The COVID-19 Pandemic Impact on Corporate Dividend Policy of Sustainable and Responsible Investment in Indonesia: Static and Dynamic Panel Data Model Comparison

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The COVID-19 Pandemic Impact on Corporate Dividend Policy of Sustainable and Responsible Investment in Indonesia: Static and Dynamic Panel Data Model Comparison

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Abstract: This research investigates the impact of crisis due to the COVID-19 pandemic on the dividend policy of green index companies in Indonesia, namely the Sustainable and Responsible Investment (SRI) by Biodiversity (KEHATI) Foundation, or SRI-KEHATI indexed companies. The purposive sampling technique was used to collect data from companies listed from 2014 to 2020, using static and dynamic panel data models. From the several panel data models tested, the static panel data regression with random effects model (REM) and fixed effect model (FEM) uses the least square dummy variable-robust standard error (LSDV-RSE) technique are the best econometric models feasible. The system generalized method of moments (SYS-GMM) is used as a suitable econometric model with a robustness test used to determine static panel data regression. It is reported that SRI-KEHATI indexed companies tend to distribute dividends positively during this crisis, and is also statistically proven robust. This gives a positive signal to the capital market concerning the sluggish trading activity. The market reaction test, using two-approaches, showed that this business did not provide a positive reaction to the capital market, which turned out to be pessimistic. Furthermore, profitability and financial leverage have a robust effect, while dividends from the previous year affect dividend policy on the static panel data model, and firm size affect dividend policy on SYS-GMM. Predictors that proved influential with a direction not in line with the hypothesis were investment opportunities on REM and SYS-GMM, and firm age on SYS-GMM. The parameter estimation that passes the model specification test is feasible, whiles the biased and inconsistency of parameter estimation due to the alleged correlation between $u_{i,t}$ and $PYD_{i,t}$ failed to occur in static panel data regression. The endogeneity issue was resolved by dynamic panel data regression with the strongest corrective effect. This research can be used as a reference for investors to obtain optimal returns on green index companies in the country. An optimal dividend policy can increase the value of the SRI-KEHATI indexed companies; therefore, it can contribute optimally to sustainability and responsibility for social and environmental aspects.

Keywords: dividend policy; COVID-19 pandemic; crisis; sustainable and responsible investment; panel data regression

JEL Classification: C33; C36; G01; G35; Q56

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1. Introduction

The COVID-19 pandemic has led to the restriction of physical activities globally in order to prevent transmission [1]. The first case was recorded on 2 March 2020 in Indonesia. This caused the government of each region to implement large-scale social restrictions known as PSBB (*Pembatasan Sosial Berskala Besar*). However, this rule was initially enacted in the Province of Jakarta on 10 April 2020 through Ref. [2], which was then followed by other regions until the pandemic's status was declared. Its implementation in the capital city was based on the fact that this area was the epicenter of the virus spread. This restriction paralyzed the economy, including the educational sector, work, religious activities, and those performed in public facilities, social and cultural exercises, and modes of transportation.

The COVID-19 pandemic led to a global crisis, specifically in Indonesia. This condition was predicted by the International Monetary Fund (IMF) to occur by the end of the first quarter of 2020 [3]. The GDP level decreased to −2.07% compared to previous years. This shows that in 2020, the economy developed negatively due to the crisis caused by the pandemic. Another condition was illustrated by the inflation rate of 1.68% in 2020. This low money supply depicts that people tend to collect their money and fail to indulge in buying and selling due to the uncertainty of the pandemic [4,5]. Moreover, this crisis had an impact on the emerging capital market, specifically the Indonesia Stock Exchange (IDX). On 20 March 2020, the IDX composite fell to 4194.94, compared to 2 January 2020, when its rate was 6283.58, resulting in a 33.25% fall. The crisis resulted in changing market assumptions and unclear supply-chain mechanisms. This caused investors not to dare get involved in trading transactions, leading to negative sentiment and the fall of the IDX composite [3,6].

The impact of the crisis due to the COVID-19 pandemic has also affected the financial market, as reported by [7]. It is reported that there was a negative dynamic conditional correlation between gold and equity returns on the S&P500 index, Euro Stoxx 50, Nikkei 225, and China FTSE A50 for the period of 31 December 2019 to 16 March 2020 (period 1). This shows that gold was a safe-haven asset for the equity index. On the other hand, in the period from 17 March 2020 to 24 April 2020 (period 2), when the government intervened in the economy by issuing fiscal and monetary stimulus packages, there was a loss of the safe-haven nature of gold for equity index. There was a significant increase in period 2 for the optimal weight of gold in the S&P500, Euro Stoxx 50, Nikkei 225, and West Texas Intermediate crude oil portfolios. This shows that investors' interest shifted to gold and showed the phenomenon of "flight-to-safety assets" in crisis conditions due to the pandemic. This condition shows that gold was a great hedging strategy for Euro Stoxx 50, FTSE A50 China, and West Texas Intermediate crude oil only in period 1. There was an increase in hedging costs in period 2 as there was an increase in the dynamic conditional correlation between financial assets and gold and an increase in risk-adjusted performance in crisis and non-crisis conditions.

The COVID-19 pandemic also impacted companies categorized under the green index. This includes the Sustainable and Responsible Investment or SRI-KEHATI index. It was recorded that the SRI-KEHATI index composite fell to 256.56 on 20 March 2020, however, when compared to its value as on 3 January 2020, which was 404.32, a decline of 36.55% was recorded, whereas this percentage is more significant than the IDX composite. The fall of the SRI-KEHATI index composite due to the pandemic is strongly suspected of impacting the company's fundamental aspects, even on its performance, thereby reducing its contribution with respect to sustainable and responsible investment.

Dividends as one of the returns on stock investments in the capital market are strongly suspected as being affected by the pandemic. Furthermore, the research question is: how is the company's dividend policy determined during a crisis period? In the perspective of dividend signaling theory, is the firm bound to increase the dividends distributed to give a positive signal such as good performance? On the other hand, do some companies tend to suppress or not distribute dividends during crisis conditions? The pecking order theory states that firms tend to prioritize internal sources of capital, such as retained earnings, over external ones. Even in crisis conditions, they experience difficulties obtaining these external sources because these circumstances usually occur systemically. The restrictions on the movement of people and goods disrupt the production chain in industries, thereby resulting in a non-smooth business cycle [8,9].

Previous research that has stated the impact of these occurrences on dividend policy [10] discovered that the crisis that occurred from 2008 to 2009 suppressed and even eliminated dividends. Ref. [11] reported that in the USA from 2006 to 2009, there was a negative shift in the company's dividend policy, regardless of its financial performance. Specifically, Ref. [12] discovered that the impact of this crisis on European banks led to the tendency to either reduce or not distribute dividends to shareholders to maintain the company's business stability. Ref. [13] stated a decrease in the dividend rate of industries in Nigeria due to a reduction in corporate cash flow, thereby having a negative signal on its performance. Ref. [14] reported that during the 2008 financial crisis in the USA, Australia, Germany, Japan, China, and South Korea, there was a decline in the dividend payout ratio. Ref. [15] further stated that in the USA, there was a decline in dividend rates during the COVID-19 pandemic and other influential predictors, namely net income and liability levels. Ref. [16] also reported that during the crisis conditions due to the COVID-19 pandemic in 2020, there was decreasing in dividend payout rates for issuers indexed by the S&P500, EuroStoxx50, and FTSE100.

Based on the results of previous empirical research, the following questions arise: What is the crisis's impact due to the COVID-19 pandemic on dividend policy? Will there be a decrease in the dividend payout ratio? This research focuses on examining the effect of the COVID-19 pandemic on dividend policies for companies in Indonesia that are included in the Sustainable and Responsible Investment, or SRI-KEHATI indices. Based on previous research, no one has reported Indonesian green index corporates dividend policy during the crisis conditions consequential of the COVID-19 pandemic. These firms apply the principles of Sustainable and Responsible Investment (SRI) and Environmental, Social, and Good Corporate Governance (ESG). Furthermore, these companies are not involved in the negative use of pesticides, nuclear energy, weapons, tobacco, alcohol, pornography, gambling, genetic engineering of organisms, and coal exploitation. According to [17], good dividend policy governance boosts firm value. Meanwhile, for companies included in the green index, it is believed to support its contribution to SRI and ESG principles, specifically during crisis conditions.

The main predictor tested is the crisis due to the COVID-19 pandemic, which is proxied by the yearly gross domestic product (GDP), commonly used to measure economic conditions [18,19]. This also includes several others postulated for robustness checking to ascertain the consistent effect of the main ones tested in complex empirical models. Other predictors tested were profitability, previous year's dividend, investment opportunity, financial leverage, firm size, and firm age [20–24]. Liquidity predictor was omitted because the SRI-KEHATI index consists of various industrial sectors. The banking sector also has varying liquidity ratios according to other sectors [8,25].

The statistical instruments, namely static and dynamic panel data regressions, were used to compare these two-parameter estimation methods. The dynamic panel data regression was used to resolve the issue of the error term (ε) endogeneity against lagged-1 endogenous variable $(Y_{i,t-1})$. This resulted in a consistent and unbiased parameter estimate, whereas the static panel data regression was unable to resolve this issue [26,27]. Furthermore, dynamic panel data regression is relevant for robust parameter estimation, where the endogenous variable for dividend policy is consistent under certain conditions and inconsistent in some others [28]. It simply implies that the number 0 is based on the assumption that the company does not distribute dividends during a specific period.

There are several ways this research contributes to the literature. First, this study examines the impact of the crisis due to the COVID-19 pandemic on the dividend policies of green index companies in Indonesia. Second, this study examines the market reaction to their dividend announcements during the crisis. Third, statistically, by comparing static and dynamic panel data models, we tested whether there are bias and inconsistency in parameter estimates due to the alleged correlation between $u_{i,t}$ and $PYD_{i,t}$. There are different findings noting in green index or SRI-KEHATI indexed companies that there was a tendency to distribute dividends positively during crisis conditions due to the COVID-19 pandemic. On the other hand, the positive dividend policy announcements were not responded to positively by the market, which turned out to be pessimistic. It is also proven that the bias and inconsistency in the static panel data model do not occur because of the difference in proxies between $PYD_{i,t}$ and $DPS_{i,t-1}$.

The research paper consists of several chapters, namely 1. Introduction; 2. Literature Review explains SRI-KEHATI indexed companies, grand theory, and hypotheses development; 3. Method describes the research method, period, sample, econometric processing program, variable, and proxy; 4. Statistical Analysis Instruments: Static Panel Data Regression vs. Dynamic Panel Data Regression; and the Endogeneity Issue, describes statistical analysis instruments and their issues; 5. Empirical Results explain descriptive statistics, correlation matrix, likelihood test for the static panel model, model specification test, and significance parameter test; 6. Discussion for the empirical results and the market reaction test; 7. Conclusion of the overall results of the study.

2. Literature Review

2.1. Sustainable and Responsible Investment—Indonesian Biodiversity (SRI-KEHATI) Index

SRI-KEHATI is the first green investment index in Indonesia and ASEAN, as well as the second in Asia. It was launched on 8 June 2009 by the Indonesian Biodiversity Foundation (KEHATI foundation) in collaboration with the IDX. Companies indexed by SRI-KEHATI applied the Sustainable and Responsible Investment (SRI) and Environmental, Social and Good Corporate Governance (ESG) concerning the Principles for Responsible Investment: A Blueprint for Responsible Investment [29]. The criteria for selecting these firms are based on their core business functions, financial conditions, and impact on the environment. Interestingly, 25 companies were listed as issuers to form a competitive index [30].

The establishments listed on the SRI-KEHATI index were based on the following criteria: those that implemented positive and sustainable environmental policies. The second criterion is the need to have an excellent financial condition, namely a market capitalization and total assets of >IDR 1,000,000,000,000, high stock availability, and a positive price to earnings ratio. Furthermore, these companies need to be assessed by a third party concerning the Environmental, Social, and Good Corporate Governance aspects. This is also based on its contribution to the environment, community involvement, corporate governance, supplier and customer behavior, employment practices, and human rights. The performance of the SRI-KEHATI index has proven to be higher than the other top indices, such as the LQ-45 and the Jakarta Stock Exchange Composite Index (JCI). The market capitalization of the SRI-KEHATI index in 2021 is recorded at IDR 1,000,000,000. Fund management companies managed total assets worth more than IDR 2,500,000,000,000. This index creates opportunities for investors to invest in issuers that contribute to financial performance, as well as has an impact on the environment and its sustainability [17,31].

2.2. Pecking Order Theory: A Perspective in Crisis Due to COVID-19 Pandemic

Pecking order theory states that corporate capital funding is prioritized for internal sources in the form of retained earnings because it has minimum risk [8,32]. Crisis conditions such as the global COVID-19 pandemic that systematically forced companies to increase retained earnings due to the uncertainty of the economy in 2020. In the same year, this justification was strengthened, irrespective of the fact that there was no appropriate vaccines treatment for patients, and its end was far from near. Systematically, it was explained that other companies were also affected, which caused them to experience difficulties obtaining external sources of capital [3,8].

2.3. Hypotheses Development

The COVID-19 pandemic impacted corporate earnings and capital ratios, which were represented by the fall of the IDX in 2020, and specifically the SRI-KEHATI index composite. Political issues concerning when this crisis will end emerged, have resulted in an economic recession contraction in the capital market, which had specific implications on the stock price volatility and returns on investment. Economic recession tends to be measured by Gross Domestic Product (GDP) annual growth rate, which describes the economy's growth opportunities. The company's business cycle delay resulted in low profitability due to reduced activities and cash flow. This condition forced these firms to suppress or even eliminate dividends which is an anticipatory measure to maintain business continuity during the pandemic [3,9,15]. The proxy for the crisis variable due to COVID-19 uses gross domestic product to represent the economic conditions. [19,33] reported that it has a positive effect on dividend policy, and this led to the proposition of the first hypothesis:

Hypothesis 1 (H1). *Gross Domestic Product has a positive influence on Dividend Policy.*

Economic conditions are also measured by binary dummy variables, namely crisis, and non-crisis conditions. Besides, it is used for robustness checking of the gross domestic product. Based on the logical reasoning developed in the previous hypothesis, the crisis conditions due to the COVID-19 pandemic have suppressed and even eliminated dividends distributed to shareholders [9], and this led to the proposition of the second hypothesis:

Hypothesis 2 (H2). *The Crisis Due to the COVID-19 Pandemic has a negative impact on Dividend Policy.*

Profitability is the company's ability to generate profits. The company's profitability level is closely related to dividend policy, while the proportion of net income is determined as dividends and retained earnings. This implies that the higher the firm's net income level, the greater the dividend distributed [20,22]. During the pandemic, where the company's business cycle was hampered, it resulted in a decrease in the net income, thereby leading to the possibility of reducing dividend rates. [20,21,34–39] reported that profitability has a positive effect on dividend policy. Therefore, this led to the proposition of a third hypothesis:

Hypothesis 3 (H3). *Profitability has a positive influence on Dividend Policy.*

The dividend announcement is a signal that represents the company's performance and more sensitive than the earnings information obtained. This phenomenon is supported by the dividend signaling theory, where the current year's dividend rate is positively influenced by the previous one. To maintain a positive signal to shareholders, the optimal dividend rate in the current period is greater than the previous period or at least at the same level in the previous period. In addition, the company benefits from the external capital realized from the equity aspect [34,39,40]. During the pandemic, there is a possibility of these firms distributed dividends to maintain a positive signal [9]. Refs. [22,34,41] reported that the previous year's dividend had a positive effect on its policy. Moreover, its predictor employed 2 proxies, namely the actual previous year's dividend and lagged-1 of the endogenous variable ($DPS_{i,t-1}$) for the static and dynamic panel data regression methods. This led to the proposition of the fourth and fifth hypotheses:

Hypothesis 4 (H4). *The previous year's dividend has a positive influence on dividend policy.*

Hypothesis 5 (H5). *There is a positive influence of $DPS_{i,t-1}$ on Dividend Policy.*

When a company has a prospective investment opportunity, the company has a good investment opportunity by increasing retained earnings on higher net income, thereby increasing future cash inflows. It can be indicated that the higher the investment opportunity, the more significant the proportion of retained earnings on the net income obtained. The pecking order theory supports this phenomenon as a result of the pandemic. In addition, companies prioritize internal sources of capital over external ones due to the risk factors [3,22,36,38]. Refs. [28,36,38] reported that investment opportunity has a negative effect on dividend policy, and this led to the sixth hypothesis:

Hypothesis 6 (H6). *Investment Opportunities have a negative influence on Dividend Policy.*

The level of debt affects cash flow, indicating the higher the interest charged, the lower the cash flow, which tends to suppress the dividend rate. Therefore, the higher the level of debt will tend to suppress the dividends distributed. In crisis conditions, any company experiencing business cycle obstructions is strongly suspected of having a negative impact on dividend policy [3,22,24]. Refs. [22,24,36,37] reported that financial leverage has a negative impact on dividend policy, and this led to the seventh hypothesis:

Hypothesis 7 (H7). *Financial Leverage has a negative influence on Dividend Policy.*

It can be implied the larger the firm size, the higher the business capability and the less vulnerability to risks, thereby supporting the company's profitability. It also implies the larger the firm size, the higher the access to external capital and the smaller its cost. These phenomena support the company to have a positive effect on dividend policy. During crisis, these establishments experience a decrease in cash flow, thereby allowing suppression and even eliminating dividend distribution [3,21,37]. Refs. [21,22,34,36,37] reported that firm size has a positive effect on dividend policy, and this led to the formulation of the eighth hypothesis:

Hypothesis 8 (H8). *Firm Size has a positive influence on Dividend Policy.*

The firm age describes the life cycle of the company, implying that the higher the age, causes the company to enter its mature phase, thereby having a low investment opportunity and more business stability. On the other hand, the lower the firm age, the higher the investment opportunity, so it requires capital to develop its business so that there is a tendency to suppress the level of dividends distributed. This positively affects dividend policy, even in crisis conditions [3,37,42]. Refs. [37,42] reported that firm age has a positive effect on dividend policy, and this led to the proposition of the ninth hypothesis:

Hypothesis 9 (H9). *Firm Age has a positive influence on Dividend Policy.*

3. Method

This quantitative research examines the causal relationship among the proposed hypotheses [43,44]. Secondary data was obtained from www.idx.co.id from 2014 to 2020. This was justified by the pandemic that emerged in 2020. The purposive sampling method was used to collect samples based on certain criteria [44]. These are the companies listed on the SRI-KEHATI index, relating to the fact that they paid dividends at least once as well as did not experience delisting and IPO during the research period, and also those that have completed their financial reports to fulfill variable measurement needs. Of the 25 firms indexed by SRI-KEHATI as of 2021, 1 of them was eliminated for not paying dividends during the research period, therefore, 24 samples were collected within 7 years, and 168 observation units were examined. The companies designated as samples are shown in Table 1. The proxies for these variables are contained in Table 2 [19–25,28,37,45,46]. The econometrics program used is STATA version 22.

Table 1. Sample of Companies by Sector.

Sector	Company Code Defined by IDX	Total
Agriculture	DSNG; LSIP	2
Basic and Chemical Industry	INTP; SMGR	2
Consumer Goods Industry	INDF; KLBF; SIDO; UNVR	4
Finance	BBCA; BBNI; BBRI; BBTN; BMRI	5
Infrastructure, Utility, and Transportation	JSMR; PGAS; TLKM	3
Mining	INCO	1
Miscellaneous Industry	ASCII; AUTO	2
Real Estate, Property, and Building Construction	BSDE; PTPP; WIKA	3
Trade and Service	PJAA; UNTR	2

Source: https://kehati.or.id/en/index-sri-kehati/ (accessed on 26 August 2021).

Table 2. Variables and Proxies.

Variable	Proxy	Formulation	Expected Sign
Dividend Policy	Dividend Per Share (DPS)	$\text{DPS} = \frac{\text{Total Dividends}}{\text{Outstanding Shares}}$	—
Crisis due to the COVID-19 pandemic	Gross Domestic Product (GDP)	GDP Annual Growth Rate of Indonesia	+
	Dummy Variable (D)	1 = A Crisis Occurs Due to the COVID-19 Pandemic 0 = No Crisis	−
Profitability	Earnings Per Share (EPS)	$\text{EPS} = \frac{\text{Earnings Available for Common Stock}}{\text{Outstanding Shares}}$	+
Previous Year's Dividend	Previous Year's Dividend (PYD)	PYD = total dividends distributed in the previous year	+
	Lagged of DPS (LD)	$\text{LD} = \text{DPS}_{i,t-1}$	+
Investment Opportunity	Market Share Price to Book Value ratio (MBR)	$\text{MBR} = \frac{\text{Market Price per Share}}{\text{Book Value per Share}}$	−
Financial Leverage	Debt to Equity Ratio (DER)	$\text{DER} = \frac{\text{Total Liability}}{\text{Total Equity}}$	−
Firm Size	Total Assets (LNTA)	LNTA = natural logarithmic transformation of total assets	+
Firm Age	Firm Age (AGE)	AGE = firm age	+

4. Statistical Analysis Instruments: Static Panel Data Regression vs. Dynamic Panel Data Regression; and the Endogeneity Issue

Generally, the panel data regression [26] is shown in Equation (1).

$$Y_{i,t} = \beta_0 + \sum_{k=1}^{K} \beta_k X_{k,i,t} + u_{i,t} \tag{1}$$

Description:
For: $k = 1, 2, \ldots, K$; $i = 1, 2, \ldots, N$; $t = 1, 2, \ldots, T$;
$Y_{i,t}$: Response variable for the i-th cross-section element and the t-the time series element;
$X_{k,i,t}$: The value of the k-th exogenous variable for the i-th cross-section element and the t-the time series element;
β_k: Slope coefficient for the k-th exogenous variable;
β_0: Panel data regression model intercept;
$u_{i,t}$: Error for the i-th cross-section element and the t-th time series element.

The panel data regression generally employed 3 estimation approaches, namely pooled least square, fixed, and random effect models. The first method is pooled least square (PLS) using the ordinary least square (OLS) technique. The second approach is the fixed effect model (FEM) using the least square dummy variable (LSDV) technique. Interestingly, there are 2 FEM assumptions, namely the slope is constant while the intercept varies between cross-section elements, as well as constant slope, with varying intercepts between cross-section and time-series elements. The third approach is the random effect model (REM) using the generalized least square (GLS) technique. There are 2 REM assumptions, namely different intercepts and slopes between cross-section elements, as well as constant intercepts and different slopes between cross-section and time-series elements. Panel data regression analysis requires a likelihood test to determine which econometric model is the most suitable. First, a Chow test was conducted to select between PLS and FEM. Second, a Hausman test was carried out to select between REM and FEM. Third, a Lagrange Multiplier test was performed using the Breusch and Pagan techniques to select between PLS and REM.

The model specification test for static panel data regression analysis is generally carried out based on classical assumptions to produce parameter estimates that are consistent and unbiased as well as meet the best linear unbiased estimation (BLUE) requirements. First, a normality evaluation was conducted using the Shapiro Wilk W-test to examine the normality distribution of $u_{i,t}$. Second, a multicollinearity test was carried out with the variance inflation factor (VIF) between exogenous variables. Third, an autocorrelation analysis was performed with the Wooldridge test to detect the correlation of $u_{i,t}$ and $u_{i,t-1}$. Fourth, a heteroscedasticity evaluation was conducted with the Modified Wald test for GroupWise, and this test was carried out to determine the heterogeneity of $u_{i,t}$ [26,27]. For PLS and FEM, the 4 classical assumption tests were carried out to meet the BLUE requirements. Meanwhile, REM, with the generalized least square estimation method does not require the classical assumption test. The parameter significance test associated with static panel data regression involves analyzing the coefficient of determination, including the simultaneous and partial tests. The coefficient of determination (R^2) was analyzed to investigate the predictors' variability on the endogenous variables. The simultaneous test was carried out with the F-test for PLS and FEM, while the REM employed the Wald test. Moreover, partial test with T-tests were used to examine the predictor's significant effect and suitability on the endogenous variables. The development of research hypotheses and the directional theory employed one-tailed statistics [27,44].

In addition to considering the BLUE aspect in terms of forming a consistent and unbiased parameter estimate, another issue involves examining the effect of $PYD_{i,t}$, which contains elements of the previous period's endogenous variables on the current one. The process causes parameter estimation with static panel data regression, which is thought to be inconsistent and biased due to the correlation between $u_{i,t}$, and explanatory endogenous variables. This is due to the fact that $u_{i,t}$ is a function of $Y_{i,t}$, and $Y_{i,t-1}$, because $Y_{i,t-1}$ is $Y_{i,t}$ in the previous period. According to [47], $Y_{i,t-1}$ has endogeneity as in $Y_{i,t}$. Furthermore, a robustness test was carried out by comparing the models, namely the dynamic panel data regression, where the issue was not accommodated in the static model. Dynamic panel data regression adopted 2 approaches, namely first difference generalized method of moments (FD-GMM) and the generalized system method of moments (SYS-GMM). The general form of the panel data regression is described in Equations (2) and (3).

$$Y_{i,t} = \alpha_{i,t} + \delta Y_{i,t-1} + \sum_{k=1}^{K} \beta_k X_{k,i,t} + u_{i,t} \quad (2)$$

where,

$$u_{i,t} = \mu_i + v_{i,t} \quad (3)$$

Description:

For: $k = 1, 2, \ldots, K$; $i = 1, 2, \ldots, N$; $t = 1, 2, \ldots, T$;

$Y_{i,t-1}$: Lagged-1 of the endogenous variable for the i-th cross section element and the t-th time series element;
δ: slope coefficient of $Y_{i,t-1}$;
μ_i: the unobserved effect of the i-th cross section element without being affected by the time factor, $\mu_i \sim IIDN(0, \sigma_v^2)$;
$v_{i,t}$: error component is general, $v_{i,t} \sim IIDN(0, \sigma_v^2)$.

Ref. [48] introduced dynamic panel data regression using the first difference generalized method of moments (FD-GMM). $Y_{i,t-1}$ is estimated to be an instrumental variable to solve problems that are not accommodated in the static panel data regression. FD-GMM accommodates the lagged-1 value of the exogenous variable, which is formed from the first difference of the endogenous variable. By using a two-step estimator, the parameter estimation of explanatory endogenous variables in FD-GMM is described in Equation (4). The realized value is unbiased, consistent, and efficient.

$$\hat{\delta} = \left[\left(N^{-1}\sum_{i=1}^{N}\left(\Delta Y_{i,t-1}Z_{diff}\right)\right)\hat{\wedge}^{-1}\left(N^{-1}\sum_{i=1}^{N}\left(\Delta Y_{i,t-1}Z_{diff}\right)\right)\right]^{-1} \left[\left(N^{-1}\sum_{i=1}^{N}\left(\Delta Y_{i,t-1}Z_{diff}\right)\right)\hat{\wedge}^{-1}\left(N^{-1}\sum_{i=1}^{N}\left(Z'_{diff}\Delta Y_i\right)\right)\right] \quad (4)$$

FD-GMM has a weakness, namely the time series element is too small, and there is an unbalance condition in the first difference transformation. Ref. [49] introduced the generalized system method of moment (SYS-GMM) to accommodate these defects. This is resolved by using the orthogonal deviation method. SYS-GMM minimizes data loss at low time-series elements. The implementation of equality between the original and adapted systems is referred to as the common system. This estimation procedure combines different levels and has the highest proportionality among other GMM methods. Moreover, by using a two-step estimator, the parameter estimation of explanatory endogenous variables in SYS-GMM is described in Equation (5), and this is more efficient than (4) [26,48–51].

$$\hat{\delta} = \left[\left(N^{-1}\sum_{i=1}^{N}\varphi'_{i,-1}Z_{sys}\right)\hat{\Psi}^{-1}\left(N^{-1}\sum_{i=1}^{N}Z'_{sys}\Psi_{i,-1}\right)\right]^{-1} \left[\left(N^{-1}\sum_{i=1}^{N}\varphi'_{i,-1}Z_{sys}\right)\hat{\Psi}^{-1}\left(N^{-1}\sum_{i=1}^{N}\left(Z'_{sys}q_i\right)\right)\right] \quad (5)$$

The model specification test for dynamic panel data regression involves the adoption of three evaluation processes, namely instrument validity, consistency, and unbiased tests. The instrument validity uses the Sargan tests, which were carried out to ensure there was no correlation between u_{it} and Y_{it-1}. The consistency test uses the Arellano-Bond tests were used to examine whether there is a serial correlation between $\Delta v_{i,t}$ and $\Delta v_{i,(t-2)}$. An unbiased test was carried out by comparing δ from Y_{it-1} with GMM, LSDV *robust standard error* (LSDV-RSE), and *OLS robust standard error* (OLS-RSE) [26,47]. Furthermore, the parameter significance test on dynamic panel data regression was carried out by employing both simultaneous and partial tests. Simultaneous and partial testing was performed using the Wald and Z-tests, respectively, as well as one-tailed statistics.

The empirical model for static panel data regression is described in Equations (6) and (7), while dynamic is proven by Equations (8) and (9).

$$DPS_{i,t} = \alpha + \beta_1 GDP_{i,t} + \beta_2 EPS_{i,t} + \beta_3 PYD_{i,t} + \beta_4 MBR_{i,t} + \beta_5 DER_{i,t} + \beta_6 LNTA_{i,t} + \beta_7 AGE_{i,t} + u_{i,t} \quad (6)$$

$$DPS_{i,t} = \alpha + \beta_1 D_{i,t} + \beta_2 EPS_{i,t} + \beta_3 PYD_{i,t} + \beta_4 MBR_{i,t} + \beta_5 DER_{i,t} + \beta_6 LNTA_{i,t} + \beta_7 AGE_{i,t} + u_{i,t} \quad (7)$$

$$DPS_{i,t} = \alpha + \delta DPS_{i,t-1} + \beta_1 GDP_{i,t} + \beta_2 EPS_{i,t} + \beta_4 MBR_{i,t} + \beta_5 DER_{i,t} + \beta_6 LNTA_{i,t} + \beta_7 AGE_{i,t} + u_{i,t} \quad (8)$$

$$DPS_{i,t} = \alpha + \delta DPS_{i,t-1} + \beta_1 D_{i,t} + \beta_2 EPS_{i,t} + \beta_4 MBR_{i,t} + \beta_5 DER_{i,t} + \beta_6 LNTA_{i,t} + \beta_7 AGE_{i,t} + u_{i,t} \quad (9)$$

Description: $DPS_{i,t}$: dividend per share on the *i*-th cross section and the *t*-th time series elements; $GDP_{i,t}$: growth domestic product on the *i*-th cross section and the *t*-th time series elements; $D_{i,t}$: binary dummy variable for crisis and non-crisis conditions on the *i*-th cross section and the *t*-th time series elements; $EPS_{i,t}$: earnings per share on the *i*-th cross section and the *t*-th time series elements; $PYD_{i,t}$: previous year's dividend on the *i*-th cross section and the *t*-th time series elements; $DPS_{i,t-1}$: lagged-1 of dividend per share on the *i*-th cross section and the *t*-th time series elements; $MBR_{i,t}$: market share price to book value ratio on the *i*-th cross section and the *t*-th time series elements; $DER_{i,t}$: debt to equity ratio on the *i*-th cross section and the *t*-th time series elements; $LNTA_{i,t}$: total assets on the *i*-th cross section and the *t*-th time series elements; $AGE_{i,t}$: age on the *i*-th cross section and the *t*-th time series elements; α: intercept; $\beta_1, \beta_2, \ldots, \beta_7$: slope coefficient of the explanatory variable; δ: slope coefficient of explanatory endogenous variables; $u_{i,t}$: error component on the *i*-th cross section and the *t*-th time series elements.

Furthermore, causality testing is full of endogeneity issues among other predictors. Ref. [52] reported that gross domestic product affects profitability. Ref. [53] reported that company size and financial leverage tend to affect profitability. Ref. [54] reported that firm age has an effect on profitability. Based on previous research, it was suspected that profitability has endogeneity. Therefore, dynamic panel data regression has a corrective effect to overcome endogeneity problems. This parameter estimation method has the highest corrective effect compared to the other methods, including producing the most appropriate coefficients [55,56].

5. Empirical Results

In Table 3, GDP has a minimum value of -0.0207, where this condition describes the GDP Annual Growth Rate of Indonesia experienced a negative development in 2020. D indicates a minimum value of 0, meaning the condition is not experiencing any crisis, while a maximum value of 1 indicates a crisis condition due to the COVID-19 pandemic. The minimum value of EPS is -246.1663, indicating that the company's profitability is negative. The minimum values of DPS and PYD are 0, and it describes the company's condition in a certain year when dividends were not distributed. These extreme conditions are included as research objects required to observe the dividend policy. The data distribution conditions for DPS, D, EPS, PYD, MBR, and DER, were in overdispersion, while GDP, LNTA, and AGE were in equidispersion. Table 4 shows the bivariate correlation between the tested variables.

The likelihood tests for selecting the Best Econometric Model on Static Panel Data Regression are shown in Table 5. The Chow test carried out on the empirical model (6) obtained *p*-value of F = 0.000 < 5%, therefore, FEM was selected. The Hausman test obtained a *p*-value of $\chi^2 = 0.7572 > 5\%$, therefore, REM was selected. The Lagrange multiplier test obtained a *p*-value of $\overline{\chi}^2 = 0.0000 \leq 5\%$, REM was selected. Based on the 3 likelihood tests, it was decided that REM should be selected for the empirical model (6) because it was consistent with the Hausman and Lagrange multiplier tests. In the empirical model (7), the chow test was used to obtain a *p*-value of F = 0.000 < 5%, FEM was selected. Hausman test obtained a *p*-value of $\chi^2 = 0.0019 \leq 5\%$, FEM was selected. The Lagrange multiplier test obtained a *p*-value of $\overline{\chi}^2 = 0.0000 \leq 5\%$, REM was selected. In accordance with the 3 likelihood tests, it was decided that FEM was selected in the empirical model (7) because it was consistent with the Chow and Hausman tests.

Furthermore, the model specification test for static panel data regression shown in Table 6 shows that the empirical model (6) does not need to be classical assumption evaluated because the parameter estimation method used is a generalized least square, while the empirical model (7) was tested for classical assumptions. The normality test results obtained a *p*-value of $z \leq 5\%$, therefore, parameter estimation violates its assumption. The multicollinearity test results showed that of all the predictors, the VIF values were < 10, indicating the parameter estimation does not violate its assumption. This was confirmed in Table 4, where the bivariate Pearson correlation among the predictors were < 0.75.

The autocorrelation test results obtained a p-value of $z > 5\%$, therefore, the parameter estimation does not violate its assumption. The heteroscedasticity test results obtained a p-value of $\chi^2 \leq 5\%$, and this violates its assumption.

Table 3. Descriptive Statistic.

	DPS	GDP	D	EPS	PYD	MBR	DER	LNTA	AGE
Obs.	168	168	168	168	168	168	168	168	168
Max.	1350	0.0517	1	3082.5717	20,623,565	82.4444	16.0786	21.1366	16
Min.	0	−0.0207	0	−246.1663	0	0.4768	0.0709	14.8437	162
Mean	183.3331	0.0402	0.1429	406.9035	2,991,335.92	4.5596	2.3189	17.9126	57.7083
Std. Dev.	266.6905	0.0249	0.3510	476.1099	4,147,811.519	11.6088	2.9021	1.6741	33.6469

Table 4. Pearson Correlation Matrix.

Proxy	DPS	GDP	D	EPS	PYD	MBR	DER	LNTA	AGE
DPS	1.000								
GDP	0.030	1.000							
D	−0.029	−0.999 ***	1.000						
EPS	0.824 ***	0.121	−0.120	1.000					
PYD	0.307 ***	−0.087	0.089	0.294 ***	1.000				
MBR	0.384 ***	0.015	−0.015	0.176 **	0.162 **	1.000			
DER	−0.050	−0.043	0.042	0.081	0.193 ***	0.007	1.000		
LNTA	0.173 **	−0.063	0.065	0.368 ***	0.624 **	−0.155	0.606 **	1.000	
AGE	−0.035	−0.036	0.037	−0.021	0.109 **	0.155	0.410 **	0.312 ***	1.000

Description: Using a one-tailed statistics approach, (***) significant at 1% level, (**) significant at 5% level.

Table 5. Likelihood Test for selecting the Best Econometric Model on Static Panel Data Regression.

Empirical Model	Chow Test	Hausman Test	Lagrange Multiplier Test
	F	χ^2	χ^{-2}
(6)	6.84 **	2.66	62.06 **
(7)	6.86 **	19.09 **	62.10 **

Description: (**) significant at 5% level.

Table 6. Classical Assumption Test for Empirical Model (7) with Static Panel Data Regression using Fixed Effect Model.

Multicollinearity Test							
Predictor	**LNTA**	**AGE**	**EPS**	**DER**	**PYD**	**MBR**	**D**
VIF	6.12	5.10	2.08	2.07	1.84	1.26	1.21

Normality Test: Shapiro-Wilk W Test		**Autocorrelation Test: Wooldridge Test**		**Heteroscedasticity Test: Modified Wald Test for Groupwise Heteroscedasticity**	
z	***p*-value**	**F**	***p*-value**	χ^2	***p*-value**
6.541	0.0000	3.757	0.0650	1.7×10^5	0.0000

Of the 4 classical assumption tests, the parameter estimation in the empirical model (7) violates the normality and heteroscedasticity assumptions. According to [27], the estimation of panel data regression using the least square dummy variable technique has a high probability of violating the normality because this method is able to capture individual heterogeneity. Furthermore, another possible violation is the multicollinearity; therefore, the classical test for FEM is limited to the autocorrelation and the heteroscedasticity assumptions. The violation of the heteroscedasticity is also suspected to be due to the LSDV's ability to capture individual heterogeneity, therefore $u_{i,t}$ is heterogeneous. This condition triggers the parameter estimation to violate BLUE, thereby making it biased and inconsistent. With respect to the violation of the normality and heteroscedasticity assumption, parameter estimation was carried out using the least square dummy variable—robust standard error (LSDV-RSE) technique. In addition, FEM was used to produce a consistent and unbiased parameter estimate and also fulfilled the BLUE requirements [26,27,47]. Therefore, it was concluded that REM and FEM with LSDV-RSE technique are feasible for the empirical models (6) and (7), respectively.

The parameter significance test was carried out with the goodness of fit test based on Table 7. Analysis of the determination coefficient selected for the empirical models (6) and (7) obtained the R^2 value of 75.5% and 16.1%, respectively. The simultaneous tests on the empirical model (6) obtained a *p*-value of Wald $\chi^2 = 0.0000 \leq 5\%$, while (7) realized a *p*-value of $F = 0.0000 \leq 5\%$. It was concluded that at least 1 predictor significantly affected the response variable. The partial test with *T*-tests were jointly carried out with theoretical hypothesis testing with decision-making criteria, namely significant parameters at the 1%, 5%, and 10% levels, as well as the suitability on the direction of the appropriate effect.

Table 7. Parameter Estimation of Static Panel Data Regression.

Proxy	Empirical Model (6) Using REM			Empirical Model (7) Using FEM with LSDV-RSE			
	PLS	FEM	REM	PLS	FEM	REM	FEM: LSDV-RSE
α	−451.143 ** (202.460)	289.864 (679.079)	236.773 (288.514)	413.443 ** (200.934)	275.233 (676.605)	213.130 (286.757)	275.233 (276.177)
$GDP_{i,t}$	−768.109 ** (416.375)	−696.402 ** (397.682)	−525.773 * (327.436)	———	———	———	———
$D_{i,t}$	———	———	———	55.115 ** (29.574)	51.760 ** (28.595)	37.898 * (23.266)	51.760 *** (18.446)
$EPS_{i,t}$	0.460 *** (0.025)	0.319 *** (0.034)	0.371 *** (0.030)	0.460 *** (0.025)	0.319 *** (0.034)	0.371 *** (0.030)	0.319 *** (0.035)
$PYD_{i,t}$	8.84×10^{-6} *** (3.64×10^{-6})	1.07×10^{-5} ** (4.67×10^{-6})	9.69×10^{-6} ** (4.22×10^{-6})	8.84×10^{-6} *** (3.64×10^{-6})	1.07×10^{-5} ** (4.66×10^{-6})	9.69×10^{-6} ** (4.22×10^{-6})	1.07×10^{-5} ** (5.17×10^{-6})
$MBR_{i,t}$	4.437 *** (1.060)	−1.472 (3.272)	3.925 ** (1.738)	4.436 *** (1.059)	−1.470 (3.269)	3.922 ** (1.739)	−1.470 *** (0.466)
$DER_{i,t}$	−4.885 (5.017)	−19.337 ** (9.523)	−13.150 ** (6.991)	−4.863 (5.016)	−19.472 ** (9.517)	−13.113 ** (6.990)	−19.472 ** (8.949)
$LNTA_{i,t}$	−25.487 ** (12.335)	18.916 (52.331)	−10.953 (17.230)	−25.546 ** (12.333)	18.941 (52.279)	−11.133 (17.240)	18.941 (32.220)
$AGE_{i,t}$	0.052 (0.348)	−9.039 (7.356)	0.051 (0.676)	0.051 (0.348)	−9.403 (7.394)	0.050 (0.677)	−9.403 (6.931)
R^2	0.766	0.169	0.755	0.766	0.161	0.755	0.161
F-statistics (*p*-value)	74.73 (0.0000)	6.84 (0.0000)	———	74.77 (0.0000)	6.86 (0.0000)	———	26.23 (0.0000)
Wald χ^2 (*p*-value)	———	———	205.76 (0.0000)	———	———	205.81 (0.0000)	———
Number of Observation	168	168	168	168	168	168	168
Number of Group	———	24	24	———	24	24	24

Note: The number in brackets is the standard error. By using a one-tailed statistics approach, (***) is significant at the 1% level, (**) is significant at the 5% level, and (*) is significant at the 10% level.

It was suspected that the parameter estimation in the static panel data regression is biased and inconsistent because an endogeneity of $u_{i,t}$ on $PYD_{i,t}$ contains elements of endogenous variables. This means a robustness test was carried out on dynamic panel data regression using 2 approaches, namely FD-GMM and SYS-GMM, with a two-step estimator, which is consistent, unbiased, and efficient. The model specification test conducted on the dynamic panel data regression using the Sargan, and Arellano-Bond tests are shown in Table 8. The instrument validity test with the Sargan test were used to obtain a p-value of $\chi^2 > 5\%$ for (8) and $\chi^2 > 5\%$ for (9) on the empirical model of the FD-GMM and SYS-GMM. It was concluded that the Sargan test results of the 2 empirical models, were not violated with overidentifying restrictions concerning the valid model estimation or $Y_{i,t-1}$ does not correlate with $u_{i,t}$. The consistency analysis carried out with the Arellano-Bond test obtained a p-value Z order-2 $>$ 5% for FD-GMM and SYS-GMM and for empirical models (8) and (9). It was concluded that the consistency test results of the 2 empirical models are not violated, therefore is no serial correlation among $\Delta v_{i,t}$ and $\Delta v_{i,(t-2)}$, and the estimated parameters are consistent.

Table 8. Sargan and Arellano-Bond tests for Dynamic Panel Data Model.

Parameter Estimation Method	Empirical Model (8)			Empirical Model (9)		
	Sargan Test	Arellano-Bond Test		Sargan Test	Arellano-Bond Test	
		Order-1	Order-2		Order-1	Order-2
	χ^2	z	z	χ^2	z	z
FD-GMM	13.370	0.783	−1.446	13.476	0.784	−1.445
SYS-GMM	18.916	−1.214	−0.101	18.891	−1.216	−0.132

Note: (**) significant at 5% level.

The unbiased test results are shown in Table 9. Relating to the empirical model (8), the unbiased test carried out on FD-GMM realized δFD-GMM < δLSDV-RSE < δOLS-RSE, therefore, the parameter estimation is downwardly biased. For SYS-GMM, the results obtained are δLSDV-RSE < δSYS-GMM < δOLS-RSE, it was concluded that the parameter estimation is unbiased. For the empirical model (9), the unbiased test carried out on FD-GMM obtained the following results δFD-GMM < δLSDV-RSE < δOLS-RSE, therefore, the parameter estimation is downwardly biased. The results δLSDV-RSE < δSYS-GMM < δOLS-RSE for SYS-GMM, concluded that the parameter estimation is unbiased. The overall model specification test performed with instrument validity, consistency, and unbiased tests concluded that the feasible parameter estimation is SYS-GMM for the empirical models (8) and (9).

The parameter significance test carried out on the dynamic panel data regression analysis is shown in Table 9. The simultaneous analysis was carried out with the Wald test. Moreover, for the empirical model (8) on the SYS-GMM, the Wald p-value obtained is $\chi^2 \leq 5\%$. It was concluded that at least 1 predictor significantly affects the response variable. For the empirical model (9) on the SYS-GMM, the Wald p-value obtained is $\chi^2 \leq 5\%$ and it was concluded that at least 1 predictor has a significant effect on the response variable. The partial test with Z-test were carried out by considering a certain significance level and the suitability of its effect based on the developed hypothesis.

Table 9. Parameter Estimations of Dynamic Panel Data Regression, and their Unbiased Tests: Parameter Estimation of Least Dummy Variable-Robust Standard Error and Ordinary Least Square-Robust Standard Error.

Proxy	Empirical Model (8) Using SYS-GMM				Empirical Model (9) Using SYS-GMM			
	LSDV-RSE	FD-GMM	SYS-GMM	OLS-RSE	LSDV-RSE	FD-GMM	SYS-GMM	OLS-RSE
$\alpha_{i,t}$	−31.002 (484.738)	−38.719 (242.610)	13.376 (79.139)	15.495 (79.791)	−37.740 (485.775)	−59.751 (246.071)	20.275 (85.081)	−7.644 (79.602)
$GDP_{i,t}$	−667.698 ** (350.874)	−497.137 *** (32.285)	−99.436 *** (53.729)	−475.229 * (341.235)	—	—	—	—
$D_{i,t}$	—	—	—	—	49.260 ** (25.892)	36.750 *** (2.206)	41.677 *** (4.580)	34.911 * (24.295)
$EPS_{i,t}$	0.313 *** (0.038)	0.348 *** (0.003)	0.296 *** (0.003)	0.279 *** (0.054)	0.313 *** (0.038)	0.348 *** (0.003)	0.277 *** (0.002)	0.279 *** (0.055)
$DPS_{i,t-1}$	−0.119 * (0.147)	−0.299 *** (0.006)	−0.023 *** (0.003)	0.360 ** (0.156)	−0.118 (0.148)	−0.299 *** (0.006)	−0.009 *** (0.003)	0.361 ** (0.156)
$MBR_{i,t}$	−0.434 (0.854)	−4.540 *** (0.229)	2.575 *** (0.063)	2.943 * (2.169)	−0.430 (0.856)	−4.540 *** (0.233)	2.526 *** (0.135)	2.492 * (2.169)
$DER_{i,t}$	−40.124 (31.399)	−28.244 *** (6.944)	−67.187 *** (3.288)	−4.354 ** (2.157)	−40.179 (31.464)	−28.161 *** (7.072)	−60.323 *** (6.588)	−4.342 ** (2.152)
$LNTA_{i,t}$	18.166 (57.450)	12.008 (14.494)	21.456 *** (4.578)	0.615 (4.836)	17.913 (57.432)	12.914 (14.672)	27.535 *** (4.902)	0.557 (4.830)
$AGE_{i,t}$	−1.620 (11.639)	−0.360 (1.148)	−4.881 *** (0.315)	−0.123 (0.152)	−37.740 (11.850)	−0.693 (1.164)	−5.604 *** (0.396)	−0.123 (0.152)
Number of obs.	144	120	144	144	144	120	144	144
Number of groups	24	24	24	—	24	24	24	—
Number of instruments	—	22	27	—	—	22	27	—
Wald χ^2 (p-value)	—	681,039.41 (0.0000)	724,916.32 (0.0000)	—	—	736,912.31 (0.0000)	708,557.76 (0.0000)	—
R^2	0.346	—	—	0.809	0.323	—	—	0.810
F-statistics (p-value)	54.24 (0.0000)	—	—	106.97 (0.0000)	55.18 (0.0000)	—	—	106.92 (0.0000)

Note: the numbers in brackets are standard errors or robust standard errors. By using a one-tailed statistics approach, (***) is significant at the 1% level, (**) is significant at the 5% level, and (*) is significant at the 10% level.

6. Discussion

The crisis caused by the COVID-19 pandemic, as proxied by the $GDP_{i,t}$, does not have a positive effect on dividend policy because all feasible parameter estimations did not prove it, therefore, H_1 was rejected. Meanwhile, $GDP_{i,t}$ has a negative effect on dividend policy, which was robustly proven by the empirical models (6), (7), (8), and (9). Similar results were even obtained when compared with all the infeasible parameter estimations. This is not in line with [11,13,14,19,33]. The crisis caused by the COVID-19 pandemic as proxied by $D_{i,t}$ does not have a negative effect on dividend policy because all of the feasible parameter estimations did not prove it, therefore, H_2 was rejected. Meanwhile, $D_{i,t}$ has a positive effect on dividend policy, which was robustly proven by the empirical models (6), (7), (8), and (9), and even when compared with all of the infeasible parameters estimations. The test results of these 2 proxies have been shown to be consistent, and this is evidenced by the bivariate Pearson correlation in Table 4. GDP and D have a $r_p$value $= -0.999$, implying an almost perfect correlation between the 2 proxies, and they exhibit a robust behavior in measuring this variable. This is in line with [9], noting that due to the pandemic, the company continues to distribute dividends and even increases it, thereby leading to the suspicion that the firm's dividend policy gives a positive signal respective of the sluggish trading in the capital market during crisis [3,9,15]. This analysis was corroborated by the fact that most of the companies indexed by SRI-KEHATI increased their dividend rate in 2020 compared to 2019. Therefore, a market reaction test was carried out concerning the rate announced in 2020.

The market reaction test was carried out with an event study, which led to the analysis of the dividend announced in 2020 [57,58]. This analyzed the possibility of abnormal returns (AR) and the cumulative (CAR) within the range of T − 5 to T + 5 dividend announcements. The test object was carried out on 21 SRI-KEHATI indexed issuers that distributed dividends in 2020 and obtained 27 observation objects because the company's dividend policy was distributed one and two times in 2020. This was performed with 2 expected return approaches, such as the IDX and the SRI-KEHATI index composites. The actual return employed the share price of each issuer tested. The statistical instrument employed was a one-sample *t*-test for daily objects normally distributed in accordance with $\alpha = 5\%$. The normality test of data per object obtained daily was carried out using the Kolmogorov-Smirnov test. Therefore, to test the significance of abnormal returns, the following hypotheses were developed:

Hypothesis 10 (H10). *There is an Abnormal Return around the Dividend Distribution announcement for the IDX Composite approach.*

Hypothesis 11 (H11). *There is an Abnormal Return around the Dividend Distribution announcement for the SRI-KEHATI Index Composite approach.*

Based on Table 10, the significance test of abnormal return with the IDX composite approach proved that there is a significant abnormal return around the dividend announcement, namely at T − 4. Based on Table 11, the significance test of abnormal return with the SRI-KEHATI index composite approach, proved that there is a significant abnormal return around the dividend announcement, namely at T − 4. Furthermore, the significance of cumulative abnormal return was tested with 2 expected return approaches, and this led to the following hypothesis:

Table 10. Normality Distribution and Significance Tests of Abnormal Return with the IDX Composite Approach.

Period	AAR	Kolmogorov-Smirnov Test	Data Distribution	df.	One-Sample *T*-Test		Decision
		Exact-Sig			T-Stat	*p*-Value	
T − 5	0.0001	0.670	Normal	26	0.034	0.973	Rejecting H_{10}
T − 4	0.0088	0.809	Normal	26	2.185	0.038	Accepting H_{10}
T − 3	0.0003	0.644	Normal	26	0.064	0.950	Rejecting H_{10}
T − 2	0.0042	0.561	Normal	26	1.164	0.255	Rejecting H_{10}
T − 1	−0.0018	0.422	Normal	26	−0.405	0.689	Rejecting H_{10}
T	−0.0026	0.445	Normal	26	−0.497	0.623	Rejecting H_{10}
T + 1	0.0058	0.238	Normal	26	1.681	0.105	Rejecting H_{10}
T + 2	−0.0018	0.559	Normal	26	−0.426	0.673	Rejecting H_{10}
T + 3	−0.0033	0.996	Normal	26	−0.979	0.337	Rejecting H_{10}
T + 4	0.0046	0.217	Normal	26	0.769	0.449	Rejecting H_{10}
T + 5	−0.0025	0.740	Normal	26	−0.916	0.368	Rejecting H_{10}

Table 11. Normality Distribution and Significance Tests of Abnormal Return with the SRI-KEHATI Index Composite approach.

Period	AAR	Kolmogorov-Smirnov Test	Data Distribution	df.	One-Sample *T*-Test		Decision
		Exact-Sig.			T-Stat	*p*-Value	
T − 5	−0.0008	0.718	Normal	26	−0.183	0.856	Rejecting H_{11}
T − 4	0.0094	0.399	Normal	26	2.491	0.019	Accepting H_{11}
T − 3	−0.0016	0.968	Normal	26	−0.410	0.686	Rejecting H_{11}
T − 2	0.0049	0.256	Normal	26	1.318	0.199	Rejecting H_{11}
T − 1	−0.0014	0.365	Normal	26	−0.332	0.743	Rejecting H_{11}
T	−0.0020	0.272	Normal	26	−0.403	0.690	Rejecting H_{11}
T + 1	0.0069	0.253	Normal	26	2.047	0.051	Rejecting H_{11}
T + 2	−0.0010	0.787	Normal	26	−0.255	0.801	Rejecting H_{11}
T + 3	−0.0040	0.929	Normal	26	−1.070	0.295	Rejecting H_{11}
T + 4	0.0051	0.082	Normal	26	0.847	0.405	Rejecting H_{11}
T + 5	−0.0009	0.801	Normal	26	−0.355	0.725	Rejecting H_{11}

Hypothesis 12 (H12). *There is a Cumulative Abnormal Return around the Dividend Distribution announcement for the IDX Composite approach.*

Hypothesis 13 (H13). *There is a Cumulative Abnormal Return around the Dividend Distribution announcement for the SRI-KEHATI Index Composite approach.*

Based on Table 12, the significance test of cumulative abnormal return with the IDX composite approach proved that there is an insignificant cumulative abnormal return around the dividend announcement. Furthermore, in accordance with Table 13, the significance test of cumulative abnormal return with the SRI-KEHATI index composite approach, showed that there is also an insignificant cumulative abnormal return around the dividend announcement. The CAAR value for the IDX and SRI-KEHATI index composite approaches does not even experience a significant change in a positive direction. Based on the significance test results of abnormal return and the cumulative, it was concluded that the dividend distribution announcement of SRI-KEHATI indexed companies was unsuccessful in spurring trading activities in the capital market. This is in line with [58], which examined the market reaction to dividend announcements on companies in Indonesia indexed LQ45. Ref. [9] research on 212 companies reported positive reaction concerning the dividend of these companies. This difference explains that the stock market, which is specifically for SRI-KEHATI indexed issuers, is implied to be in a pessimistic condition. Irrespective of the fact that the majority of these companies increase their dividends and maintain the same level of distribution, these efforts have not succeeded in boosting their sluggish abilities of trading in the capital market [58].

Table 12. Normality Distribution and Significance Tests of Cumulative Abnormal Return with the IDX Composite approach.

Period	CAAR	Kolmogorov-Smirnov Test	Data Distribution	df.	One-Sample *T*-Test		Decision
		Exact-Sig			T-Stat	*p*-Value	
T − 5	−0.0008	0.718	Normal	26	−0.183	0.856	Rejecting H_{12}
T − 4	0.0087	0.246	Normal	26	1.533	0.137	Rejecting H_{12}
T − 3	0.0070	0.937	Normal	26	1.071	0.294	Rejecting H_{12}
T − 2	0.0119	0.815	Normal	26	1.489	0.148	Rejecting H_{12}
T − 1	0.0105	0.971	Normal	26	1.084	0.288	Rejecting H_{12}
T	0.0085	0.711	Normal	26	0.710	0.484	Rejecting H_{12}
T + 1	0.0154	0.620	Normal	26	1.189	0.245	Rejecting H_{12}
T + 2	0.0144	0.567	Normal	26	1.014	0.320	Rejecting H_{12}
T + 3	0.0104	0.508	Normal	26	0.746	0.462	Rejecting H_{12}
T + 4	0.0155	0.448	Normal	26	1.096	0.283	Rejecting H_{12}
T + 5	0.0146	0.782	Normal	26	1.077	0.291	Rejecting H_{12}

Table 13. Normality Distribution and Significance Tests of Cumulative Abnormal Return with the SRI-KEHATI Index Composite approach.

Period	CAAR	Kolmogorov-Smirnov Test	Data Distribution	df.	One-Sample *T*-Test		Decision
		Exact-Sig.			T-Stat	*p*-Value	
T − 5	0.0001	0.670	Normal	26	0.034	0.973	Rejecting H_{13}
T − 4	0.0089	0.259	Normal	26	1.435	0.163	Rejecting H_{13}
T − 3	0.0092	0.975	Normal	26	1.296	0.206	Rejecting H_{13}
T − 2	0.0134	0.659	Normal	26	1.546	0.134	Rejecting H_{13}
T − 1	−0.0021	0.460	Normal	26	−0.480	0.635	Rejecting H_{13}
T	0.0090	0.403	Normal	26	0.685	0.500	Rejecting H_{13}
T + 1	0.0148	0.375	Normal	26	1.061	0.299	Rejecting H_{13}
T + 2	0.0130	0.489	Normal	26	0.836	0.411	Rejecting H_{13}
T + 3	0.0097	0.313	Normal	26	0.632	0.533	Rejecting H_{13}
T + 4	0.0143	0.449	Normal	26	0.868	0.394	Rejecting H_{13}
T + 5	0.0119	0.516	Normal	26	0.720	0.478	Rejecting H_{13}

Profitability proxied by $EPS_{i,t}$ has been proven to have a significant positive effect on all of the feasible parameter estimations; therefore, H_3 is accepted. A similar condition is exhibited by comparing it with the infeasible parameter estimation, however, this proves that profitability is the strongest predictor of dividend policy, and it is also a postulate. These results are in line with [9,20,21,34–37]. This indicates the higher the company's level of profitability, the greater the dividend distribution. This condition shows that SRI-KEHATI indexed firms have a good reputation and are able to make huge profits that tend to be stable as well as positively distribute dividends even in crisis conditions [3,9,15,20].

The previous year's dividend proxied by $PYD_{i,t}$ has been proven to have a positive effect on REM and FEM-LSDV-RSE, therefore, H_4 is accepted. Meanwhile, that proxied by $DPS_{i,t-1}$ has a negative effect on dividend policy, and H5 is rejected. The difference is based on the fact that static data regression describes the actual previous year's dividend while the dynamic type tests the endogenous variable lagged-1. It was suspected that the correlation of $u_{i,t}$ with $PYD_{i,t}$, would have some problems. However, it is necessary to compare the estimation of the empirical model (7) with LSDV-RSE as shown in Table 7 which uses $PYD_{i,t}$, and the empirical model (9) with LSDV-RSE in Table 9 which uses $DPS_{i,t-1}$. The empirical models (7) and (9) has a significant (+) slope coefficient, and insignificant parameters, respectively. The comparison of the 2 shows that (7) has better suitability or effect and predictor significance than (9). Therefore, it is strongly suspected that in the empirical model 9, $u_{i,t}$ correlates with $DPS_{i,t-1}$, resulting in a biased and inconsistent parameter estimation. The empirical model (7) is strongly suspected to be consistent and unbiased because it uses a $PYD_{i,t}$ proxy which is different from $DPS_{i,t-1}$, and the parameter estimation is BLUE [9]. It was concluded that the previous year's dividend has a positive effect on its policy, which is robustly proven by empirical models (6) and (7), even when compared with the infeasible parameter estimations in static panel data regression. These results are in line with [9,34,41,59]. This proves the relevance of the dividend signaling theory that the company issues a positive signal to the market based on its performance. This is in accordance with the H_1 and H_2 tests that the firm maintains the dividend level.

Investment opportunity proxied by $MBR_{i,t}$ in the empirical models (6), (8), and (9) has been proven to have a positive effect on dividend policy, while (7) has a negative effect. This led to the conclusion that there is a positive effect on dividend policy because the results are consistent with the empirical models (8) and (9). The parameter estimation is more robust than (7), and the results are also strengthened by (6) [9], therefore, H_6 is rejected. These are in line with [21,23,59]. This describes the condition that companies with high investment opportunities have absolute access to capital and are not dependent on internal funds; besides, they are able to expand more profitable businesses. The result contradicts [9], that investment opportunity has no effect on dividend policy, with the justification that SRI-KEHATI indexed issuers specifically exhibit different behavior.

Financial leverage proxied by $DER_{i,t}$ has been proven to have a robust negative effect on dividend policy as evidenced by all feasible parameter estimations, therefore, H_7 is accepted. These results are in line with [22,24,37]. This condition explains that the higher the interest on the debt to cash flow charged the company, tends to suppress the dividend rate. The crisis condition due to the COVID-19 pandemic shows the firm's low debt presumed, thereby making it possible to distribute dividends positively [3,15,24]. This contradicts [9], that the SRI-KEHATI indexed issuers exhibit different behaviors.

Firm size proxied by $LNTA_{i,t}$ has a positive effect on dividend policy which is proven by empirical models (8) and (9), therefore, H_8 is accepted. These results are in line with [21,34,37]. This indicates the larger the firm size, the less vulnerable it is to business risks and the more the profitability. This permits the company to positively distribute dividends despite the crisis conditions caused by the pandemic. It was reported that there is a positive and significant correlation between $LNTA_{i,t}$ and $EPS_{i,t}$, and it further explains the predictor's behavior towards dividend policy. This result is in contrast to [9], which explains the different behaviors exhibited by SRI-KEHATI indexed issuers.

Firm age proxied by $AGE_{i,t}$ does not have a positive effect on dividend policy, therefore, H_9 is rejected. However, firm age has a negative effect on dividend policy, and this was proven by empirical models (8) and (9). This is in line with [60,61]. Based on the perspective of life cycle theory, when the company is either in the growth or declining phase, it makes business innovations to maintain its conditions. Under these circumstances, it has a high investment opportunity, thereby having a negative effect on dividend policy [60–62]. This contradicts [9], that SRI-KEHATI indexed issuers exhibits different behaviors. Meanwhile, the discrepancy in the results of effect direction is due to the fact that firm age has an indirect effect on dividend policy, where age has moderating effect to causality effect of investment opportunity on dividend policy [62,63].

Statistically, all of the feasible parameter estimates are consistent and unbiased. Moreover, the dynamic panel data model with instrumental variable parameter estimation can produce more efficient parameter estimates [47]. The endogeneity problem of the static panel data model for the alleged correlation among $u_{i,t}$ and $PYD_{i,t}$ was not proven in the comparison of empirical models (7) and (9) on LSDV-RSE. The endogeneity problems in the dynamic panel data model did not occur because $DPS_{i,t-1}$ as $Y_{i,t-1}$ is an instrumental variable which is proven in the Sargan test that there is no correlation to $u_{i,t}$, so that the instrumental variable parameter estimations are valid. The problem of endogeneity among other predictors was also solved with a dynamic panel data model, in line with the research conducted by [9,55,56]. As reported by [55,64], the generalized method of moments (GMM) produces parameter estimates with the highest curative effect on endogeneity problems. GMM is the parameter estimation method that produces the best coefficient direction and its significance among other methods; compared to the ordinary least squares, even the 2-step least-square (2SLS) and the 3-step least-square (3SLS), which have to detect endogeneity problems, use the Durbin-Wu-Hausman test [48]. In the empirical results, the coefficients of influence and their significances among the static and dynamic panel data models also have no significant differences, so the parameter estimation of static panel data that fulfills the BLUE requirements can produce sufficient parameters compared to the dynamic panel data model as the best parameter estimation method in the context of panel data regression.

7. Conclusions

This research led to the proposition of various hypotheses during the pandemic, including the diverse behaviors exhibited by the SRI-KEHATI indexed companies that tend to distribute dividends in a robust and positive manner, thereby issuing a positive signal to the market. Irrespective of this, the market reaction test shows that these positive signals are negatively responded to due to pessimistic capital market conditions in their trading activities. The robustness analysis carried out by testing predictors is a postulate in order to form a complex empirical model. It shows that profitability has a robust and positive effect on dividend policy. The previous year and firm size had a positive effect on dividend policy, while financial leverage has a robust negative impact. The predictor test is not in accordance with the hypothesis that investment opportunity has a positive effect on dividend policy, while firm age has a negative impact. These explain the relevant conditions for dividend signaling theory, compared to that of pecking order. [9], research showed the different behaviors of investment opportunity, financial leverage, and firm age predictors, including those exhibited by the SRI-KEHATI indexed companies compared to other establishments in general.

Statistically, the feasible parameter estimations on each variable are consistent and unbiased as proven by the model specification test. This condition also shows the suitability of the slope and its significance. The bias discovered in static panel data regression is due to the hypothesis that $u_{i,t}$ correlates with $PYD_{i,t}$, although this has been proven not to occur because the $PYD_{i,t}$ proxy is different from $DPS_{i,t-1}$ [9]. Therefore, we suggest that future research should study these problems mathematically to examine the problem of biased and inconsistency among static and dynamic panel data model. The problem of endogeneity in static panel data regression was solved by employing the dynamic type, thereby producing parameters that match the effect direction and its significance. It has also been proven to have a stronger and more robust statistical power than the static panel data regression, thereby forming parameter estimations that are more consistent, and efficient as well as less biased [26,27,47,55].

This research, which is expected to aid practitioners, and academics, needs further analysis. Investors need to pay attention to the dividend policy determinants as well as test the market reaction in order to obtain optimal returns during crisis conditions, specifically on green index firms in Indonesia. Company management needs to consider this research to formulate an optimal dividend policy during such circumstances. These establishments need to consider relevant corporate actions or other managerial policies to give a positive signal to a pessimistic market, thereby lifting the sluggish trading activity in the capital market, specifically the green index ones in the country.

This research only examines dividend policy on SRI-KEHATI indexed issuers during the COVID-19 pandemic which emerged in 2020. Moreover, further analyses needs to be developed to examine the effects of pre-, during-, and post-crisis conditions [11,13]. The Indonesian economy experienced positive growth in 2021, as proxied by the GDP Annual Growth Rate of 3.69%. This condition needs to be further analyzed in post-crisis economic situations, specifically for green index companies, including market reactions to dividend announcements. Furthermore, the predictors of investment opportunity and firm age are suspected to have a common thread, thereby, having a different effect direction from the proposed hypothesis. Therefore, there is need to carry out another research by examining the moderating effect of firm age on investment opportunity and dividend policy [63].

This research has not examined the aspects of the study in the context of the "survival aspect." In addition to companies increasing retained earnings in the encounter of uncertain conditions in business and economic activities, many companies also carry out alternative survival strategies by business innovation and restructure which require high costs. The decrease in the dividend rate can also be caused by a decrease in profit and reallocation of resources. As reported [65], companies in Japan carry out green investment policies to support positive and sustainable environmental policies, even against catastrophic events. This can also be applied by green index companies in Indonesia, specifically in the event of the COVID-19 pandemic. These aspects can be studied for future research to form a more comprehensive empirical model.

An optimal dividend policy is believed to increase firm value [17]. This indicates the higher the value of an SRI-KEHATI indexed company that implements positive policies on the sustainability of the environment, the greater its capability in terms of contributing to the creation of a sustainable business climate with responsible social and environmental aspects. Green index companies that refer to the principles of Sustainable and Responsible Investment, as well as Environmental, Social, and Good Corporate Governance are believed to be able to contribute positively to the COVID-19 pandemic which has an impact on the global community, specifically in Indonesia. An optimal dividend policy on investment in the capital market can also trigger stock investment and trading so that the country's economy grows and develops, specifically in Indonesian economy [9,21,66].

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