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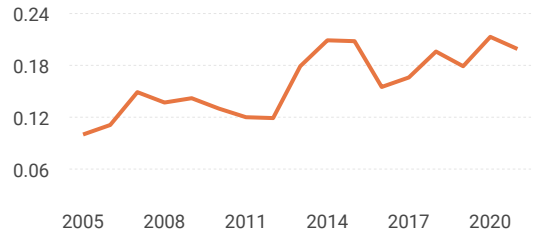

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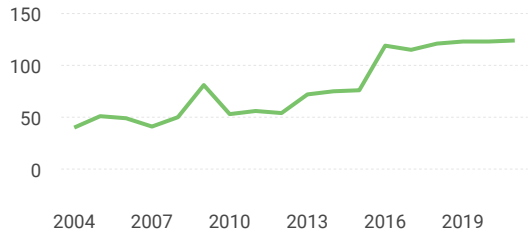

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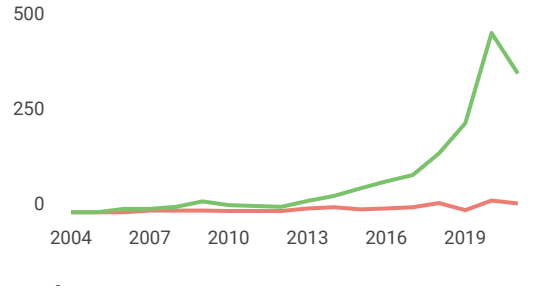

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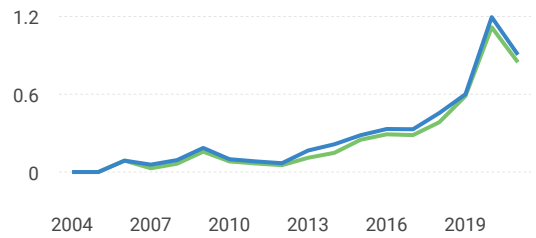

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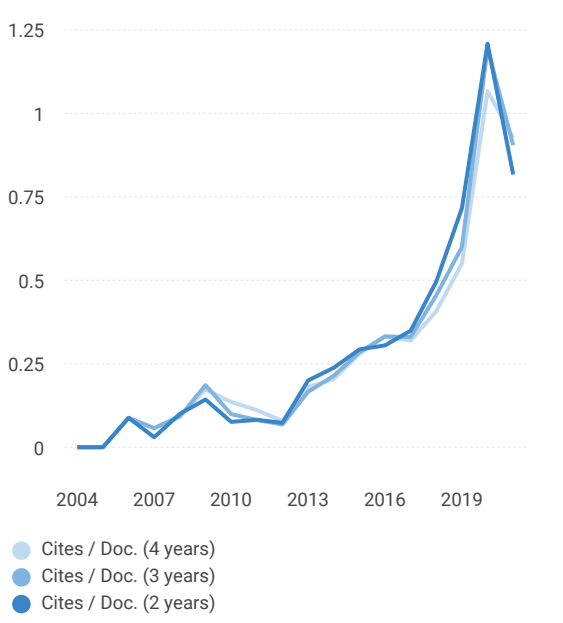

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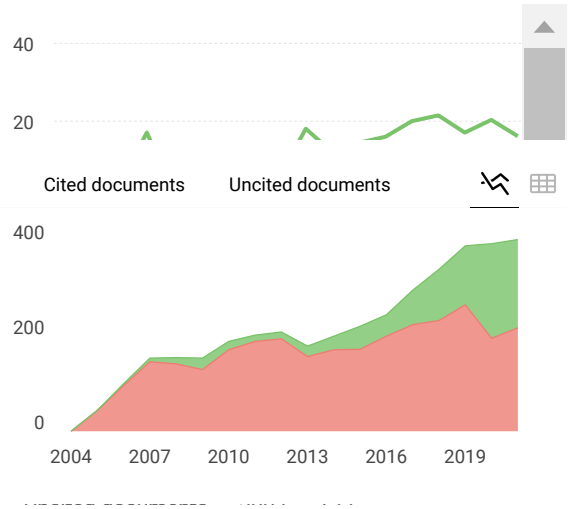

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MARKET RESPONSE AND FUTURE PERFORMANCE OF INEFFICIENT INVESTMENT: OVER-INVESTMENT OR UNDER-INVESTMENT

Abstract

There have been many studies on the market response to investment spending, but only a few have examined the market response to the issue of over-investment or under-investment. This study examines the effect of the issue on market response and future financial performance. The sample includes large-cap companies listed on the Indonesia Stock Exchange (IDX) for 2016–2021. Samples must have at least 120 active trading days for each year. Two hundred and thirty-two observations meet the qualifications. This study adopts the investment inefficiency model developed by previous studies to measure over-investment or under-investment. Residual inefficient investment models are used as over-investment or under-investment scores, in addition to the dummy of the residual category. Market response is measured by cumulative abnormal returns (CAR), market capitalization (MCAP), and market-to-book value (MTB).

Meanwhile, a firm's performance uses return on assets (ROA) and return on equity (ROE). The results show that the coefficient of the inefficient investment variable, using both the residual value and the dummy variable, shows a negative direction, which means the market responds negatively to over-investment or under-investment. However, the value of t is significant at the <0.01 level on the market response variable as measured by MTB, but not significant for the other two proxies. Thus, hypothesis 1 is supported, although not for all market response proxies. The value of the inefficient investment coefficient also shows a negative direction when testing hypothesis 2 and is significant at the <0.1 level. These results are consistent with future performance variables measured by ROA and ROE.

Keywords inefficient investment, over-investment, under-investment, financial performance, market response, big-cap companies

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INTRODUCTION

Capital expenditure decisions are operational and have a strategic focus for two reasons: first, because of its size, and second, because of its long-term impact (Alkaraan & Northcott, 2006; Kim et al., 2020). In addition, the optimum amount of investment, which is an investment level considering growth opportunities, financial constraints, and the ability to obtain funding if needed, is another crucial factor (Choi et al., 2020). To date, previous studies have focused more on the sources of investment inefficiency, such as the quality of capital expenditure forecasts by analysts and female commissioners in the composition of the board of commissioners, good governance, managerial ability, and business strategy (Choi et al., 2020; Shin et al., 2020; Naeem & Li, 2019; Gan, 2018; Navissi et al., 2017; Goodman et al., 2014).

Paying attention to the optimum level of investment is essential because a company's resources are limited, and the company cannot al-

ways easily fund capital expenditures. On the other hand, managers tend to overinvest to enlarge their business empire, which means achievement for managers but becomes a burden for the company (Chen et al., 2015). Moreover, excessive capital expenditure will cause idle capacity, while too low capital expenditure will eliminate many opportunities for companies to create returns. Therefore, assessing the market response to capital expenditures without assessing the level of efficiency, as many previous studies have done, can produce biased findings (Choi et al., 2020).

This study will examine the market's response to both over-investment and under-investment issues and the impact of inefficient investment on future performance. This study adopts the investment efficiency model to measure over-investment and under-investment (McNichols & Stubben, 2008; Biddle et al., 2009; Goodman et al., 2014; Shroff, 2017; Choi et al., 2020). In addition, this study was applied to large-cap companies listed on the Indonesia Stock Exchange, considering that the market is generally more concerned with the corporate actions of large companies. Thus the big-cap's corporate actions will get more attention from the market than the small-cap actions (Botosan, 1997; Sengupta, 1998). The present study will contribute to the previous results that the quality of information plays a vital role in guiding the market response to information. This study was conducted in Indonesia, a developing country where law enforcement is generally still low and information asymmetry is much higher. Therefore, it provides greater opportunities for management to over or under-invest in particular interests.

1. LITERATURE REVIEW

Capital expenditure activities carried out by management are signals sent by managers to the market to reduce the occurrence of information asymmetry (Karaman et al., 2020). Several previous studies have studied the market response to capital expenditure. One of the phenomenal studies related to capital expenditure and the market response is the research conducted by McConnell and Muscarella (1985). This study uses two sample groups: industrial and public utility companies. It is found that an unexpected increase in capital expenditure results in an increase in stock market prices and vice versa. Trueman (1986) considered the level of investment in a similar study. His research findings show that the level of investment provides perfect information about the firm's actual value.

Woolridge and Snow (1990) conducted a more specific study on the announcement of strategic investment decisions, which include joint ventures, R&D projects, product/market diversification, and capital expenditures. Research findings support that strategic investment decisions increase cumulative abnormal returns – tests per type of strategic decision show congruent results that the market responds positively. Additional capital expenditures affect income for the period, which causes the market to respond positively (Kerstein & Kim, 1995). Changes in capital expenditures that are higher or lower than the industry average provide positive or negative signals, respectively (Lev & Thiagarajan, 1989; Kerstein & Kim, 1995). Chung et al. (1998) added a variable quality of investment opportunities to provide an additional explanation for the results of previous studies, where an increase/decrease in capital expenditures had a positive/negative effect on market response. The results of this study were then followed by Jones et al. (2004) and Brailsford and Yeoh (2004). They found that investment opportunities, growth opportunities, cash flow conditions, and their interactions are essential variables in the relationship between capital expenditure announcements and market response.

Other studies prove the success of companies influencing market valuations through a series of capital expenditure measures (Burton et al., 1999; Vafeas & Shenoy, 2005; Bae et al., 2018; Luo, 2016; Chen, 2006; Bhanna, 2008). However, some studies still show a negative market response to investment spending (Akbar et al., 2008; Qhandari et al., 2016; Chen & Chang, 2020). The optimum amount of investment, which is an investment level considering growth opportunities, financial constraints, and the ability to obtain funding if needed, turned out to be an essential factor (Markopoulou & Papadoupoulos, 2009; Choi et al., 2020). Excessive capital expenditure will cause idle capacity; otherwise, too low capital expenditure will eliminate

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many opportunities for companies to create returns. Overinvestment and under-investment lead to a non-optimal allocation of resources and increase agency costs and risks for investors (Choi et al., 2020). Investors are at high risk when the investment is not optimal because this kind of investment will impact investment returns that are also not optimal.

To date, previous research has focused more on the sources of inefficiency. Choi et al. (2020) found that the higher the quality of the investment analyst, the more efficient the investment. Shin et al. (2020) revealed that the composition of the board of commissioners that involves women in the team is less likely to overinvest than a board without women in its management structure. Intense monitoring prevents management from investing excessively (Naeem & Li, 2019). Gan (2018) and Goodman et al. (2014) find that managerial ability can overcome two sources of inefficiency: over- or under-investment. Companies with a prospector strategy tend to overinvest, and vice versa, those with a defender strategy (Navissi et al., 2017). Attention to the sources of investment efficiency is essential, and previous research has revealed it. However, the ex-post effect of investment inefficiency on market response and long-term performance is urgently addressed for the following reasons. First, in the signaling approach, capital investment is a signal that managers use to show that the company has high-profit prospects in the future. This signal is important in the capital market, characterized by information asymmetry (John & Nachman, 1985; Miller & Rock, 1985; Ambaris et al., 1987). Efficient investment spending can provide a reliable signal of a company's cash flow and provide good potential returns for investors (Kerstein & Kim, 1995).

On the other hand, if a company invests efficiently, the market will catch the red flag of investment risk that the investment does not provide the expected results. First, over-investment or under-investment prevents a company from achieving optimal investment returns. Second, from the agency perspective, management tends to increase investments to improve reputation (Chen et al., 2015) at the principal's expense. Therefore, this study will address the inefficiency of investment to market response, which needs more evidence.

The market response to investment spending represents how much the market believes that the investment will generate future returns (Yen & Lee, 2008). According to the decision usefulness approach, investors are assumed to be rational and risk-averse (Cartney, 2004; Dandago & Hassan, 2013), so when they judge investment inefficiency, investors will respond negatively. Therefore, confirming the market's expectations and whether future financial performance aligns with the market's assessment of inefficient investments is important. Many previous studies examine the efficiency of capital expenditures with financial performance (Bryan, 1997; Jiang et al., 2006; Kumar & Li, 2013). For example, after controlling for current-year corporate earnings, Jiang et al. (2006) found a significant positive relationship between capital expenditures and future corporate earnings. Meanwhile, Kumar and Li (2013) found that capital expenditure positively affects financial performance (five years after investment) in companies with high R&D intensity, and vice versa in companies with low R&D intensity.

Ou (1990) and Abarbanell and Bushee (1997) find a negative relationship between capital expenditures and future earnings. Bar-Yosef et al. (1987) find that investment spending does not provide information on past earnings when predicting future earnings. Burton (2005) examines the effect of capital expenditure on market reactions and finds that investors respond positively to new investments, especially those not part of alliance activities. Turner et al. (2019) tested companies engaged in the hospitality sector. They observed explicitly that capital expenditures in the form of renovations significantly impacted short-term performance because they increased revenue and, on the other hand, reduced maintenance costs. Finally, Farooq et al. (2015) examined over-investment and under-investment and their impact on corporate performance. Using a sample of 360 non-financial companies from 2005 to 2011, it is found that both over-investment and under-investment harm financial performance.

Meanwhile, Trong et al. (2020) specialize in their study on the over-investment aspect only in non-financial companies in Hanoi and find that over-investment harms financial performance. In contrast to previous studies, this one does not merely

examine the effect of inefficient investments on future performance but wants to confirm market expectations of inefficient investments with future financial performance. If market expectations are correct, i.e., the market responds negatively to inefficient investments, this will be in line with the results of testing the effect of these inefficient investments on future performance.

1.1. The hypothesis of the study

This study aims to prove the market response to under or over-investment and the impact of under or over-investment on future financial performance. According to the aim of the study and theoretical framework and previous findings, the hypotheses of this study are:

H1: The market reacts negatively to over-investment or under-investment.

H2: Over-investment or under-investment negatively affect long-term financial performance.

2. METHOD

This study is applied to large-cap companies listed on the Indonesia Stock Exchange. The sample selection criteria, the primary and control variables, the analysis model, and the definition of operational variables are explained in the following sections.

2.1. Sample

The research sample comprised companies listed on the Indonesia Stock Exchange. The sampling period was 2016–2020. The sample is selected based on companies classified as having large capitalization because big-cap companies are more concerned with investors than companies with small capitalization. In addition, the shares of the sample companies must be actively traded and have daily stock data for at least 120 days per year. This study does not exclude sectors; therefore, all sectors are represented in the sample. A total of 230 observations met the sample criteria. Daily stock data and the composite stock price index used to measure market responses were obtained from Yahoo Finance.

2.2. Main variable

The main variables in this study consist of market response, market capitalization, market-to-book, and investment inefficiency. Below is a description of each main variable.

2.2.1. *Market response*

According to the efficient market hypothesis (EMH), all published information is quickly embedded in security prices (Fama, 1970). Stock prices that move up or down around certain published events reflect the market responses. Abnormal returns measure the evidence that the market responds to specific information. The market model is widely used to explain market factors and company-specific factors that affect stock returns (Chung et al., 1998; Perveen et al., 2020) with the following model:

$$R_{jt} = \alpha_j + \beta_j R_{mt} + \varepsilon_{jt}. \quad (1)$$

R_{jt} and R_{mt} were obtained from Yahoo Finance, where the estimation period was –120 to –20 days before the publication date. Therefore, the event period was 20 days before and after publication. Furthermore, abnormal returns (AR) were calculated using the following formula:

$$AR_{jt} = R_{i,j} - (\alpha_j + \beta_j R_{mt}). \quad (2)$$

The cumulative abnormal return for the following window (–20, +20) is obtained by summing the AR during the event window as follows:

$$CAR = \sum_{i=1}^{N} AR_{i,t}. \quad (3)$$

2.2.2. *Market capitalization*

In addition to using abnormal returns as a market response, this study uses market capitalization as a proxy for a market response. Market capitalization is the value of a company based on its current market prices. Market capitalization allows investors to measure companies based on how much the public perceives them to be valued (Reinganum, 1999). The higher the value, the greater the company's market appreciation. A measure of market capitalization can inform the level of risk an investor might expect when investing in a company's stock, as well as how much the investment will return over time. The formula for the market cap is the market price multiplied by the number of outstanding shares

doi

(Marito & Sharif, 2020). This study uses market capitalization on the publication date.

2.2.3. Market-to-book (MTB)

Market-to-book (MTB) is another indicator of market response because MTB reflects the future return on equity (Penman, 1996). Market-to-book (MTB) is the ratio of market to book value of equity at the end of year t (Roychowdhury & Watts, 2007). This study applied market equity at the publication date.

2.2.4. Investment inefficiency

Investment efficiency shows the level of investment that is reasonable. The investment must be proportional to investment opportunities owned by a company (Stulz, 1998; Thomas, 2002; Choi, 2020). Investment efficiency is measured by estimating the extent to which investment deviates from the expected level of investment (Choi, 2020). This study adopts the investment efficiency model used in previous studies (McNichols & Stubben, 2008; Biddle et al., 2009; Goodman et al., 2014; Shroff, 2017; Choi et al., 2020) to measure investment inefficiency, using the following model:

$$\begin{aligned} INVEST_{i,t} &= \beta_0 + \beta_1 \beta TQ_{i,t-1} + \\ &+ \beta_2 \beta CFO_{i,t-1} + \beta_3 ASSETGR_{0i,t-1} + \\ &+ \beta_4 INVEST_{i,t-1} + \varepsilon_{i,t}, \end{aligned} \quad (4)$$

where $INVEST_{i,t}$ is the capital expenditure of company i in year t divided by net PPE at the beginning of year t; $TOBIN'S\ Q_{i,t-1}$ is the market value of equity plus the book value of short-term debt and long-term debt divided by total assets measured at the end of year $t1$; $CFO_{i,t}$ is the cash flow from operations in year t; and $ASSET\_GR_{i,t-1}$ is the percentage change in firm i's assets between years $t2$ and $t1$. The model is estimated for each 2-digit SIC industry with at least 14 observations each year.

The residuals from the estimation model capture the extent to which a firm's investment deviates from the optimal level of investment and are thus used to measure investment inefficiency. In the year of observation, companies with positive residuals were classified as overinvesting companies, and those with negative residuals were classified as underinvesting companies. Companies classified as over-invested are given a score of 1 and an under-investment score of 0. This measurement uses both the residual and residual categories.

2.3. Analysis model

This study tested the hypothesis of market response to investment inefficiency, where the market response was measured using three indicators representing market response: cumulative abnormal (CAR), market capitalization (MCAP), and market to book (MTB), which Models 1a represents to 1c. The next step is to examine the effect of CAPEX on financial performance for two years after the year of capital expenditure when financial performance is measured by ROA and ROE (models 2a and 2b).

Model 1a

$$\begin{aligned} CAR_{i,t+1} &= \beta_0 + \beta_1 INEFF_{i,t} + \\ &+ \beta_2 DUMINEFF_{i,t} + \beta_3 CAPEX_{i,t} + \\ &+ \beta_4 LCAPEX_{i,t} + \beta_5 FSIZE_{i,t} + \\ &+ \beta_6 ASSGRT_{i,t} + \beta_7 DER_{i,t} + \beta_8 FCF_{i,t} + \\ &+ \beta_9 ROA_{i,t} + \beta_{10} SALESIND_{i,t} + \\ &+ \beta_{11} PUBOWN_{i,t} + \beta_{12} INDUST_{i,t} + \varepsilon_{i,t}, \end{aligned} \quad (5)$$

Model 1b

$$\begin{aligned} MCAP_{i,t+1} &= \delta_0 + \delta_1 INEFF_{i,t} + \\ &+ \delta_2 DUMINEFF_{i,t} + \delta_3 CAPEX_{i,t} + \\ &+ \delta_4 LCAPEX_{i,t} + \delta_5 FSIZE_{i,t} + \\ &+ \delta_6 ASSGRT_{i,t} + \delta_7 DER_{i,t} + \delta_8 FCF_{i,t} + \\ &+ \delta_9 ROA_{i,t} + \delta_{10} SALESIND_{i,t} + \\ &+ \delta_{11} PUBOWN_{i,t} + \delta_{12} INDUST_{i,t} + \varepsilon_{i,t}, \end{aligned} \quad (6)$$

Model 1c

$$\begin{aligned} MTB_{i,t+1} &= \theta_0 + \theta_1 INEFF_{i,t} + \\ &+ \theta_2 DUMINEFF_{i,t} + \theta_3 CAPEX_{i,t} + \\ &+ \lambda_4 LCAPEX_{i,t} + \lambda_5 FSIZE_{i,t} + \\ &\lambda_6 ASSGRT_{i,t} + \lambda_7 DER_{i,t} + \lambda_8 FCF_{i,t} + \\ &+ \lambda_9 ROA_{i,t} + \lambda_{10} SALESIND_{i,t} + \\ &+ \lambda_{11} PUBOWN_{i,t} + \lambda_{12} INDUST_{i,t} + \varepsilon_{i,t}, \end{aligned} \quad (7)$$

Model 2a

$$ROA_{i,t+2} = \lambda_0 + \lambda_1 INEFF_{i,t} + \\ + \lambda_2 DUMINEFF_{i,t} + \lambda_3 CAPEX_{i,t} + \\ + \lambda_4 LCAPEX_{i,t} + \lambda_5 FSIZE_{i,t} + \\ + \lambda_6 ASSGRT_{i,t} + \lambda_7 DER_{i,t} + \lambda_8 FCF_{i,t} + \\ + \lambda_9 ROA_{i,t} + \lambda_{10} SALESIND_{i,t} + \\ + \lambda_{11} PUBOWN_{i,t} + \lambda_{12} INDUST_{i,t} + \varepsilon_{i,t}, \quad (8)$$

Model 2b

$$ROE_{i,t+2} = \phi_0 + \phi_1 INEFF_{i,t} + \\ + \phi_2 DUMINEFF_{i,t} + \phi_3 CAPEX_{i,t} + \\ + \phi_4 LCAPEX_{i,t} + \phi_5 FSIZE_{i,t} + \\ + \phi_6 ASSGRT_{i,t} + \phi_7 DER_{i,t} + \phi_8 FCF_{i,t} + \\ + \phi_9 ROE_{i,t} + \phi_{10} SALESIND_{i,t} + \\ + \phi_{11} PUBOWN_{i,t} + \phi_{12} INDUST_{i,t} + \varepsilon_{i,t}. \quad (9)$$

The main independent variable is capital expenditure inefficiency (INEFF), which is the residual of the investment efficiency model, as explained in the investment efficiency in the previous section. DUMINEFF is a categorization of residuals into over-investment and under-investment. In addition, the analytical model includes CAPEX and LCAPEX, which are capital expenditures for the year of observation and before the year of observation as control variables, and several other control variables related to the company- and industry-specific characteristics. Company-specific characteristics include firm size (FSIZE), leverage (DER), asset growth (ASSGRT), free cash flow (FCF), return on equity (ROE), return on assets (ROA), and public ownership (PUBOWN). Industry-specific companies include the company's sales to the sales sector (SALESIND) and industrial sector (INDUST). The complete definition of research variables is shown in Table 1.

Table 1. Variable definition

Main variables	Measurement
INEFF	The inefficiency score was obtained from the residual efficiency investment model. This measurement is adopted from the investment efficiency model used by previous research (McNichols & Stubben, 2008; Biddle et al., 2009; Goodman et al., 2014; Shroff, 2017; Choi et al., 2020)
DUMINEFF	Dummy variables for over-invest and under-invest. Over-invest if the residual is positive, and vice versa; if the residual is negative, it is categorized as under-invest. Over-invest is given a score of 1 and 0 for under-invest
Control Variables	
CAPEX	Capital expenditures for the current year are scaled by the total assets of the previous year
LCAPEX	CAPEX for the previous period
DER	Long-term liabilities divided by equity (Stulz, 1990)
FCF	Is cash flow in excess of what is needed to fund investments (Jensen, 1986). Free cash flow manifests agency problems because excess cash cannot be returned to shareholders (Brailsford & Yeoh, 2004). Free Cash flow is calculated using the approach of Lang et al. (1991) and as follows: FCF= EBIT+ DEPR-TAX-DIV-INT-INV EBIT is earning before interest and tax; DPR is depreciation expense; TAX is tax paid; DIV is the dividend paid for ordinary shares; INT is interest expense; INV is a current-year investment
SALESIND	Firm sales to subsector sales
PUBOWN	Share owned by public
INDUST	The industrial sector of firm sample
Market response variables	
CAR	Cumulative abnormal return in 20 days before and after the publication date of the financial statements
MCAP	Market capitalization value at the date of publication of financial statements
MTB	The market value of equity at the publication date of the financial statements divided by the book value of equity
Financial performance	
ROA	Earning after tax divided by total assets
ROE	Earning after tax divided by total equities

3. RESULTS

The data were processed and analyzed descriptively to describe the variable profile briefly, and then the results of hypothesis testing were analyzed. Tables of descriptive analysis and tables of hypothesis testing results, respectively, are presented in Table 2 and Table 3.

should be: Table 2 to Table 7

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3.1. Descriptive analysis

Table 2 shows the mean value of each variable for the over- and under-investment sample groups. The mean CAPEX for the over-invested sample group was higher than that of the under-invested group and was significant at < 0.01. There is a significant difference in the size of companies in the overinvest and underinvest groups. The performance of the overinvest sample group companies is better than that of the underinvest group, as can be seen from the mean ROA, FCF, and SALESIND values of the overinvest sample group, which are significantly different from the mean performance of the underinvest sample group.

The analysis of variables per sector (Table 3) shows that the technology sector has the highest asset growth compared to the other sectors. It is in line with the rapid development of technology, which requires this sector to conduct aggressive capital expenditure. Each sector has a safety risk, as seen from the DER, which is only about 0.50 of equity funded with debt. Some sectors have a negative FCF, meaning funding and investment needs cannot be facilitated internally, while consumer cycle and healthcare sectors have a positive FCF. These two sectors have stable FCFs and even increased during the pandemic, so they have healthy operating cash flows. The basic materials, industry, property, and energy sectors have a high ROA of around 8%-9% per year, while the ROA of other sectors is around 4%-7%.

Regarding ROE, basic materials provided the highest ROE of 21%, followed by energy and industry. The highest public ownership (PUBOWN) is above 30% in the basic materials, consumer cyclical, financial, industry, and infrastructure sectors, whereas the average ownership is 20% in other sectors. The average individual sales per sector were below 10%, indicating that the level of competition was relatively high. Sectors with an average sales of 50% are the cyclical consumer sector and the industrial sector.

Companies that underinvest seem to have cash flow problems because the average free cash flow is more negative than those that overinvest. Choi et al. (2020) describe that companies are under financial constraints and tend to underinvest.

Table 2. Mean-difference between over-invest and under-invest

Variables	Over-Invest (N = 40)	Under-invest (N = 192)	t	Sig (2-tailed)
CAR	31.9000	–5.7917	1.561	0.1200
MCAP	10.3000	10.3299	–0.999	0.905
MTB	1.3320	1.3342	-0.0215	0.9829
CAPEX	0.7716	0.5982	4.2426	0.0000***
FSIZE	10.4873	10.7742	–2.9190	0.0039***
ASSGRT	0.1059	0.1060	–0.0033	0.9974
DER	0.4285	0.4655	–0.3420	0.7327
FCF	-9.6849	–52.6638	4.2426	0.0000***
ROA	0.0873	0.0611	1.6837	0.0936*
SALESIND	0.1822	0.1704	2.3775	0.0182**
PUBOWN	0.6835	0.6911	–0.3028	0.7623

Table 3. Descriptive statistics (CAR, MCAP, MTB, CAPEX, INVEFF) by sector

SECTORID	N	Mean	CAR	MCAP	MTB	CAPEX	INVEFF
Basic Material	36	Mean	–1.611	10.417	1.485	0.614	–3.413
		Std. Deviation	46.108	0.604	0.895	0.273	19.959
Consumer Cyc	8	Mean	23.750	10.125	1.234	0.653	–0.189
		Std. Deviation	89.596	0.354	0.336	0.239	0.574
Consumer NY	44	Mean	–37.591	10.591	1.310	0.651	–8.457
		Std. Deviation	201.343	0.542	0.575	0.225	40.953
Energy	32	Mean	–7.063	10.313	1.317	0.626	–23.457
		Std. Deviation	15.937	0.592	0.391	0.238	108.250

Table 3 (cont.). Descriptive statistics (CAR, MCAP, MTB, CAPEX, INVEFF) by sector

SECTORID	N	Mean	CAR	MCAP	MTB	CAPEX	INVEFF
Financial	56	Mean	37.214	10.018	1.356	0.623	–12.553
		Std. Deviation	205.793	2.004	0.644	0.257	66.059
Healthcare	4	Mean	–25.750	10.000	1.207	0.852	–0.047
		Std. Deviation	23.880	–	0.247	0.113	1.373
Industry	6	Mean	8.625	10.375	1.356	0.552	–23.207
		Std. Deviation	14.774	0.518	0.480	0.259	65.292
Infrastructure	24	Mean	–10.417	10.500	1.337	0.638	–1.485
		Std. Deviation	65.273	0.511	0.291	0.274	17.633
Property	16	Mean	3.875	10.188	1.134	0.612	–59.321
		Std. Deviation	35.293	0.403	0.223	0.167	168.035
Technology	4	Mean	12.500	10.750	1.110	0.477	–17.427
		Std. Deviation	18.212	0.500	0.314	0.190	34.340
Total	230	Mean	0.707	10.319	1.334	0.628	13.752
		Std. Deviation	139.33	1.102	0.578	0.244	72.117

Table 4. Descriptive statistics (FSIZE, ASSGRT, DER, FCF, ROA) by sector

SECTORID	N	Mean	FSIZE	ASSGRT	DER	FCF	ROA
Basic Material	36	Mean	10.808	0.135	0.584	–7.971	0.084
		Std. Deviation	0.744	0.197	0.911	30.850	0.114
Consumer Cyc	8	Mean	10.549	0.067	0.479	0.444	0.064
		Std. Deviation	0.402	0.051	0.758	0.506	0.073
Consumer NY	44	Mean	10.830	0.100	0.388	–24.733	0.061
		Std. Deviation	0.558	0.135	0.594	106.344	0.064
Energy	32	Mean	10.590	0.068	0.454	–55.787	0.081
		Std. Deviation	0.576	0.117	0.520	157.551	0.101
Financial	56	Mean	10.718	0.146	0.516	–96.323	0.052
		Std. Deviation	0.469	0.311	0.658	374.223	0.066
Healthcare	4	Mean	10.416	0.067	0.260	0.198	0.052
		Std. Deviation	0.159	0.052	0.229	0.223	0.034
Industry	6	Mean	10.798	0.084	0.475	–11.788	0.088
		Std. Deviation	0.949	0.127	0.513	34.242	0.160
Infrastructure	24	Mean	10.770	0.022	0.438	–23.164	0.040
		Std. Deviation	0.514	0.096	0.361	77.442	0.071
Property	16	Mean	10.557	0.140	0.296	–66.696	0.092
		Std. Deviation	0.518	0.189	0.367	268.230	0.138
Technology	4	Mean	10.908	0.189	0.264	–57.836	0.041
		Std. Deviation	0.560	0.379	0.174	115.980	0.034
Total	230	Mean	10.725	0.106	0.459	–45.254	0.066
		Std. Deviation	0.575	0.204	0.622	213.495	0.090

Table 5. Descriptive statistics (ROE, PUBOWN, SALESIC) by sector

SECTORID	N	Mean	ROE	PUBOWN	SALESIC
Basic Material	36	Mean	0.210	0.310	0.111
		Std. Deviation	0.328	0.159	0.063
Consumer Cyc	8	Mean	0.154	0.279	0.500
		Std. Deviation	0.235	0.151	0.050
Consumer NC	44	Mean	0.118	0.348	0.091
		Std. Deviation	0.092	0.138	0.064
Energy	32	Mean	0.191	0.289	0.125
		Std. Deviation	0.302	0.144	0.065
Financial	56	Mean	0.104	0.308	0.071
		Std. Deviation	0.100	0.145	0.074

doi

Table 5 (cont.). Descriptive statistics (ROE, PUBOWN, SALESIC) by sector

SECTORID	N	Mean	ROE	PUBOWN	SALESIC
Healthcare	4	Mean	0.078	0.280	1.000
		Std. Deviation	0.044	0.184	–
Industry	6	Mean	0.177	0.374	0.500
		Std. Deviation	0.255	0.096	0.258
Infrastructure	24	Mean	0.112	0.305	0.167
		Std. Deviation	0.276	0.140	0.108
Property	16	Mean	0.150	0.289	0.250
		Std. Deviation	0.190	0.135	0.117
Technology	4	Mean	0.083	0.218	1.000
		Std. Deviation	0.034	0.198	–
Total	230	Mean	0.142	0.311	0.172
		Std. Deviation	0.219	0.145	0.209

3.2. Empirical results

This study aims to complement previous research on the market response to capital expenditure by examining the inefficiency of capital expenditure. Investment inefficiency is characterized by either over- or under-investment, which harms investors because companies finance capital expenditures more than or less than the required amount. Inefficient investment has an impact on non-optimal investment returns. Hypothesis 1 predicts that the market responds negatively to over- and under-investment information, and the test results show that INEFF has a negative coefficient for all market response indicators (CAR, MCAP, and MTB) and is significantly negative at the <0.05 level for the market response as measured by CAR. DUMINEFF, which is the categorization of over-investment and under-investment, shows the same results, where the DUMINEFF coefficient is negative for all market response indicators and significantly negative at the <0.01 level for a market response as measured by MTB. Table 6 also shows that the market response to CAPEX information is positive and significant at levels <0.05 and <0.01 for market response indicators using MCAP and MTB and significant negative for a market response as measured by CAR. LCAPEX, the CAPEX of the previous period, is still in the market's attention and has a significant positive response at the <0.05-level for a market response as measured by MCAP. Hypothesis 1, which predicts that over-investment and under-investment will respond negatively to the market, is proven especially for a market response measured by CAR and MTB.

Table 6. Market Response to Inefficient Investment

Variables	CAR	MCAP	MTB
	Coefficient	Coefficient	Coefficient
	t-stat	t-stat	t-stat
INEFF	−0.2452**	−0.030	−0.005
	(−2.31)	(−0.44)	(−0.20)
DUMINEFF	−0.1155	−0.015	−0.355***
	(−1.51)	(−0.26)	(−3.55)
CAPEX	0.3286**	0.440***	0.073***
	(2.44)	(4.65)	(2.49)
LAGCAPEX	−0.0141	0.152**	0.020
	(−0.12)	(1.83)	(0.82)
FSIZE	0.1320	0.764***	0.083***
	(1.17)	(8.97)	(3.30)
ASSGRT	−0.1777**	−0.055	−0.460**
	(−2.39)	(−0.94)	(−2.06)
DER	−0.0249	0.055	0.807***
	(−0.32)	(0.90)	(19.77)
FCF	0.417***	−0.003	0.003
	(4.00)	(−0.05)	(0.21)
ROA	0.0873	0.115*	0.050***
	(1.05)	(1.71)	(2.67)
SALESIC	−0.065	0.054	0.005
	(-0.89)	(0.94)	(0.31)
PUBOWN	−0.090	−0.139**	0.938
	(−1.18)	(−2.31)	(0.86)
Industrial-fixed effect	Yes	Yes	*Yes*
Year-fixed effect	Yes	Yes	*Yes*
Adjt R-sq	0.105	0.255	0.738

The second hypothesis predicts that excessive or under-target investment will not produce optimal performance and tends to reduce performance. After all, it is more than necessary; conversely, an investment that is too low reduces the chances of achieving the expected returns, thereby reducing the overall potential to generate positive returns. It is proven that over- and under-investment hurt

financial performance two years after the investment. The DUMINEFF coefficient is negative and significant for all the performance measures, both ROA and ROE, at a significance level of <0.1. Meanwhile, if viewed from CAPEX, it shows the opposite: capital expenditure results in increased performance in the future. The test results support Hypothesis 2.

Table 7. Future financial performance of investment inefficiency

Variables	ROA_{t+2}	ROE_{t+2}
	Coefficient	Coefficient
	t-stat	t-stat
INEFF	0.018	–0.036
	(0.16)	(–0.32)
DUMINEFF	–0.710*	–0.650*
	(–1.89)	(–1.75)
CAPEX	0.630*	0.564–
	(1.658)	(1.503)
LAGCAPEX1	0.011	–0.005
	(0.13)	(0.05)
FSIZE	0.250***	0.197**
	(2.62)	(2.11)
ASSGRT	0.125*	0.114*
	(1.92)	(1.81)
DER	0.084	–0.135**
	(1.26)	(–2.14)
FCF	–0.119**	–0.067
	(–1.88)	(–1.09)
ROA	0.366***	
	(4.95)	
ROE		0,338
		(5.03)
SALESIC	0.004	0.065
	(0.06)	(1.00)
PUBOWN	–6.454	4.356
	(–1.51)	(–1.05)
Industrial-fixed effect	Yes	*Yes*
Year-fixed effect	Yes	*Yes*
Adjt R-sq	0.140	0.163

As shown in Table 6, the size and ability of a company to generate profits (ROA) have a positive influence on the three market response indicators, primarily the significant effect on the MCAP and MTB market response indicators. MCAP and MTB increase when the company's size and ability to generate profits are growing. However, the market responded differently to an increase in asset growth (ASSGRT). In addition, the amount of debt level (DER) is proven to cause an increase in MTB, the size of the FCF is proven to cause an increase in CAR, and the number of shares owned by the public (PUBOWN) is proven to reduce MCAP. Regarding the characteristics of the industry, this study did not prove the effect of SALESIND on the three market response indicators. However, it did prove the effect of the type of research on the three market response indicators.

As shown in Table 7, that company size (FSIZE), asset growth (ASSGRT), and profitability (ROA and ROE) currently have a positive influence on the company's ability to generate profits as measured by ROA and ROE for the next two years. FSIZE, ASSGRT, ROA, and ROE are good predictors of ROA and ROE in the next two years. DER and FCF have been shown to negatively affect ROE and ROE in the future, while public ownership does not affect ROA and ROE. Regarding the characteristics of the industry, this study did not succeed in proving the effect of SALESIND on the company's ability to generate future profits (ROA and ROE). However, this study proved the influence of the type of industry on the company's ability to generate profits in the future.

4. DISCUSSION

An *inefficient investment* is an investment that is excessive or below a company's capacity, which will potentially bring losses to interested parties, including investors. As described in the analysis section, this study finds that the market responds negatively to inefficient capital expenditures; over or under-investment is read by the market as a risk that the company cannot provide optimal results. These results contradict previous research, where the average market responds positively to capital expenditure activities (Burton et al., 1999; Vafeas & Shenoy, 2005). However, these results address the inconsistency of previous studies regarding market response to capital expenditure (Akbar et al., 2008; Qhandari et al., 2016; Chen & Chang, 2020). The market only sometimes responds positively due to inefficient investments that make investors doubt the company's ability to achieve optimal investment returns.

This study uses the investment efficiency model following several previous studies (McNichols & Stubben, 2008; Biddle et al., 2009; Goodman et al., 2014; Shroff, 2017; Choi et al., 2020). The residual

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value of the investment efficiency model and the dummy variable of the residual, which is used as a proxy for investment efficiency, both show consistent results that investment inefficiency is responded to negatively by the market. This finding implies that the market considers the risk of inefficient investment, which has the potential to prevent investors from obtaining optimal yields. This finding narrows the differences in the results of previous studies by highlighting the inefficiency aspect of investment decisions.

One of the objectives of capital expenditure is to improve future financial performance, but the inefficient investment is counterproductive to that goal. Management is at high risk when investing over what is required or, conversely, when investing lower than the efficient level of investment. As hypothesized, inefficient investment, either over or under-investment, negatively affects the company's future performance. Using ROA and ROE two years after the year of investment, it is found that over or under-investment has a negative effect. This finding is in line with the results of previous studies that prove a negative relationship between capital expenditure and future earnings (Bar-Yosef et al., 1987; Abarbanell & Bushee, 1997; Burton, 2005). Other research findings also prove that the efficiency of capital expenditures affects financial performance (Bryan, 1997; Jiang et al., 2006; Kumar & Li, 2013; Michael & Herword, 2019).

The results of this study explain that inefficient capital expenditure reduces a company's ability to improve financial performance because expensive investment costs burden financial performance and reduce company productivity. A company bears an expensive investment cost that needs to be commensurate with the revenue earned from the additional new investment. The optimal use of investment is crucial for the company, given its limited resources (Biddle et al., 2009; Bae et al., 2018). Consistent with the agency perspective, managers tend to reinvest excess funds rather than return them to shareholders, which has proven risky (Brailsford & Yeoh, 2004). Managers pay for it through a negative response from the market and suboptimal financial performance, as evidenced by current research.

CONCLUSION

This study examines the market response and future firm financial performance related to over-investment or under-investment. The sample is devoted to large-cap companies listed on the Indonesia Stock Exchange for 2016–2021 and obtained 232 samples that meet the requirements. Over or under-investment was measured using the residual investment inefficiency model. The results of testing hypothesis 1 show that the coefficient of the dummy variable over-invest or under-invest (DUMINEFF) is negative and consistent for all market response measurements using cumulative abnormal returns (CAR), market capitalization (MCAP), and market-to-book (MTB). However, the DUMINEFF coefficient is significant for the market response measured using MTB.

Furthermore, the results of testing hypothesis 2 found that the DUMINEFF coefficient is negative and significant to future performance, both as measured by ROA and ROE. Thus, this study yielded two critical findings. First, the market responded negatively by inefficient investment, either over or under-investment. This finding answers the diversity of previous research on investment spending, which is only sometimes responded positively by the market. Second, this study shows that over-investment or under-investment harms future financial performance. This result complements the previous studies by examining the effect of over or under-investment on future financial performance rather than current-year performance.

Apart from the above results, this study needs to discuss the motivation of management to over-invest or under-invest, which would be interesting to disclose. Theoretically, there is an explanation for the behavior of managers to over-invest or under-invest, either because of cash shortage problems or other agency problems that prevent management from investing at an efficient level. Therefore, this provides an opportunity for future research to uncover aspects of management motivation regarding inefficient investments.

AUTHOR CONTRIBUTIONS

Conceptualization: Juniarti Juniarti.
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