Article Type: Research Paper

Green investment and firm value: Does corporate governance matter?

Estu Widarwati[1]*, Nabila Nur Rohmah[1], E. Wityasminingsih[2], Nunik Nurmalasari[1], Devy Widya Apriandi[1], and Mutqi Sopiawadi[1]

Abstract

Research aims: This study examines the effect of green investment on firm value with corporate governance moderation.

Design/Methodology/Approach: Green investment is proxied by the green-firm investment ratio, Tobin's Q measures firm value, and corporate governance is proxied by board size. The sample is 34 companies receiving PROPER awards listed on the IDX for the 2017-2021 period from the primary material, consumer non-cyclical, and consumer cyclical sectors. The data were analyzed using panel data regression, T-test, and moderate regression analysis tests.

Research findings: The results showed that green investment positively affects firm value. Meanwhile, this study has not found strong evidence about the moderation role of board size in the effect of green investment and firm value.

Theoretical contribution/Originality: This research strengthened previous empirical evidence that companies' implementation of green investment activities will impact increasing firm value and board size as part of effective governance needs to be paid attention.

Practitioner/Policy implication: This research has implications for companies to include green investment as an important investment decision because it is proven to be an advantage for companies to increase their value

Research limitation/Implication: This research's determining factor for firm value is only green investment, and the corporate governance proxy only uses board size. Therefore, it is hoped that future research can explore other new models that consider industry characteristics, economic conditions in the research period, and other measures of the variables studied.

Keywords: Board Size; Corporate Governance; Firm Value; Green Investment; PROPER

AFFILIATION:
[1]Department of Management, Sekolah Tinggi Ilmu Ekonomi Sutaatmadja, West Java, Indonesia

[2]Computerized Accounting Study Program, Politeknik Piksi Ganesha, Bandung, West Java, Indonesia

***CORRESPONDENCE:**
wie2tdz@gmail.com

DOI: 10.18196/jai.v25i3.22159

CITATION:
Widarwati, E., Rohmah, N. N., Wityasminingsih, E., Nurmalasari, N., Apriandi, D. W., & Sopiawadi, M. (2024). Green investment and firm value: Does corporate governance matter? *Journal of Accounting and Investment, 25*(3), 1156-1174.

ARTICLE HISTORY
Received:
23 Apr 2024
Revised:
16 Jul 2024
26 Aug 2024
Accepted:
30 Sep 2024

JAI Website:

Introduction

Economic growth can become a competitive advantage for the country, which refers to the amount of incoming investment, including investment contributions from businesses in the country. Many investors consider investing, including developing share prices, as a form of assessment to measure a company's market performance. The measure of company performance begins when investors believe the company in which they invest their funds can provide good returns. Better stock price movements indicate that the returns generated will be higher. Share prices are the main assessment tool for all market players. Thus, share prices can be

a benchmark for company management performance and reflects the company's ability to generate profits by using resources efficiently. Widarwati et al. (2022) stated that investment is one of the most important elements for a company to generate profits in the future. When a company spends some funds to acquire new equipment or improve fixed assets during a year or more of its business operations, implementing a capital expenditure strategy will certainly improve company performance because it will increase fixed assets for future use. Of course, a company must adapt to its investment activities to optimize firm value during normal and crisis periods to provide shareholders with long-term and sustainable welfare.

Investment decisions are crucial for maximizing shareholder wealth and can increase capital costs when unmanageable, ultimately impacting company performance (Suman & Singh, 2021). On the other hand, the capital expenditure allocated by the company can be used to support its operational activities and make it more productive. Increasing productivity can increase the company's ability to earn profits the greater the return investors expect from the company.

However, there is an important issue linked to the trends of consumer and stakeholder behavior, climate change, as well as investor preferences, which are increasingly sensitive to sustainability value, and a company must have different investment decision strategies than before (Chiţimiea et al., 2021a). A company needs to focus not only on financial factors but social and environmental welfare factors that integrate the ability to create profits, the ability to improve social life (people), and the company's ability to protect the environment (planet). This means that business activities are not only aimed at making profits for the company but also contribute to the interests of society and preserve the environment. According to the KIC survey (2021) results, 66.1% of respondents own shares in companies prioritizing sustainable business and ESG practices. The reason is that they feel safer because of the company's good reputation. Companies with sustainable practices will have a good reputation, making them more attractive to investors. Investors invest because they can help maintain environmental health. Accordingly, environmental sustainability is one of the most important factors for investors to pay attention to because environmental pollution by companies as a result of their operational activities includes pollution that may have long-term effects and damage the environment.

Increased awareness of global issues in the sustainable development goals (SDGs) agenda has triggered the emergence of the term "green investment" in the economic sector, especially financially. Green investment refers to capital activities demonstrated in projects addressing global issues such as energy savings, climate change, and social issues. On a corporate scale, the concept defines corporate investment activities aimed at protecting the environment, reducing pollution, reducing carbon emissions, using alternative energy sources, and conserving natural resources (Chiţimiea et al., 2021). Clarkson et al. (2008) stated that capital expenditure on fixed assets could influence green activities because investment in new equipment is considered better for managing emissions. Hence, it has advantages in terms of environmental performance. Moreover, it will significantly improve company performance (Nakamura, 2011).

In the Indonesian context, green investment is tied to government regulations, so the motivation for implementing this is to comply with applicable regulations. The green activities carried out by companies in Indonesia can be demonstrated in the form of awards from the Company Performance Rating Program in environmental management or the Public Dislocation Program for Environmental Compliance (PROPER) obtained from the Ministry of Environment and Forestry. PROPER is a form of government policy that improves the company's environmental management performance according to what has been stipulated in statutory regulations. The PROPER award is given to companies that have complied with environmental standards such as implementing an environmental management system with energy efficiency efforts, reducing emissions, implementing reduce, reuse, and recycle (3R), water conservation and biodiversity protection, as well as developing community development programs (proper.menlhk.go.id). Based on the VOS Viewer mapping by researchers in 2022, the PROPER criteria are similar to the concept of green investment related to climate change, carbon emissions, renewable energy, environmental quality, regulation, and sustainability. Therefore, companies that win the PROPER award reflect the implementation of green investment activities carried out by the company. A company's success in winning the PROPER award can be seen from its seriousness in investing its money in environmental issues (Chariri et al., 2019). The percentage of Indonesian companies listed on the Indonesian Stock Exchange (IDX) is still lower than those not receiving this award. It reflects the low implementation of green investment by Indonesian companies.

Various studies have been conducted previously regarding green investment policies. Several previous studies found positive results of green investment with company performance (Chen & Ma, 2021; Nakamura, 2011), green investment with profitability (Naveed et al., 2023), and stock returns (Li et al., 2022). Green-based investment decisions can increase profits for companies and contribute to environmental and social interests that help companies prevent greater environmental damage as a result of operational activities. They can also further help companies to make environmental damage costs more efficient.

However, the investment decision-making process and company activities need to be carried out based on the concept of Good Corporate Governance (GCG). Corporate governance is designed to professionally direct a company's management based on transparency, accountability, responsibility, independence, fairness, and equality principles. Corporate governance mechanisms are designed to align the interests of managers and shareholders' interests (Suman & Singh, 2021). Poor governance quality cannot protect investors, so it cannot increase investor confidence, attract investment, and vice versa. Healthy corporate governance practices can eliminate agency problems, improve company performance, and maximize shareholder wealth (Shahid & Abbas, 2019a). As stated before, the low implementation of green investment by Indonesian companies leads to ineffective governance in Indonesia’s companies managing green investment. This is reflected in the low consistency of PROPER Award recipients from all companies on the Indonesia Stock Exchange over the last five years. A company cannot always maintain a green investment strategy on cost considerations. The sustainability of green investment is a corporate commitment that depends on good governance.

Making good investment decisions is closely related to effective governance. Good governance is related to company decision-making in assessing a profitable investment because investment decisions involve large amounts of funds, so they support the company's strategic plans and determine profitability (Shahid & Abbas, 2019). The corporate governance mechanisms that are taken into consideration in making investment decisions are the size of the board, the independence of the board, and the audit committee (Shahid & Abbas, 2019). Inderst et al. (2016) supported this, stating that the board of directors or supervisors contributes to investment decision-making. Chams and García-Blandón (2019) revealed that board members in corporate governance are considered the main contributors to obtaining various social activities, such as encouraging ethical and moral involvement, influencing philanthropy, implementing codes of ethics, compliance with laws and policies, awareness of environmental issues, social disclosure reporting, and stock market indicators.

A larger board of directors will be able to better comply with corporate sustainability laws and guidelines (Rossi et al., 2021). As stated by Orozco et al. (2018), companies with large corporate boards tend to have a high corporate reputation. However, increasing the number of corporate boards can lead to problems of coordination, control, and flexibility in decision-making. Lack of supervision within the institutions that are the responsibility of the company board and wrong investment decisions can reduce investor confidence in the company (Widarwati et al., 2022). Therefore, investments will be managed and controlled well if the company has strong corporate governance.

Many previous studies have linked green investment with external company factors, such as regulatory factors and government policies (Chen & Ma, 2021; Naveed et al., 2023); Du et al., 2019; Farooq et al., 2021)). Research by Karim et al. (2021) revealed that companies with larger capital expenditures have a greater opportunity to disclose carbon emissions. Nevertheless, studies are still found that support negative results between green investment and financial performance (Cunha & Samanez, 2013) and companies are encouraged to improve their performance using environmental management, which is proven unnecessary (Pekovic et al., 2018).

However, this research focused on the suggestions from Chen and Ma (2021) to integrate internal corporate governance factors, namely the board corporate mechanism. Then, we built a new model that included corporate governance as a moderation variable and used board size as the proxy. We argue that investment decisions involve large amounts of funds, which will be risk-reducing or increasing. With a large board, the company will be more involved in environmental conservation activities. The low implementation of green investment in Indonesian companies shows a problem with board policies supporting the implementation of green investment. According to Shahid & Abbas (2019), the board is the main structure in governance and has an important role as a decision-maker and supervisor. Then, investment decisions can be considered and monitored as well as possible depending on the number of boards. The decision of the investment spending board will give a positive signal to investors that the company has the opportunity to improve its productive performance to earn profits in the future. So, when a company receives the PROPER award as a form of green investment implementation, it can

encourage investor confidence. Thus, it can be interpreted that the low proportion of PROPER award recipients in the Indonesian industry will trigger investor confidence issues that need to be further tested about the company's value.

This research uses a green investment measure as per research by Chang et al. (2021), namely the green-firm investment ratio, which is the value of net investment growth divided by asset value. Tobin's Q ratio measures the firm value because it can reflect the long-term investment value (Chen & Ma, 2021). The unit of analysis chosen in this (Khalid et al., 2023)research is PROPER winning companies, which reflect the main application of green activities in Indonesia in resource utilization and environmental management. Furthermore, we control the research model with company size. It functions as a control variable in which the amount of assets reflects the company's sufficient resources to finance its investments and generate more profits.(Naveed et al., 2023).

With limited research about green investment, we explore the data on PROPER companies in Indonesia using descriptive and hypothesis approaches. The findings are useful theoretical benefits that contribute to strengthening the theory and describe the facts of green investment implementation in Indonesia's industry. The finding also gives the practical contribution that a company must pay attention to in order to make green investments in their sustainability strategy efforts, as well as for investors as investment considerations and for the government to strengthen environmental conservation policies.

Literature Review and Hypotheses Development

Investment policy is important to determine the allocation of funds to alternative forms of investment that can provide benefits in the future. Managers can meet shareholder expectations through superior performance by creating strategies that are valuable and difficult to imitate. However, the high desire of companies to increase their productivity can result in environmental degradation, which will ultimately damage sustainable economic growth and force companies to take an active part in environmental protection. Social and community pressure and government regulations mean companies have different investments to respond to this. Thus, forming a new market competition pattern that automatically gradually improves environmental quality makes green investment an inseparable part of company investment. By paying attention to environmental factors, corporate investment can improve effective management relationships with the community and shareholders, thereby increasing company performance and value.

Green investment refers to the investments that are required to reduce greenhouse gas emissions and air pollution without significantly reducing the production and consumption of non-energy goods, including both public and private investments. All the company's efforts in managing environmental problems by reducing the negative impact of environmental damage as a result of the company's activities are categorized as green investments (Chariri et al., 2019). Therefore, green investment is an effort to invest in the

company, and the results of the investment can have a positive impact on environmental sustainability in the hope of obtaining profits for the company in the long term.

To make it easier for the public and stakeholders to read information related to the company's green investment, the government of Indonesia appreciates the ranking of environmental management practices and the success of community development carried out by the company in the form of a PROPER award. The Minister of Environment and Forestry Regulation No.1 of 2021 concerning the Company Performance Rating Assessment Program in Environmental Management contains an explanation related to the foundation, mechanism, and provisions of PROPER. The highest PROPER award color rating is gold, which means that the company's environmental management practices are outstanding. In contrast, the next color is green, which means that the company's performance is good in meeting environmental standards, and blue means that it is quite good, and this color is the minimum limit that the company must obtain. Red and black colors mean that the company has not implemented environmental management practices in accordance with the set standards, and the PROPER color has the worst ranking. Therefore, companies need to strategize so that their image is in accordance with the level of environmental management carried out.

Green investment decision-making must be based on GCG to achieve the company's competitive advantage. GCG is useful in determining strategic direction, systematic performance, and company performance. Implementing good GCG is the main aspect of building solid fundamentals because company performance will not be sustainable if it is not based on good governance practices. The company board, which consists of the board of commissioners and the board of directors, is the party that has a stake in this decision. A larger board size has a separate workload so that the company's investment and sustainability policy-making activities can be well monitored and can balance stakeholder demands. It represents and creates relationships with a wider range of stakeholders and can provide access to greater information due to the board's diverse background, experience, and knowledge.

The Effect of Green Investment on Firm Value

An investment is an investment made by a company to increase the company's wealth. A company's investment activity is reflected in how much the company allocates funds to forms of investment that can bring long-term profits to the company. According to signal theory, investment spending provides a positive signal that companies try to communicate as their opportunity to improve productive performance to gain profits in the future. Companies will make decisions and finance investments to maximize firm value by maximizing share prices (Grozdic et al., 2020).

Increasing spending on green investment and adjusting conducive industrial structures can improve green economic development indicators (Chen & Ma, 2021), giving companies a competitive advantage. Therefore, companies must make green investments as their long-term strategy (Chen & Ma, 2021; Nakamura, 2011). Other studies argue that investments in environmental initiatives can hinder profitability (Cunha & Samanez, 2013;

Pekovic et al., 2018) because responding to environmental problems requires businesses to incur additional costs and financial constraints, thereby reducing productivity and firm value. Meanwhile, Grozdic et al. (2020) found that long-term capital investment has a significant impact on a company's performance.

H_1: *Green investment positively affects firm value.*

The Effect of Green Investment on Firm Value with Corporate Governance as Moderation

This research uses a board-size proxy as a corporate governance mechanism. Corporate governance is a company's decision-making body defining strategic priorities and goals in various areas, including sustainability practices (Chams & García, 2019) and financial results that can influence company performance (Bhatt & Bhattacharya, 2015). In addition, many councils can accommodate environmental experts to advise and engage in social and ecological practices. The board of directors must face pressure not only from shareholders but also from other stakeholders. It must consider the interests of different groups so that the board will consider every investment decision taken in the interests of stakeholders by developing investment opportunities that can provide good returns for stakeholders and companies.

The investment policy to allocate funds to green investments is a decision taken by the board to obtain future benefits and align environmental performance. Board size plays a key role in board quality, supervising and monitoring company management, and influencing internal control quality. Large board sizes can include experts in environmental issues to advise and help navigate the uncertainties often involved in implementing green initiatives (de Villiers et al., 2011). A large board size will be more involved in green investment activities to create firm value. Companies with higher board sizes can effectively monitor the decisions made by financial managers and reduce the negative impact on investors' confidence in their investments. Increasing the board's supervisory function can control shareholder interests (Shahid & Abbas, 2019). Several studies claim that board size and firm value are not linear. However, Guo and Kga (2012) show that when board size increases, the firm value decreases Merendino and Melville (2019) show that board size has a positive effect on the company performance for different levels of smaller board size.

H_2: *Corporate governance moderates the relationship between green investment and firm value.*

Based on the development of the hypothesis, a research model was formulated, presented in Figure 1.

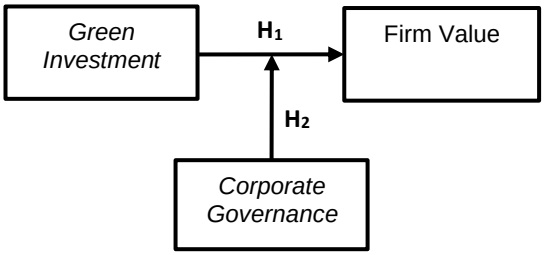

Figure 1 Research Model
Source: developed from Chen & Ma (2021) and Chang et al. (2020)

Research Method

Data and Sample

This research focused on testing the effect of green investment on firm value with corporate governance as a moderating variable with the analysis unit of companies receiving PROPER awards registered on the Indonesia Stock Exchange (IDX) in 2017-2021, which were selected using a non-probability sampling technique with a purposive sampling approach. We selected the companies' samples on the Indonesia Stock Exchange (IDX) based on the criteria of consistently receiving consecutive PROPER awards during the research period. This was based on the argument that good governance will encourage sustainable green investment management policies. If the company does not get a PROPER award in one year, it leads to a lack of commitment to green investment triggered by poor governance. Therefore, the sample of companies that meet these criteria is not comparable to the number of companies in the Indonesia Stock Exchange (IDX), and this further strengthens the allegation that there is a problem with the implementation of green investment in Indonesian industries that needs to be tested in relation to corporate value and governance. Our total sample was 34 companies that received consecutive PROPER awards during the research period, including 10 firms of basic materials, 12 firms of consumer non-cyclical, one firm of consumer cyclical, three firms of energy, four firms of healthcare, and 4 firms of industrial sectors. Also, this research applied a quantitative method using a descriptive verification approach with secondary data sources obtained through the IDX website and company website, as well as data obtained via the internet and online searching. The data collection technique in this research used documentation techniques from financial reports and the companies' annual reports as research samples.

Variable Measurement

Green Investment as an independent variable was measured using the green-firm investment ratio, namely the value of the increase in net investment to asset value (Chang et al., 2021a). Net investment is the current year's net investment, while t-1 net investment is the previous year's net investment, and total assets reflect the current

year's total assets. This measure can describe the level of change in the investment made by the company. The higher the ratio means that it shows an increase in investment made by the company. This increase in investment means an opportunity to increase revenue for the company in the future, thereby affecting profitability, performance, and firm value.

Firm value as a dependent variable was measured using Tobin's Q because this ratio effectively describes the company's long-term investment value (Chen & Ma, 2021). Tobin's Q can provide a more comprehensive picture of a company's market value and reflect the company's prospects.

Corporate Governance, as a moderating variable, is proxied by board size, namely the number of members of the board of commissioners plus the board of directors. This is because this measure covers all board members in the company (Nasih et al., 2019). Bhatt and Bhattacharya (2015) and Hoang et al. (2021) stated that the larger the board size, the higher the company performance will be, the division of work will be more orderly, and the size of the company board supports ethical behavior that encourages performance transparency.

Company size as a control variable is a size that describes the size of a company and can be seen from the total assets owned by a company (Chen & Ma, 2021; Naveed et al., 2023).

Data Analysis

This research used a simple linear regression model with data analysis techniques using panel data, a combination of time series, and cross-section data. The panel data moderation equation is formulated as follows:

$$Y_{it} = \alpha + \beta_1 X_{it} + \beta_2 K_{it} + e \quad \text{(I)}$$
$$Y_{it} = \alpha + \beta_1 X_{it} + \beta_2 M_{it} + \beta_3 X_{it}*M_{it} + \beta_4 K_{it} + e \quad \text{(II)}$$

Based on the formula that has been created, α describes as Constanta, β_1-β_4 as predictor regression equation coefficient, X as *green investment*, Y as Firm Value, M as *corporate governance*, X*M as Interaction between green investment and corporate governance, K as Company Size, e as error terms.

To test the hypothesis of the relationship between green investment and firm value, this research used the T-test. At the same time, the moderating role of corporate governance was analyzed using the Moderated Regression Analysis (MRA) test. The research had passed the classical assumption tests of data normality, autocorrelation, and heteroscedasticity.

Result and Discussion

Descriptive Analysis

Table 1 shows that the total data that meets the research quality is 130. The average green investment variable shows a mean value of 0.017007. Meanwhile, the maximum value of the company's value is 1.757760. The board size has an average value (mean) of 11 people, the highest in the industrial sector.

Table 1 Descriptive Statistic

	Green Investment	Firm Value	Governance (board size)	Firm Size (Ln)
Mean	0.017007	1.063275	11.12308	29.73089
Median	0.001298	1.050170	11.00000	29.76118
Maximum	1.626938	1.757760	21.00000	33.53723
Minimum	-0.191130	0.358588	4.000000	25.79571
Std. Dev.	0.166060	0.302375	3.702116	1.702384
Skewness	7.248022	0.147591	0.551046	0.122336
Observations	130	130	130	130

Green investment is a form of investment from environmentally friendly companies measured by the increase in net investment value divided by the company's total assets (Chang et al., 2021). The large net investment shown by the company indicates that the company will obtain greater potential income in the future.

The data in Figure 2**,** showed that 12 companies, or the equivalent of 55%, had applied values of the green investment concept above the industry average, and the remaining 22 companies had values below the average. It reflects the lack of implementation of green investment activities, caused by the high cost of green investment. This less-than-optimal allocation of green investment funds can decrease productivity and lower the PROPER rating, ultimately reducing the company's reputation. Therefore, allocating funds for green investment needs to be a concern for companies.

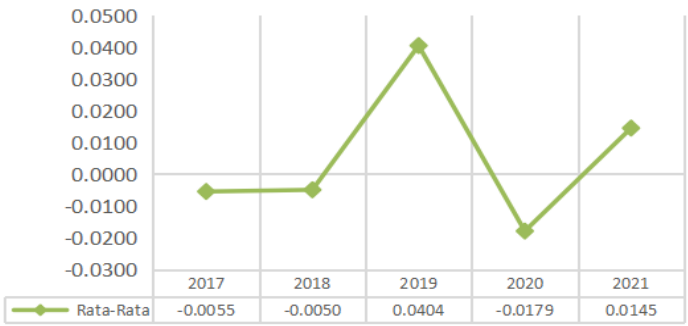

Figure 2 Average Green Investment of PROPER Companies in 2017-2021
Source: processed data, 2023

Furthermore, the 3 sample sectors in this research show green investment values above the average, namely the consumer non-cyclical, energy, and healthcare sectors. In comparison, the other 3 industries show values below the average to reach negative values, namely the basic materials sector, consumer cyclical, and industrial.

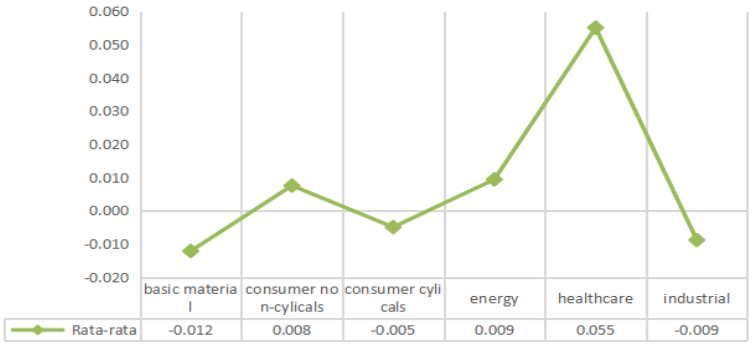

Figure 3 Average Green Investment Per PROPER Company Sector in 2017-2021
Source: processed data, 2023

Based on Figure 3, our analysis results show that the healthcare sector has the highest average of 0.055, and the basic materials sector has the lowest average of -0.012. Sectors above and below the average have an equal number, so green investment per sector can still be categorized as not optimal.

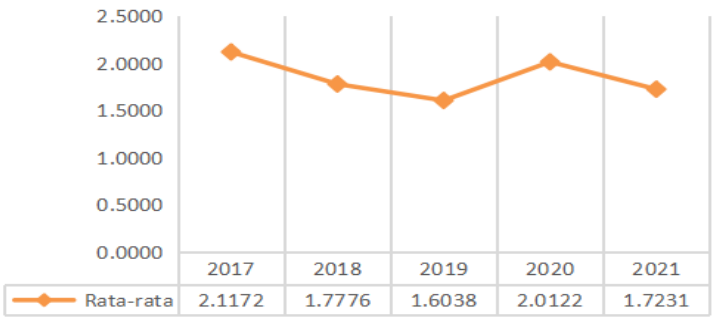

Figure 4 Average Firm Value of PROPER Companies for the 2017-2021 Period
Source: processed data, 2023

The results of the firm value data measured by Tobin's Q ratio showed that 27 companies, or almost 80%, have an average firm value > 1.00. According to Figure 4, there are only 8 companies that have a value above the average, and the remaining 26 have a firm value below the average. There are still many firm values that are below average, reflecting that the reputation of most companies has not been assessed well by investors who see the low value of green investment, and this has an impact on investor confidence, thereby triggering a decline in firm value.

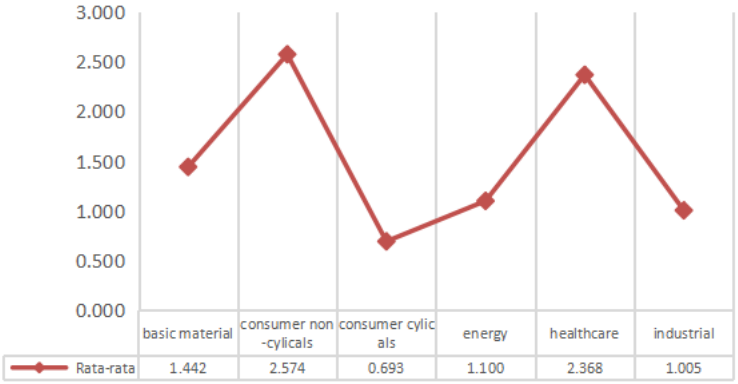

Figure 5 Average Firm Value per Per PROPER Company Sector for the 2017-2021 Period
Source: processed data, 2023

Our data analysis in Figure 5 showed that the two sectors that have values above the average value are the consumer non-cyclical and healthcare sectors, followed by four other sectors with average values, namely the basic materials sector, consumer cyclical, energy, and industrial. The firm value of property companies tends to be less good because there are still more below-average sectors.

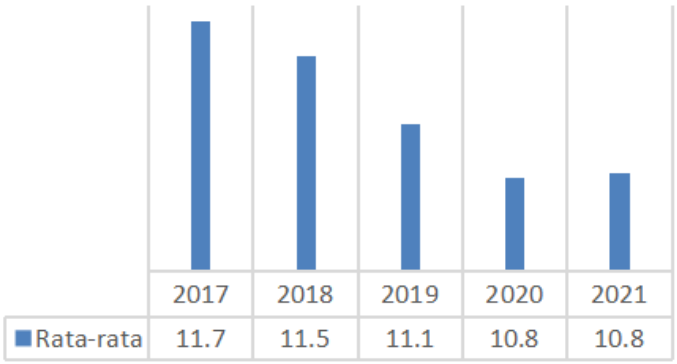

Figure 6 Average Board Size for the 2017-2021 Period
Source: processed data, 2023

Corporate governance in this study was measured using a board, which refers to the total number of commissioners and directors in a company's organizational structure. According to POJK No. 33/POJK.04/2014 regulation, the number of Board of Commissioners and Directors is at least two people each, which is fulfilled in Indonesian industry as shown in Figure 6.

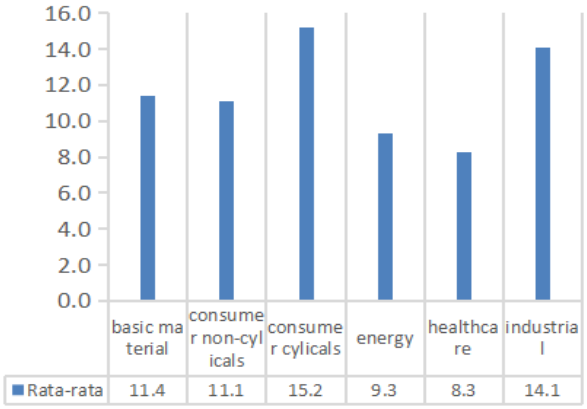

Figure 7. Average Board Size Per Sector for the 2017-2021 Period
Source: processed data, 2023

In Indonesia's industry (Figure 7), the average board size is 11 people, and 47% of companies have a board number above. The consumer cyclical sector has the highest board average of 15 people, and the healthcare sector has the lowest board number of 8 people.

Test the Panel Data Regression Hypothesis

This research examines the relationship between green investment and firm value moderated by corporate governance with a hypothesis-testing approach using panel data regression analysis and MRA analysis. Panel data regression analysis is data analysis that has a combined type of data from time series data and cross-section data and the panel data model selected in the Random Effect Model (RE).

As expected, this research proves that green investment significantly influences firm value, so H1 is accepted. High investment in a company will reflect that the company has long-term prospects for making profits. The large amount of funds allocated for investment can provide a positive signal to shareholders that the company has the potential to earn greater income and can provide profits for them in the future. It is supported by the research of Widarwati et al. (2024) which found a significant investment influence on company performance. Normally, companies continue to invest by spending capital to acquire new equipment or improve fixed assets to improve company performance. Meanwhile, companies do not invest in the company during a crisis and tend to survive, so the company performance increase is insignificant. The results of this research are in line too with research by Nakamura (2011), Chen & Ma (2021), Khalil and Nimmanunta (2023), and Naveed et al. (2023) with different research measurements that green investment influences the growth of profitability, performance, and firm value so that investments made by companies can maximize shareholder value.

Table 2 presents the results of the research model's panel data regression. The dependent variable is firm value proxied by Tobins'Q; the independent variable is green investment measured by the green-firm investment ratio, followed by corporate governance as a

moderation variable proxied by board size. The control variables are firm size measured by Ln asset. The values in parentheses are standard errors.

Table 2 Regression Results

Research Model	Model (1) regression X - Y	Model (2) regression X - M - Y
Dependent Variable (Y) *Firm Value (Tobins'Q)*		
Moderate Variable (M)		-0.0099 (0.0094)
Corporate Governance (board size)		
Interaction X*M		-0.0356 (0.0502)
Independent Variable (X)		
Green Investment (green-firm investment ratio)	0.5478* (0.1256)	0.8277** (0.4210)
Control Variables *Firm Size (Ln Total Asset)*	0.0719* (0.0166)	0.0864* (0.0216)
Year dummies	Not Included	Not Included
Constant	Included	Included
Method	RE GLS	RE GLS
Adjusted R-squared	0.198990	0.202175

Note: *significant 1% ; **significant 5%.

The form of investment in companies that receive PROPER is not limited to conventional forms of investment in general. Still, there is additional investment in assets that can minimize the impact of environmental damage from their operational activities, such as investment in more sophisticated technology and the ability to minimize waste. Companies that make green investments will have a smaller risk of conflict with stakeholders because the company has fulfilled its interests by trying to build its sustainability performance. Apart from that, even though green investment will require large costs, the benefits will be greater because companies can be more efficient in minimizing the costs of environmental damage and claims for the damage caused. It can also create good relationships with the community so that public demand for using the company's products will increase. Therefore, the results of these investment activities can impact increasing operational productivity, increasing future income, and ultimately improving performance.

According to the signal theory, an increase in firm value will reflect company performance because companies will provide information related to their performance, which can form positive investor sentiment, such as information on profitable investment decisions. The results of these investment decisions also need to consider all the impacts and risks that will be obtained because companies are not only responsible to investors but also to stakeholders and the communities around which they operate. Hence, the sustainability

of the surrounding environment also needs to be maintained. So, investment decisions are also in line with the legitimacy theory, which states that companies need to carry out their obligations according to the rules and norms in their environment. The better the level of investment that pays attention to the environmental impact, the more it will help the company increase its PROPER score so that its environmentally friendly image will also be maintained.

Unfortunately, we do not find strong evidence of the board size on the relationship between green investment and firm value, so H2 is rejected. Even though this research found that board size has no effect, the value of the moderating interaction coefficient is negative, which means that large board size will weaken the relationship between green investment and firm value. Guo and Kga (2012) findings claim a negative relationship between board size and firm value. Merendino and Melville (2019) suggest that larger boards can increase communication and coordination problems and higher agency costs, larger boards can face greater levels of conflict, and poor coordination among directors leads to slow decision-making and delays in information transfer. Furthermore, board size has a positive effect on performance for lower board sizes and a negative effect on performance for higher levels of board size. These findings highlight that boards should be adequate but not too large (Merendino & Melville, 2019). Bhatt and Bhattacharya (2015) recommend a board size of 7 or 8 members and a maximum board size of 10 members.

Therefore, a large board size can be inefficient because it will face greater difficulties in reaching agreements, including environmental-based investment decision-making agreements. This is in line with the findings of Hoang et al. (2021), which show that the number of board members is not a factor that helps improve environmental performance and transparency. So, a large board size is not a benchmark for a company to work more effectively because good governance practices are more influenced by the ability and integrity of the board itself than by its number.

Furthermore, this research finds that company size significantly controls the influence of green investment on firm value without and with the corporate governance moderating variable. It is in line with research by Chen and Ma (2021), Naveed et al. (2023), and Saif et al. (2022) that company size can be a controlling factor in the relationship between investment and firm value.

Conclusion

The condition of green investment in PROPER recipient companies shows that the increase in investment in companies with positive value is greater than that of negative investment. However, this increase still cannot exceed the overall average because companies with below-average investment values still dominate. The implementation of green investment in Indonesia appears to be increasing, and this shows that the concept of green investment, especially in PROPER recipient companies, is not yet optimal. It impacts the value of PROPER recipient companies, which shows that more companies

have Tobin's Q scores below the industry average, which reflects that the company's reputation is still considered not good enough by investors. This condition can be triggered by governance that is not good enough even though the number of board members is by applicable regulations. Companies need to improve performance by increasing share prices, forming positive stakeholder and investor sentiment such as maintaining company productivity and increasing the company's competitive advantage through sustainability performance, including environmentally based investments to maintain productivity and PROPER ratings so that the company's environmentally friendly reputation can be maintained.

Furthermore, this research strongly highlights that the green investment of Indonesia's industry is the main determinant that influences their performance, which means that companies' implementation of green investment activities will impact increasing firm value. Although there is no strong evidence of the moderating role of board size on the relationship between green investment and firm value, a company should pay attention to the number of boards as part of effective governance. It needs to be considered sufficient in number and not too large to positively affect performance.

The findings of this research have implications for companies that want to make green investment a sustainability strategy to increase their firm value and build governance oriented towards achieving these goals. This research has several limitations, namely, the unit of analysis used in this research is limited to companies that have received PROPER awards, so the results obtained cannot be generalized to all companies. Apart from that, this research's determining factor for firm value is only green investment and does not include other factors, and the corporate governance proxy only uses board size. Therefore, it is hoped that future research can explore the relationship between green investment, firm value, and corporate government with other new models that consider the characteristics of the sample industry, economic conditions in the research period, and other measures of the variables studied. Better clarity regarding the relationship between the three is necessary.

References

Arias Fogliano de Souza Cunha, F., & Samanez, C. P. (2013). Performance Analysis of Sustainable Investments in the Brazilian Stock Market: A Study About the Corporate Sustainability Index (ISE). *Journal of Business Ethics*, *117*(1), 19–36. https://doi.org/10.1007/s10551-012-1484-2

Bhatt, R. R., & Bhattacharya, S. (2015). Board structure and firm performance in Indian IT firms. *Journal of Advances in Management Research*, *12*(3), 232–248. https://doi.org/10.1108/JAMR-07-2014-0042

Chams, N., & García, J. (2019). Sustainable or not sustainable? The role of the board of directors. *Journal of Cleaner Production*, *226*, 1067–1081. https://doi.org/10.1016/j.jclepro.2019.04.118

Chang, K., Ding, J., Lou, Q., Li, Z., & Yang, J. (2021). The impact of capital leverage on green firms' investment: New evidence regarding Chinese green industries' size and age effects. *Finance Research Letters*, *38*. https://doi.org/10.1016/j.frl.2020.101529

Chariri, A., Nasir, M., Januarti, I., & Daljono, D. (2019). Determinants and consequences of environmental investment: an empirical study of Indonesian firms. *Journal of Asia Business Studies*, *13*(3), 433–449. https://doi.org/10.1108/JABS-05-2017-0061

Chen, Y., & Ma, Y. (2021). Does green investment improve energy firm performance? *Energy Policy*, p. *153*. https://doi.org/10.1016/j.enpol.2021.112252

Chițimiea, A., Minciu, M., Manta, A. M., Ciocoiu, C. N., & Veith, C. (2021). The drivers of green investment: A bibliometric and systematic review. *Sustainability (Switzerland)*, *13*(6). https://doi.org/10.3390/su13063507

de Villiers, C., Naiker, V., & van Staden, C. J. (2011). The effect of board characteristics on firm environmental performance. *Journal of Management*, *37*(6), 1636–1663. https://doi.org/10.1177/0149206311411506

Du, H. S., Zhan, B., Xu, J., & Yang, X. (2019). The influencing mechanism of multi-factors on green investments: A hybrid analysis. *Journal of Cleaner Production*, *p. 239*. https://doi.org/10.1016/j.jclepro.2019.117977

Farooq, U., Ahmed, J., Tabash, M. I., Anagreh, S., & Subhani, B. H. (2021). Nexus between government green environmental concerns and corporate real investment: Empirical evidence from selected Asian economies. *Journal of Cleaner Production*, p. *314*. https://doi.org/10.1016/j.jclepro.2021.128089

Grozdic, V., Maric, B., Radišic, M., Šebestová, J., & Lis, M. (2020). Capital investments and manufacturing firms' performance: Panel-data analysis. *Sustainability (Switzerland)*, *12*(4). https://doi.org/10.3390/su12041689

Guo, Z., & Kga, U. K. (2012). Corporate Governance and Firm Performance of Listed Firms in Sri Lanka. *Procedia - Social and Behavioral Sciences*, *pp. 40*, 664–667. https://doi.org/10.1016/j.sbspro.2012.03.246

Inderst, G., C. Kaminker & F. Stewart (2012), "Defining and Measuring Green Investments: Implications for Institutional Investors' Asset Allocations", OECD Working Papers on Finance, Insurance and Private Pensions, No. 24, OECD Publishing. http://dx.doi.org/10.1787/5k9312twnn44-e

Karim, A. E., Albitar, K., & Elmarzouky, M. (2021). A novel measure of corporate carbon emission disclosure, the effect of capital expenditures and corporate governance. *Journal of Environmental Management*, *p. 290*. https://doi.org/10.1016/j.jenvman.2021.112581

Khalil, M. A., & Nimmanunta, K. (2023). Conventional versus green investments: advancing innovation for better financial and environmental prospects. *Journal of Sustainable Finance and Investment*. https://doi.org/10.1080/20430795.2021.1952822

Li, Z., Wei, S. Y., Chunyan, L., Mahfod, M. M., Qadus, A., & Hishan, S. S. (2022). The impact of CSR and green investment on Chinese export industry stock return. *Economic Research-Ekonomska Istrazivanja*, *35*(1), 4971–4987. https://doi.org/10.1080/1331677X.2021.2019599

Merendino, A., & Melville, R. (2019). The board of directors and firm performance: empirical evidence from listed companies. *Corporate Governance (Bingley)*, *19*(3), 508–551. https://doi.org/10.1108/CG-06-2018-0211

Nakamura, E. (2011). Does Environmental Investment Really Contribute to Firm Performance? An Empirical Analysis Using Japanese Firms. *Eurasian Business Review, 1*(2), 91–111. https://doi.org/10.14208/bf03353800

Nasih, M., Harymawan, I., Paramitasari, Y. I., & Handayani, A. (2019). Carbon emissions, firm size, and corporate governance structure: Evidence from Indonesia's mining and agricultural industries. *Sustainability (Switzerland)*, *11*(9). https://doi.org/10.3390/su11092483

Naveed, K., Khalid, F., Nawaz, R., Sun, X., Wu, Y., & Ye, C. (2023). *Does corporate green investment enhance profitability? An institutional perspective,* https://doi.org/10.21203/rs.3.rs-1499301/v1

Orozco, L. A., Vargas, J., & Galindo-Dorado, R. (2018). Trends on the relationship between board size and financial and reputational corporate performance: The Colombian case. *European Journal of Management and Business Economics*, *27*(2), 183–197. https://doi.org/10.1108/EJMBE-02-2018-0029

Pekovic, S., Grolleau, G., & Mzoughi, N. (2018). Environmental investments: Too much of a good thing? *International Journal of Production Economics*, pp. *197*, 297–302. https://doi.org/10.1016/j.ijpe.2018.01.012

Rossi, M., Chouaibi, J., Chouaibi, S., Jilani, W., & Chouaibi, Y. (2021). Does a Board Characteristic Moderate the Relationship between CSR Practices and Financial Performance? Evidence from European ESG Firms. *Journal of Risk and Financial Management*, *14*(8), 354. https://doi.org/10.3390/jrfm14080354

Saif, M., Meo, M. S., & Usman, M. (2022). The relationship between corporate investment decision and firm performance: The moderating role of cash flows. *Journal of Public Affairs*, *22*(2). https://doi.org/10.1002/pa.2445

Shahid, M. S., & Abbas, M. (2019). Does corporate governance play any role in investor confidence and corporate investment decision relationships? Evidence from Pakistan and India. *Journal of Economics and Business*, p. *105*. https://doi.org/10.1016/j.jeconbus.2019.03.003

Suman, S., & Singh, S. (2021). Corporate governance mechanisms and corporate investments: evidence from India. *International Journal of Productivity and Performance Management*, *70*(3), 635–656. https://doi.org/10.1108/IJPPM-09-2019-0453

Hoang, T. H., Przychodzen, W., Przychodzen, J., & Segbotangni, E. A. (2021). Environmental transparency and performance: Does the corporate governance matter? *Environmental and Sustainability Indicators*, *10*. https://doi.org/10.1016/j.indic.2021.100123

Widarwati, E., Karmila, S., & Nurmalasari, N. (2022). Governance and Bank Performance: Do Bank Risk Matter? *Etikonomi*, *21*(2), 281–294. https://doi.org/10.15408/etk.v21i2.24364

Widarwati, E., Nugraha, M. M., Nurmalasari, N., & Wityasminingsih, E. W. E. (2024). Corporate Investment and Corporate Performance: Do Crisis Matter? *Jurnal Kajian Akuntansi*, *7*(2), 181-199.

About the Authors

Estu Widarwati (E.W.) is a Doctor of The Management Departement in Sekolah Tinggi Ilmu Ekonomi Sutaatmadja, Subang, West Java, 41211 Indonesia. Email: wie2tdz@gmail.com PUBLON ID: 470402; WOS ID: AHC-0982-2022; ORCHID ID: https://orcid.org/0000-0001-5720-0589

Nabila Nur Rohmah (N.N.R.) is an Alumni of The Management Department, Sekolah Tinggi Ilmu Ekonomi Sutaatmadja, Subang, West Java, 41211 Indonesia. Email: nabilla30nur@gmail.com

Estu Wityasminingsih (E.W.T) is a Lecturer of the Compurized Accounting, Politeknik Piksi Ganesha, Bandung, West Java, 40275, Indonesia. Email: rnee.tyas@yahoo.com

Nunik Nurmalasari (N.N.) is a Lecturer of the Management Department, Sekolah Tinggi Ilmu Ekonomi Sutaatmadja, Subang, West Java, 41211 Indonesia. Email: nuniknurmalasari90@gmail.com

Devy Widya Apriandi (D.W.A) is a Lecturer of the Management Department, Sekolah Tinggi Ilmu Ekonomi Sutaatmadja, Subang, West Java, 41211 Indonesia. Email: devyapriandi8@gmail.com

Mutqi Sopiawadi (M.S) is a Lecturer of the Management Department, Sekolah Tinggi Ilmu Ekonomi Sutaatmadja, Subang, West Java, 41211 Indonesia. Email: mutqi@stiesa.ac.id.

Author Contributions

Conceptualisation, E.W., and N.N.R.; Methodology, E.W., and N.N.; Investigation, E.W. and N.N.; Analysis, E.W. and N.N.R.; Original draft preparation, E.W., and E.W.T.; Review and editing, E.W., E.W.T., D.W.A., and M.S.; Visualization, E.W., D.W.A, and M.S; Supervision, E.W.

Conflicts of Interest

The authors declare no conflict of interest. The funders had no role in the design of the study, in the collection, analyses, or interpretation of data, in the writing of the manuscript, or in the decision to publish the results.