measures firm's ability to protect customer's privacy, product quality produced, and responsible marketing. The Workforce category measures a company's ability in providing safe, clean, healthy workplace with diversity and inclusion (equal opportunities for everyone) and provided career development and training (Refinitiv, 2020, p.10).

In contrast with the environmental aspect, there is a vast amount of research discussing the effect of social aspect on credit risk. For example back to Dorfleitner (2019), not only on environment aspect, firms with higher social sustainability receive better credit rating. More from Bauer (2009) that show that firms with stronger employee relations have lower cost of debt and higher bond rating for firms with stronger employee relations. Another research possessed by Oikonomou (2014) argue that firms with irresponsible behaviour have a higher probability of getting penalties and sanction from the government. This reason reflects the main reason behind this research whereas a lot of companies violate ESG and behave irresponsibly on their daily operation, suffer long financial impact by ruining firms reputation on public eyes that'll affect firm's profitability and their ability to pay their obligations.

Moreover on the effect of CSR on social aspect, Branco and Rodrigues (2006) shows better CSR performance improving firm reputation among customers, investors, bankers, and suppliers as company's stakeholders. This is align with Pfau et al (2008) that shows corporate reputation and credibility built and enhanced by CSR communication. Communicating company's CSR by reporting and releasing sustainability report can help maintaining company's image in public especially for environmentally sensitive company. This is align with this research background researcher have mentioned on increasing trend in sustainable investing where Financial Service Authority (OJK) in Indonesia released a regulation no.51/POJK.03/2017 on sustainability report obligations for financial services, listed and public companies to assure that the company meet sustainability-related criteria to attract wider investors and maintain positive image on public to avoid product boycott ESG related issues. Given all of these positive findings, the hypothesis between social aspect and firms credit rating being tested in this study is:

Hypothesis 2 (H2). *There is a significant positive relationship between social pillar and firm credit rating.*

2.1.3. *The Governance Pillar*

The categories covered in 'G' (Governance) on ESG rating is the company's CSR Strategy, Management and Shareholders. The CSR Strategy category measures firm's transparency in CSR and sustainability reporting and company's ability in implementing environment, social, and governance aspects into day-to-day decision making. Management category measures independence, diversity and committees on its management, also measures company's ability in managing compensation. Shareholder category measures a company's ability in fulfilling shareholder rights and their ability in implementing anti-takeover defenses policy (Refinitiv, 2020, p.10).

More previous research on governance aspect on credit risk (Ashbaugh-Skaife, Collins, & LaFond, 2006; Bhojraj & Sengupta, 2003) show that higher quality of corporate governance implementation leads to lower credit risk and higher credit rating. Bhojraj & Sengupta (2003) shows this is due to the fact that governance mechanism possess extra control by monitoring managerial performances and agency costs mitigation by information asymmetric reduction. Evidence by Tarigan (2017) prove a positive relationship between board size, audit committee, external auditor size, and institutional ownership on firm's credit rating, and negative effect from the number of blockholders and outside directors.

This is align with Ashbaugh-Skaife (2006) document a negative relationship between CEO power and blockholders number on firm credit rating and positively on takeover defenses, accrual quality, earnings timeliness, board independence, board stock ownership, and board expertise. Interestingly, he finds that firms with speculative grade credit rating are more likely to overcompensate their CEO compared to firms with strong governance. Firms with board independence also improve managerial monitoring for an effective decision making that'll increase firm value and decrease agency costs with high potential of decreasing firm value by putting their interest above the firm's. Given these positive findings on previous research, researcher expect a positive relationship between governance aspect and firm credit rating and pose the following hypothesis:

Hypothesis 3 (H3). *There is a significant positive relationship between governance pillar and firm credit rating*

2.2. Credit Rating

Significant numbers of research support the use of credit rating as financial performance. Credit rating not only incorporates current and historical financial performance, but also the expectation of future prospects as well. Credit rating also includes non-financial information that is related to the firm's ability in conducting their financial performance. Kisgen (2006) states that credit ratings may include information on the firm quality above and beyond the publicly available information and may receive significant information that isn't public that could potentially affect firm performances. Rating agencies is also a specialize on information gathering for the evaluation process for the credit rating assessment and thereby provide a reliable firm's creditworthiness measures. Boot et al (2006) argues that credit rating agencies could be viewed as data-processing agencies that could speed up the extension of information to financial markets. Therefore it is reasonable to consider credit rating as a measure of a firm's financial performance.

2.3. ESG as Credit Rating Assessment

Weber (2010) shows the result of survey on 40 Germany banks that assess sustainability criteria as factors to predict the debtor's financial performance and assessment on the firms' creditworthiness. Understanding that ESG as part of CSR affect firm's financial and non-financial information. Researchers assume that credit rating agencies consider ESG as their assessment on the firm credit rating. This assumption indeed consistent with Hörter (2017) show the three leading credit rating agencies –S&P, Moody's and Fitch incorporate ESG factors as their consideration especially S&P that considerably consider each of the ESG factors as their credit rating assessment. While credit rating agencies consider ESG as their credit rating assessment as described above, the outcome (credit rating) might not be significantly related with CSR activities as part of ESG if other crucial rating criteria, such as profitability and its ability to pay debts, outbalance the credit assessment.

2.4. Sustainability on Cost of Debt

Previous research has been conducted to assess the relationship between CSR as a sustainability measure on credit rating. For example, Cooper and Uzur (2015) finds a negative correlation between CSR commitment and the cost of debt for bank loans. They show the increased level of CSR as part of ESG leads to cheaper debt financing as a form of beneficial relationship on the credit rating. There is a study by Hoepner (2016) that is highly relevant to this research that yields a similar result that company's environment and social commitment impact debt financing, especially social factors that result in less cost reduction in debt financing compared to environmental factors.

El Ghouli et al. (2011) shows his analysis on a sample of 12,915 US firm-year observations from 1992 to 2007 and shows that firms with a better CSR score and commitment yield lower cost of equity capital. He also shows that evidence that firms related to two "sin" business sectors, tobacco and nuclear power, appear to have higher equity financing costs. This assumption consistent with analysis on 11,662 US firms shows investment in CSR individual factors results in higher credit rating which results in cheaper financing costs influenced heavily by CSR's individuals components as a non-financial information that is used to evaluate firms' level of creditworthiness (Attig, 2013).

In contrast, Menz (2010) shows companies with higher CSR commitment face higher corporate bonds spreads which results in higher credit ratings by gathering data from sustainable asset management research and based on his sample on 498 European corporate bonds over the period 2004–2007. Supporting Menz research, Goss and Roberts (2011) investigated the relationship between 3,996 bank loans from 1991 to 2006 CSR investment found that banks reward sustainability responsible firms with lower cost of loans compared to irresponsible firms with between 7 to 18 basis points lower interest rates. Banks have their own risk perspective when evaluating the terms and conditions for their credit and spotlight on CSR related risks. Firms with significant levels of sustainability related risks are given less appealing credit contract terms or lower credit rating.

Attig (2013) argue that CSR can increase company's credit rating by reducing the company's apparent danger of financial distress through at least these three channels: (1) by improving relations with firm stakeholders and in turn increasing its sustainability (2) by flagging the association's efficient utilization of internal resources and financial performance, and (3) by diminishing the company's likelihood of incurring the expenses (fines) related with socially irresponsible behavior. Related previous research has clearly shown that CSR as ESG measures has an effect on the cost of debt. Hence, firms that constantly raise external financing can reduce their cost of debt while improving their credit rating and firm's competitiveness by considering the environment, social and governance (ESG) of their business activities.

3. Methods

3.1. Research Strategy

A quantitative study will be used to test and analyze the hypothesis by gathering numerical data to then build the mathematical model and apply the statistical technique for the data analysis to finally result in findings. According to Collins (2014) the quantitative study collects data and analyses the data using statistical methods. Also MacIntosh (2015) who argues that quantitative study tries to answer the research question to establish the mechanisms through one or more variables that may affect another dependent variable. Researcher will also use secondary data from the Refinitiv database on the ESG rating and PEFINDO firm credit rating which we will test using statistical technique upon. Researcher believe he is able to observe characteristics of each related variable to this research through secondary data gathering and draw conclusions. As researcher's intend to examine secondary data, an archival study will be described as our research and thus conduct an empirical study from the data available from Refinitiv and PEFINDO. This describes the chosen strategy of a quantitative study.

3.2. Population and Sample

Researcher decided to conduct the research and focus this study on Indonesian firms due to cope with increasing trend of sustainable investing where Financial Service Authority (OJK) in Indonesia released a regulation no.51/POJK.03/2017 on sustainability report obligations for financial services, listed and public companies to assure that they meet sustainability-related criteria to attract wider investors. This is also due to the fact that there is no research has been conducted in Indonesia regarding ESG and firm credit rating as there is no standardization yet for sustainability. This makes the research even more important when currently sustainability becomes a top global agenda, Indonesia included.

The population in this research are companies that are listed on the Indonesian Stock Exchange. This is because only listed companies who possess ESG Rating assessed by Refinitiv as a global financial data provider. Unlisted companies have a very different characteristic for the measurement for the variable with listed companies that potentially results in irrelevant findings at the end. Also, the data availability for unlisted companies' financial data is one of the reasons to not include them in this research. Researcher confident that the chosen population will give us a good observation and analysis of a sample that represents the entire population. The firm credit rating that will be used in this research is available in Perneringkat Efek Indonesia (PEFINDO) which will be filtered later to produce representative sample. This study will utilize the ESG rating and firm credit rating for the last four years (2015 – 2019) to be able to produce and conclude large enough samples to at the end be able to draw reasonable and valid conclusions. Researchers have found 49 Indonesian companies with ESG rating data available, but only 18 Indonesian companies possess ESG rating data for period of the 2015 – 2019 that synchronized with firm credit rating data availability from PEFINDO.

4. Results and Discussion

In this discussion, researcher will provide the analysis of this research empirical result by testing our hypothesis, start with the result of the regression model on baseline analysis of both dependent and independent variable without control variables included in the model. The result are presented in **Table 1** model 1.

Table 1 Ordered probit regression on the effect of ESG on firm credit rating

<i>Credit Rating</i>	(1)	(2)
<i>Environment</i>	-0.0257*** (-3.22)	-0.0386*** (-2.66)
<i>Social</i>	0.025*** (3.19)	0.0153 (1.19)
<i>Governance</i>	0.031*** (4.56)	0.020** (2.08)
<i>Size</i>		0.026*** (4.53)
<i>Leverage</i>		0.469 (0.22)
<i>Coverage</i>		-0.004 (-0.26)
<i>Margin</i>		4.702**

		(2.22)
<i>CAPINT</i>		2.231***
		(2.81)
<i>Beta</i>		-0.979**
		(-2.35)
<i>Loss</i>		0.251
		(0.35)
Year Effect	Yes	Yes
<i>N</i>	90	90
Pseudo-R2	0.173	0.517

z-statistics are reported in parentheses. ***, **, and * represent statistical significance at the 1, 5, and 10 % levels, respectively.

The result of our analysis finds a relationship between ESG rating to firm credit rating does exist. By our ordered probit regression model, each ESG pillar (Environment, Social and Governance) shows a significant impact to firm credit rating. The estimated coefficient on Environment pillar at 1% level is negatively affecting firm credit rating, suggesting that firms with higher environmental score reduces firm credit rating and more likely in the lower credit rating category. Contrary with Environment pillar, Social and Governance pillar positively affecting firm credit rating, indicating firms with higher and better social and governance performance reduce risk on firm creditworthiness and more likely in a higher credit rating category.

However, if we compare it to the regression result with control variables included in the analysis presented in model 2 of **Table 1**, Social pillar does not have a significant effect on firm credit rating. Which proven that **Hypothesis 2 (H1)**. “*There is a significant positive relationship between social pillar and firm credit rating*” is rejected. The rejected hypothesis is due to the variable’s insignificance on its effect towards firm credit rating. Even though **Table 1** model 1 shows 2.5% significance, the complete model in **Table 1** model 2 shows insignificant effect on firm credit rating. Individual social categories also shows insignificance on firm credit rating that’ll be discussed later in the next discussion on ESG individual categories strengthen the result of model 2 on **Table 1**.

But consistent with Attig (2013) and our analysis without control variables, environment pillar has a significant and negative effect at 1% level indicating firms with higher environmental score reduces firm credit rating and more likely in the lower credit rating category. Because of its negative effect, **Hypothesis 1 (H1)**. “*There is a significant positive relationship between environment pillar and firm credit rating*” is rejected. The rejected hypothesis means the perceived values is negatively affecting firm credit rating. This result is consistent with **Table 2** discussing individual environmental categories that possess negative effect and significantly affect firm credit rating.

Next, align with previous research (Ashbaugh-Skaife, Collins, & LaFond, 2006; Bhojraj & Sengupta, 2003), governance pillars has a significant and positive coefficient at 5% level on firm credit rating, indicating firms with higher governance score reduce risk on firm creditworthiness. Leading to answer third hypothesis, **Hypothesis 3 (H1)**. “*There is a significant positive relationship between governance pillar and firm credit rating*” is accepted. With this result, we can say that governance pillar governance pillar significant and positively affecting firm credit rating. The control variables however, is substantially more significant. Specifically discussing the individual variables, consistent with previous research (Blume et al, 2008; Attig, 2013; Bhojraj and Sengupta, 2003 and Ashbaugh-Skaife et al, 2006) analyzing credit rating, Size is significant and positively impacting firm credit rating at 1% level, indicating firm with larger size facing lower risk of default due to its higher ability to pay its obligation result in more likely of a higher category of credit rating. Also align with previous research (Blume et al, 2008; Attig, 2013; Bhojraj and Sengupta, 2003), Margin is significant and positive at 5% level, indicating firm with higher operating profit face lower probability of bankruptcy and more likely in a higher category of credit rating. This makes sense because more profitable firms have higher ability to pay its obligation to the debtholder. Beta is significant with negative effect on firm credit rating, suggesting higher equity risk results in lower credit rating. Coefficient on CAPINT has significant and positive effect at 1% level, indicating firms with higher capital intensity are expected with higher credit rating. In contrary with previous research that shows Leverage, Coverage and Loss are significant. **Table 1** shows Leverage, Coverage and Loss have an insignificant impact on firm creditworthiness. Not only the significance, the effect of those variables are the opposite of what the previous research has proven, Leverage with positive effect, Coverage with negative effect and Loss with positive impact. Because of the insignificant, these variables would not be analyzed further in the discussion.

Focusing on the independent variables, we see the changes of significance of Social pillar. Analysis in **Table 1** model 1 where the control variables are not included in the analysis prove the positive and significant effect of Social pillar, meanwhile **Table 1** model 2 where the model incorporating control variables in the analysis shows the insignificant of Social pillar. The changes in significance of Social pillar due to its less significant effect on firm credit rating compared to the control variables which has greater and more significant effect on firm credit rating. Later in the next discussion, we will see the individual categories of each pillar and specifically on Social pillar, most of the categories are insignificant supporting the insignificant individual Social pillar.

4.1. ESG Individual Categories

Each ESG pillars has their own categories as researcher have mentioned in Chapter 2. In this part, researcher is analyzing whether certain categories are more relevant and significant in effecting firm credit rating than the others as the basis for firm future decision making. In **Table 2**, researcher provide the result of ordered probit regression with several models. The first model is incorporating all the individual ESG categories –10 categories for the researcher to be able to draw a conclusion on individual ESG categories comparison and its effect on firm credit rating to see whether certain categories are more relevant and significant in effecting firm credit rating than the others, second model is looking closer on the categories of Environment pillar and its effect on firm credit rating, third model focuses on Social pillar and its significance on credit rating and the last model focuses on the categories of Governance pillar to find its effect on credit rating.

Ten categories are analyzed to understand the effect of each categories on firm credit rating. The categories covered in ‘E’ (*Environment*) is the company’s emission (*E_Emission*), innovation level (*E_EnvironmentallInnovation*) and resource use (*E_ResourceUse*). ‘S’ (*Social*) on ESG rating is the community development and involvement (*S_Community*), human rights (*S_HumanRight*), product responsibility (*S_ProductResponsibility*) and workforce conditions (*S_Workforce*). The categories covered in ‘G’ (*Governance*) is the company’s CSR Strategy (*G_CSRStrategy*), Management (*G_Management*), and Shareholders (*G_Shareholders*).

Table 2 model 1 present the result of the ordered probit regression between ESG individual categories with firm credit rating. The result shows 5 out of 10 categories are significant in affecting firm credit rating: resource use (*E_ResourceUse*), Emission (*E_Emission*), human rights (*S_HumanRight*), Management (*G_Management*), and Shareholders (*G_Shareholders*) at 1% level. Looking at its impact on credit rating, resource use (*E_ResourceUse*), human rights (*S_HumanRight*) and Shareholders (*G_Shareholders*) have negative effect, indicating an adverse effect of increased of each category to firm credit rating. In contrary, Emission (*E_Emission*) and Management (*G_Management*) have positive effect on firm creditworthiness, suggesting firm with better emission usage and policy, and better management performance reduce risk of default result in higher credit rating.

Specifically, resource use (*E_ResourceUse*) is significant at 1% level and negatively affecting firm credit rating. Indicating higher firm’s effort to reduce the use of resources and find more eco-efficient resources result in the more likely to be in the lower category of credit rating. Researcher assume this is due to the resources expended to achieve resource use (*E_ResourceUse*) goal is not commensurate with the results. Company are spending money for research and development for more eco-efficient solution, but the short-term effect can’t be felt directly because the research and development expenses are focusing more on long term growth. Emission (*E_Emission*) is significant at 1% level and positively affecting firm credit rating. Indicating higher firm’s commitment in reducing emission in its daily operations result in higher credit rating and more likely in the higher credit rating category. Human Rights (*S_HumanRight*) is negative and significant at 1% level, suggesting increasing firm’s effort in respecting human right convention result in lower credit rating and more likely in the lower credit rating category. This is contrast with Attig (2013) proving Human Right is insignificant even though both have negative impact on credit rating and more from Hillman and Keim (2001) states credit rating is not affected by social issue that is not directly related to firm’s primary stakeholder such as human rights.

Management (*G_Management*) is positive and significant at 1% level, indicating increasing firm’s effort towards best practice of good corporate governance results in higher credit rating and more likely in the higher credit rating category. Contrast with Klock et al. (2004) on stronger anti-takeover results in lower cost of debt and higher credit rating, Shareholders (*G_Shareholders*) has negative effect and significant at 1% level, indicating higher firm’s commitment on equality towards shareholders and its effort on anti-takeover devices results in lower credit rating. This is due to the fact that firms with stronger shareholder rights are expected to have lower credit rating since credit

rating agencies and bondholders may view governance mechanism that place stronger power for shareholder as a risk of wealth transfer and probability of ownership changes to stockholders.

What the control variables show in this model, Leverage is highly positive and significant at 1% level. Coverage possess positive effect and significant at 10% level, and Beta is significant at 5% level and has negative effect on firm credit rating. In addition, innovation level (*E_EnvironmentalInnovation*) possess a positive effect on credit rating but is insignificant. community development and involvement (*S_Community*) is positive but is not either significant, product responsibility (*S_ProductResponsibility*) has negative effect on firm credit rating but is insignificant, workforce conditions (*S_Workforce*) is positive but insignificant, and CSR Strategy (*G_CSRStrategy*) possess negative effect but doesn't have any significant impact on firm credit rating as shown by the estimated coefficient that's statistically insignificant. Hence, these variables will not be analyzed further.

Table 2. Ordered probit regression on the effect of ESG individual categories on firm credit rating

<i>Credit Rating</i>	(1)	(2)	(3)	(4)
<i>E_ResourceUse</i>	-0.074*** (-3.04)	-0.066*** (-4.4)		
<i>E_Emission</i>	0.090*** (3.25)	0.062*** (3.7)		
<i>E_EnvironmentalInnovation</i>	0.012 (1.01)	-0.0028 (-0.31)		
<i>S_Workforce</i>	0.031 (1.55)		0.218 (1.79)	
<i>S_HumanRight</i>	-0.049*** (-2.8)		-0.013 (-1.52)	
<i>S_Community</i>	0.003 (0.2)		-0.010 (-1.06)	
<i>S_ProductResponsibility</i>	-0.0016 (-0.13)		-0.009 (0.255)	
<i>G_Management</i>	0.056*** (3.51)			0.026*** (2.92)
<i>G_Shareholders</i>	-0.039*** (-2.84)			-0.027*** (-3.65)
<i>G_CSRStrategy</i>	-0.017 (-0.86)			-0.008 (1.14)
<i>Size</i>	0.008 (1.01)	0.0059 (0.96)	0.019*** (3.30)	0.017*** (3.19)
<i>Leverage</i>	9.582*** (2.72)	9.509*** (4.11)	5.025** (2.48)	3.001 (1.44)
<i>Coverage</i>	0.049* (1.7)	0.038** (2.08)	0.006 (0.38)	-0.023 (-1.33)
<i>Margin</i>	2.195 (0.58)	2.748 (1.31)	5.568** (2.49)	5.232** (2.56)
<i>CAPINT</i>	0.881 (0.74)	1.232 (1.55)	2.02*** (2.71)	2.281*** (2.63)
<i>Beta</i>	-1.466** (-2.31)	-0.975** (-2.22)	-0.924** (-2.2)	-0.627 (-1.55)
<i>Loss</i>	1.554 (1.38)	-0.031 (-0.05)	0.749 (1.08)	0.600 (0.83)
Year Effect	Yes	Yes	Yes	Yes
<i>N</i>	90	90	90	90
Pseudo-R2	0.7335	0.5937	0.5209	0.5686

z-statistics are reported in parentheses. ***, **, and * represent statistical significance at the 1, 5, and 10 % levels, respectively.

Looking closer on the effect of environmental categories on firm credit rating on **Table 2** model 2, this model shows a highly consistent result with model 1 where resource use (*E_ResourceUse*) is significant at 1% level and negatively affecting firm credit rating. Indicating higher firm's effort to reduce the use of resources and find more eco-efficient

resources result in the more likely to be in the lower category of credit rating. Emission ($E_Emission$) is significant at 1% level and positively affecting firm credit rating. Indicating higher firm's commitment in reducing emission in its daily operations result in higher credit rating and more likely in the higher credit rating category. innovation level ($E_EnvironmentalInnovation$) possess a positive effect on credit rating but is insignificant. Still consistent on the control variables, Leverage, Coverage and Beta are significant with positive, positive and negative effect respectively.

Moving on to **Table 2** model 3 to analyze the effect of social categories on firm credit rating, social categories show an insignificant effect on firm credit rating. Community development and involvement ($S_Community$) has negative effect and is insignificant, human rights ($S_HumanRight$) possess negative effect on firm credit rating but also insignificant, product responsibility ($S_ProductResponsibility$) is negative and insignificant and workforce conditions ($S_Workforce$) possess positive effect but insignificant. This result align with **Table 1** model 2 that shows the insignificance of Social pillar on firm credit rating.

The result in **Table 2** model 4 analyzing the effect of governance categories on firm credit rating shows a consistent result with model 1 where Management ($G_Management$) is positive and significant at 1% level, indicating increasing firm's effort towards best practice of good corporate governance results in higher credit rating and more likely in the higher credit rating category and Shareholders ($G_Shareholders$) has negative effect and significant at 1% level, indicating higher firm's commitment on equality towards shareholders and its effort on anti-takeover devices results in lower credit rating. CSR Strategy ($G_CSRStrategy$) possess negative effect but insignificant affecting firm credit rating, therefor will not be analyzed further.

4.2. Final Regression Model

After testing the necessary statistical test to understand deeply the effect of ESG rating on firm credit rating, researcher have established which variables has an impact and statistically significant to the dependent variable. The final regression model is built with the help of previous research to later developed by the researcher to provide the best statistical model to describe the effect of ESG rating on firm credit rating.

$$Probit(CreditRating) = \alpha + \beta_1 ENV + \beta_2 GOV + \beta_3 SIZE + \beta_4 MAR + \beta_5 CAPINT + \beta_6 BETA + \varepsilon$$

Where,

ENV	= Environment pillar
GOV	= Governance pillar
SIZE	= Size
MAR	= Operating Margin
CAPINT	= Capital Intensity
BETA	= Beta

As the final regression of this model we have produced in the analysis is different with the model discussed in earlier chapter and different with the previous research on firm credit rating, the researcher provides the final regression result on this model to see its effect on firm credit rating in **Table 3**. In the result below we only include the variables that are statically significant on 1%, and 5%. Therefor some variables (Leverage, Coverage, and Loss) are not included in the final regression test.

Table 3 Test of final regression model

Credit Rating	Final Regression Model Result
Environment	-0.0275*** (-3.5)
Governance	0.0237*** (2.64)
Size	0.0285*** (5.06)
Margin	4.7070** (2.43)
CAPINT	2.0714*** (2.77)
Beta	-1.0306**

	(-2.51)
Year Effect	Yes
N	90
Pseudo-R2	0.5007

z-statistics are reported in parentheses. ***, **, and * represent statistical significance at the 1, 5, and 10 % levels, respectively.

First, comparing the Pseudo-R2 with our previous analysis in **Table 1** model 2 –which will be the comparison for this final model, has decreased slightly from 0.517 to 0.5007, meaning there’s a different explanatory power between the previous model and the final model because of the variables elimination. Even though the explanatory power has decreased, the difference is only 1% between the two models, it shows that the insignificant variables doesn’t add much explanatory power to firm and proven to had so little effect on the firm credit rating.

Consistent with our main model shown in **Table 1** model 2, environment pillar has a significant and negative effect at 1% level indicating firms with higher environmental score reduces firm credit rating and more likely in the lower credit rating category. Like before, **Hypothesis 1 (H1)**. “*There is a significant positive relationship between environment pillar and firm credit rating*” is rejected due to its negative effect on firm credit rating. This result is consistent with **Table 2** discussing individual environmental categories that possess negative effect and significantly affect firm credit rating. Next, still consistent with our model 2 in **Table 1** and align with previous research (Ashbaugh-Skaife, Collins, & LaFond, 2006; Bhojraj & Sengupta, 2003), governance pillars has a significant and positive coefficient at 5% level impacting firm credit rating, indicating firms with higher governance score reduce risk on firm creditworthiness which leads to the acceptance of **Hypothesis 3 (H1)**. “*There is a significant positive relationship between governance pillar and firm credit rating*”.

Highly consistent with our previous model that shows control variables have greater impact, Size shows a positive coefficient of 0.0285 that is slightly higher than the previous model 2 in **Table 1** of 0.026 at 1% level, but the difference on both coefficient is very low of 0.002 which tell us the model is highly consistent. indicating firm with larger size facing lower risk of default due to its higher ability to pay its obligation result in more likely of a higher category of credit rating. Margin possess positive and significant effect. The coefficient on both model are the same of 4.7 which also show high consistency, indicating firm with higher operating profit face lower probability of bankruptcy and more likely in a higher category of credit rating. However this variables on both model still only shows the significance on 5% level instead of 1%.

Coefficient on CAPINT has significant and positive effect on firm credit rating with approximately 2.071 which is slightly lower than the previous model of 2.231, indicating firms with higher capital intensity are expected with higher credit rating and more likely in a higher rating category with such a high effect. Beta still show negative coefficient of -1.030 that is slightly lower than the one in the previous model of -0.979 on firm credit rating, suggesting higher equity risk results in lower credit rating. The other variables: Leverage, Coverage and Loss possess insignificant impact on firm creditworthiness. Therefor these variables would not be analyzed further in the discussion. After running the final regression model, the coefficient of each significant variables are known. Therefore, the final regression equation is

$$Probit(CreditRating) = -0.0275 ENV + 0.0237 GOV + 0.0285 SIZE + 4.707 MARGIN + 2.0714 CAPINT - 1.0306 BETA$$

5. Conclusion

This research is intended to analyse the relationship between ESG rating and firm credit rating of Indonesian firms. Companies with lower ESG should pay a higher cost of capital since corporations who violate ESG comes with substantial fines and long term financial effect, the probability of default is higher for those firms with ESG violation with long term impact and financial loss on their financial performance. Researcher tested this argument using ESG rating of individual pillars and firm credit rating data over the period of 2015 –2019 using ordered probit regression model. Our research shows that environmental pillar negatively affecting firm credit rating and firms with higher environmental score tends to have lower credit rating, social pillar possesses positive effect on firm credit rating but is insignificant, which later will be eliminated due to the insignificance effect. Lastly governance pillar possesses a significant and positive effect on firm credit rating.

Aside from these results, researcher finds not all individual ESG categories are significant and relevant to firm’s credit rating. Specifically, researcher finds that resource use, emission, human rights, management, and shareholders

significantly affecting firm credit rating. However from the significance, resource use, human rights and management possess negative effect on firm credit rating while half of the categories are statistically insignificant: environmental innovation possess a positive effect, community development and involvement has positive effect, product responsibility has negative effect, workforce conditions is positive, and CSR possess negative effect, therefor not included in the final model. These results suggest by implementing a good corporate governance, firms are more likely to have a higher credit rating, which also equal to enhancing firm and shareholders' value. In contrary, investment in environment pillar will result in lower credit rating and more likely to increase firm's financing costs, which the firms should be avoided. Lastly, Investment in social pillar doesn't have a significant impact on firm credit rating.

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