

FIRM LIFE CYCLE AND INVESTMENT INEFFICIENCY: EMPIRICAL STUDY IN INDONESIAN STOCK EXCHANGE

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DOI: <https://doi.org/10.33005/jasf.v3i2.86>

Received: July 13, 2020. Revised: October 07, 2020. Accepted: November 30, 2020

Abstract

This paper investigates whether the firm's life cycle stages carry out free cash flow efficiently or not before their investment performance. We utilize cash flow patterns to classify firms into five several life cycles stages. Our data consists of non-financial firms listed in Indonesia Stock Exchange from 2008-2018. We find evidence that Indonesian firms in the introduction, growth, and shakeout stage are underinvesting. This paper also shows that firms in decline stage are overinvested. The characteristic of the mature firm includes that firms with high cash flow will tend to overinvest. However, contrasting with mature firms' common characteristics, our results show that Indonesian firms in maturity stage tend to underinvest. The results also imply that the government should acknowledge the existence of Indonesian firms' investment inefficiency problem. Overall, this paper contributes to the literature by providing empirical evidence on Indonesia's investment inefficiency phenomena. It is suggested that further research may select a different method in calculating growth opportunities and may also study private firms since it tends to have higher financial constraints.

Keywords: *Free Cash Flow, Firm Life Cycle, Overinvestment, Underinvestment, Investment Inefficiency, Agency Problem.*

How to cite (APA 6th style)

Guntoro, A. G., Gracia & Juliana R. (2020). Firm Life Cycle and Investment Inefficiency: Empirical Study in Indonesian Stock Exchange. *Journal of Accounting and Strategic Finance*, 3 (2), 169-184.

INTRODUCTION

A dynamic and rapidly changing economic conditions worldwide force firms to develop and offer more uniqueness to compete. To compete and survive, one of the crucial factors that could be affecting the company's growth and stock returns is the investment activities of firms. Alti (2003) indicates that all firms' investment in each class and period is susceptible to cash flow, leading to being underinvested and overinvested. The firms' investment activities can be affected by corporate governance's performance (Bertrand and Mullainathan, 2003), a firm's financing decision, and investment-cash flow sensitivity (Hovakimian and Hovakimian, 2009).

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Habib and Hasan (2019) paper present a research gap regarding investment efficiency and the firm life cycle. The cost of capital influences the firm life cycle through availability and cash flow. The operating cash flow captures the profitability, the investing cash flow captures the growth rates, and the financing cash flow captures the risk. The firm life cycle phases affected the firm investment, operating performance, and financing decision (Hasan, Hossain, Cheung, & Habib, 2015). Hence, this paper analyzes whether a firm investment inefficiency is varied in every stage of firm life cycle using the firm life cycle theory by Dickinson (2011) and investment inefficiency theory by Richardson (2006). By utilizing Dickinson (2011) cash flow method, the researchers can determine what phase firms are at and capture companies' performance within each life cycle stages using the cash flow patterns. Therefore, the research questions that raised for this paper is: "Are firms in introduction and growth (maturity and decline) life cycle stages have tended to be under- (over-) invest?"

The firm life cycle concept has been expanded widely, connected to other aspects, and became more complex. Many studies have shown that a firm life cycle can determine firms' performance and decisions. The researches include valuing cash holdings (Drobetz et al., 2016), dividend payout policy (DeAngelo et al., 2006), capital structure (Castro et al., 2015), strategies in merger and acquisition activities (Owen and Yawson, 2010). The firm life cycle can be a critical point for a firm if they ignore their stage. On the other hand, firms can reap the advantage from the correctly taken decisions if they know their phases' characteristics.

All firms will go through some stages in life cycle stages, but every firm might be in different stages that cause them to face various challenges and do different strategies (Dickinson, 2011; Faff et al., 2016). Following Gort and Klepper (1982) and Dickinson (2011) expanded the firm life cycle theory and defined life cycle phase as a business's progress and its phases over time bring a company's new product. She develops it into five stages: introduction, growth, maturity, shakeout, and decline. The distinction of life stages is also using the operating, investing, and financing cash flow of a firm.

The introduction phase is when the company begins to start their businesses' operation and launch new products or services through innovative technologies (Gort and Klepper, 1982). Young firms like start-ups are dependent on debt support, despite the high cost of debt, due to the high growth potential and investment opportunities, but limited internal resources (Chuang, 2020; La Rocca et al., 2007). Next, in the growth phase, the company will experience rapid sales growth, increase market demand, and enjoy the initial product-market success (Miller and Friesen, 1984). Therefore, they are also very dependent on the needs of external financing resources for investing in the marketing, research and development process, and fixed assets (Dickinson, 2011; La Rocca et al., 2011). Then, in the mature phase, the company's sales meet its highest point of cash flow. The efficiency of firms also increases under the sales and earnings (Miller and Friesen, 1984). The availability of debt increasing due to the excellent reputation the firms had, makes them beneficial (Bakarich et al., 2019; La Rocca et al., 2011). However, as the opportunities of investment decline over the firm's life cycle, the firm will prefer to utilize the internal resources first, before using debt and equity (Faff et al., 2016; La Rocca et al., 2011). In the fourth stage, shake out, when a company unable to adapt to changing environments, fail to offer innovation and lose in competition, the weaker firms will have to quit. Besides, during the last stage, decline, the company's business life cycle, sales, profits, and cash flow are declining. The industry will have

zero entry, and companies might even quit (Gort and Klepper, 1982). Therefore, the only relevant factors are profitability and growth opportunities (Castro et al., 2015) to survive.

Firms at each stage of life cycle stages show different characteristics, behaviour and strategies that will impact their investment efficiency and determine the market performance. Faff et al. (2016) show an association between firm life cycle and the corporate policies, especially in the investment and equity issuance, debt issuance and cash holdings. The acquisition and equity issuance are negatively related to the firm life cycle because of the decreasing investment opportunities.

Based on free cash flow theory, the use of excess cash flows can determine the efficiency and performance of the firm's investment, as it should be used as efficient as possible to decide on the value of a firm, maximize the shareholder's wealth, and increasing the dividends (Faff et al., 2016; Jensen, 1986; Richardson, 2006). Accordingly, the firm's investment opportunity and cash flows keep pace with different stages of the firm life cycle (Faff et al., 2016; Miller and Friesen, 1984). Jensen (1986) states that the manager of a firm with excess free cash flow will invest it in abnormal investment rather than handing out to shareholders. Firms cause this action with positive free cash flow to increase investment on more self-beneficial projects rather than distribute cash to shareholders. There is also an association with investment cash flow sensitivity. Overinvestment is done by firms with high cash flow and underinvests by a firm with low cash flow (Hovakimian and Hovakimian, 2009). Therefore, after considering the previous reasoning, the researcher formulated these hypotheses to examine the relationship between the firms' cash flow and their investment. The first testable hypothesis:

The first hypothesis is built under the assumption that firms in the introduction phase of the firm life cycle have a higher investment opportunity, but they have difficulty in issuing debt and obtaining external financing, which makes their retention is bigger than distribution (DeAngelo et al., 2006; La Rocca et al., 2011). Hovakimian and Hovakimian (2009) studied investment cash flow sensitivity. They proved that firms in their low cash flow years would tend to underinvest because of lower internal liquidity, limited and costly external financing, which supported our argument that firms in the introduction stage have tighter or rigid financial constraints.

Also, risk avoidance characteristic of young firms with high opportunity growth tends to avoid risky projects and obtaining debt to prevent managers from losing control for the firm and benefits of the investment will mostly go to the debtholders. Thus, firms will avoid the positive net present value investments (La Rocca et al., 2007). Moreover, consistent with the empirical evidence of Richardson (2006) who found the positive relationship between firms with the negative free cash flow and the experience to under-investment.

Hypothesis 1: The companies in the introduction stage tend to underinvest

Firms in the growth stage start to increase market demand that gives rapid sales growth and sales revenue. In this stage, firms have to invest more in their assets, such as plant, property, equipment, research and development activities, and advertising activities, to fulfil the market demand (Dickinson, 2011). Although their internal fund has increased due to the positive response and rising market demand, firms still face difficulty obtaining debt due to high cost and high risk of debt. The firms that do not have any good credit histories (Bulan and Yan, 2009) will lead them to underinvest.

Hypothesis 2: The companies in the growth stage tend to underinvest

Firms in the maturity stage have a low investment opportunity due to declining projects with positive net present value. Firms at the maturity stage are willing to invest in projects with a negative present-value which means that managers are increasing the firm's size to gain personal benefits but ignoring the investments' value (Drobotz et al., 2016; La Rocca et al., 2007) and initially decreasing. (La Rocca et al., 2007) argues that firms in the maturity stage with firms yield high profitability, high liquidity with low debt level could lead to over-invest or empire building. Our hypothesis is built upon prior research and our argument that the maturity stage firms have positive free cash flow consistent with Richardson (2006). The free cash flow can lead to over-investment activities, such as increasing the manager's benefit and increasing the shareholder's expense (DeAngelo et al., 2006).

Hypothesis 3: The companies in the maturity stage tend to overinvest

The declining stage firms faced intense pressure in doing more innovation, reform their investment, research and development activities (Habib and Hasan, 2019), and keeping up with the technological changes to survive through the industry (Gort and Klepper, 1982). This stage urges them to sell tangible assets to make their cash flow running and return their profitability; also, they will make lots of investments. However, the positive net present value project has already exhausted. Therefore, those conditions will lead the firms to overinvest.

Hypothesis 4: The companies in the decline stage tend to overinvest

RESEARCH METHOD

This research paper is a quantitative research using secondary data. The data will be taken from the sampled companies' that have been listed in Indonesia Stock Exchange. The companies' complete data of financial statements and annual reports are comprised yearly from 2008 - 2018. All financial report data are taken from the S&P Capital I.Q. Database. The samples used for this research consists of 418 firms with 3725 firm-year observations, where most of the sample result is in the maturity stage. Hence, the list of companies is based on sampling companies' criteria:

1. All public companies in Indonesia and are listed in Indonesia Stock Exchange (IDX).
2. Companies that are not within the financial industry to minimize the bias of data due to the unique nature of their cash flows (Dickinson, 2011)
3. Companies with a complete annual report from 2008 until 2018

Table 1. The Results of Purposive Sampling

Criteria	Number of Companies
Number of Firms Listed in Indonesia Stock Exchange (IDX)	656
Number of Financial Firms (2008-2018)	115
Number of Firms with Incomplete Annual Report (2008-2018)	123
<i>Number of Firms Total Samples</i>	418

Table 2. Measurement of Variables

Variable	Definition	Measure
I_{NEW}	Investment expenditure on new projects	The difference between total investment (I_{TOTAL}) and maintenance investment expenditure ($I_{MAINTENANCE}$).
Growth Opportunities	market-to-book ratio	Using market capitalization of that year divided by the total of common equity of that year.
Leverage	Firm's Leverage	The sum of the book value of the short term and long-term debt to the sum of total debt and total equity.
Cash	Firm's liquidity	The balance of cash and short-term investments to total assets.
Age	Firm's age	Log of a number of years the firm has been listed in IDX.
Size	Firm's size	Log of total assets measured at the start of the year.
Stock Returns	The yield of stock returns	Using the market capitalization of that year reduced by the amount of the previous year, divided by the last year's amount.
Investment Inefficiency	the estimation value of the abnormal investment	The residual value of the regression of new investment.

Source: Richardson (2006)

Model Specification

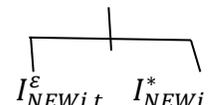
The empirical analysis will use the investment inefficiency measurement by Richardson (2006) to examine the relationship between free cash flow and investment inefficiency in each firm's life cycle stages. Investment inefficiency measurement based on Richardson (2006) use several stages:

$$I_{TOTAL,i,t} = CAPEX_{i,t} + Acquisitions_{i,t} + RD_{i,t} - SalePPE_{i,t}$$

The total investment, ' $I_{TOTAL, i,t}$ ', where 'i' represents the firm, and 't' means the time-series dimension, is calculated by adding up all expenses on capital expenditures, acquisitions, and research and development, less the receipts from the sale of property, plant, and equipment.

Then, ' $I_{TOTAL, i,t}$ ' or the total investment expenditure will be sectioned into two main parts:

$$I_{TOTAL,i,t} = I_{MAINTENANCE,i,t} + I_{NEW,i,t}$$



$I_{NEW,i,t}^E$ $I_{NEW,i,t}^*$

Where ' $I_{MAINTENANCE, i,t}$ ' is investment expenses used to preserve the assets in place and ' $I_{NEW, i,t}$ ' is the expense of new projects' investment. The ' $I_{MAINTENANCE, i,t}$ ' will be calculated through the amortization and depreciation that is used to maintain property, plant, and equipment, and

operating assets, because the depreciation and amortization of firm's assets indicate the revenue earned by the firm while depreciating the cost of the asset each year. For ' $I_{NEW,i,t}$ ', it will be divided into ' $I_{NEW,i,t}^*$ ' which is expected investment expenses in new positive NPV projects, and ' $I_{NEW,i,t}^\varepsilon$ ' will be an abnormal investment, taken from the residual of the regression of below:

$$I_{NEW,i,t} = \alpha + \beta_1 Growth\ Opportunities_{i,t-1} + \beta_2 Leverage_{i,t-1} + \beta_3 Cash_{i,t-1} + \beta_4 Age_{i,t-1} + \beta_5 Size_{i,t-1} + \beta_6 Stock\ Returns_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

I_{NEW} is the difference between I_{TOTAL} , the total investment expenditure, and $I_{MAINTENANCE}$, the maintenance investment expenditure. The market-to-book ratio measures growth opportunities. Leverage is the firm's Leverage. Cash measures the liquidity level. Age is the firm's age since it is listed on IDX. Size is the firm's size. Stock returns are the yield of stock returns. The residual or error term is the estimation value of abnormal investment or investment inefficiency.

Utilizing Richardson (2006) investment inefficiency measurement as the dependent variable, the primary research model that is used to examine both of the hypothesis is as follows:

$$I_{NEW,i,t}^\varepsilon = \alpha + \beta_1 Introduction_{i,t} + \beta_2 Growth_{i,t} + \beta_3 Maturity_{i,t} + \beta_4 Shakeout_{i,t} + \beta_5 Decline_{i,t} + \varepsilon_{i,t} \quad (2)$$

Where 'i' denotes firms and 't' represents the year. The researcher will measure the dependent variable, firm-specific abnormal investment, ' $I_{NEW,i,t}^\varepsilon$ ', with the firm life cycle as its independent variables in the following year to capture the investment inefficiency in the firm life cycle phases. Abnormal investment can be positive or negative. The negative sign corresponds to under-invest, and the positive sign corresponds to over-invest. By using the model above, we classified the companies at each year using the cash flow patterns table by Dickinson (2011) to identify whether the firm is in introduction, growth, maturity, shakeout, and decline phase at each period from 2008 – 2018 and their investment inefficiency, using the measurement below by Richardson (2006):

$$\begin{aligned} FCF &= CF_{AIP\ i,t} - I_{NEW,i,t}^* \\ &= CFO_{i,t} - I_{MAINTENANCE_{i,t}} + RD_{i,t} - I_{NEW,i,t}^* \end{aligned}$$

Where 'FCF' denotes free cash flow, ' $CF_{AIP\ i,t}$ ' represents free cash flow from existing assets in place, and ' $I_{NEW,i,t}^*$ ' represents an expected investment in new projects. The calculation of ' $CF_{AIP\ i,t}$ ' is derived from the sum of net cash flow from operating activities ($CFO_{i,t}$) and research and development expenditure ($RD_{i,t}$), less maintenance investment expenditure ($I_{MAINTENANCE_{i,t}}$).

To distinguish the firm's stage, Dickinson (2011) indicates eight possible cash flow pattern combinations using the sign positive or negative and resulting in the firm life cycle classifications, as follows:

Table 3. Possibilities of Cash Flow Patterns

Cash Flow Type	Introduction	Growth	Mature	Shake Out	Shake Out	Shake Out	Decline	Decline
Operating Activities	-	+	+	-	+	+	-	-
Investing Activities	-	-	-	-	+	+	+	+
Financing Activities	+	+	-	-	+	-	+	-

Source: Dickinson (2011)

The results are a negative cash flow in operating and investing in the introduction stage and positive cash flow in financing activities. The negative net cash flow in the operating activities was due to their needs to operate, develop, and introduce the firm to cost a significant amount of money (Dickinson, 2011). On the other hand, they will also make extensive and optimistic investments, given that they have considerable opportunities, leading them to have negative investing cash flow. To waste the significant investment opportunities, they will heavily rely on external financing, which leads them to have positive financing cash flow (Drobotz et al., 2016).

As a result of the acceptance and increased demand from the market, the firm in growth stage has to keep developing and providing the sources in its operating activities, such as in the property, plant, and equipment, advertising, research and development process, and also investments (Dickinson, 2011), resulting in negative investing net cash flow. Though the operating cash flow is expected to be positive due to successful approach in the introduction stage that increase the firm's profitability (Miller and Friesen, 1984) which makes them more efficient in their operational process, the firm will still rely on external financing to keep up their high investment opportunities (Drobotz et al., 2016).

As the firm entered the maturity stage, the operating cash flow has reached its maximum capacity simultaneously with the efficiency in sales and earnings of firms that caused it to be positive (Drobotz et al., 2016; Miller and Friesen, 1984). However, to maintain the investment activities in previous stages, the firm has negative investing net cash flow. Also, though they have more debt capacity, they try to reduce it to utilize the internal financial which is getting better, leading to negative financing cash flow (Drobotz et al., 2016; La Rocca et al., 2011).

In the shakeout stage, firms are experiencing declining innovations and growth rates. As the firm becomes inefficient and faces financial distress, it might lead the firm to have negative operating cash flows to keep the firm operating. For investing activities, it could be negative or positive, depending on liquidating their assets. And for the financing activities, the result depends on the ability to rely on external financing (Drobotz et al., 2016).

Firms in the decline stage suffer from failing to innovate and compete with the other firms (Gort and Klepper, 1982), leads to negative operating net cash flow. On the contrary, Drobotz et al., (2016) argue that based on Dickinson (2011) cash flow pattern, the firms will experience a positive investing cash flow because of lack of investment opportunities that urge them to liquidate their assets instead of spending more in the investing activities. As for financing activities, the

result could be positive (negative) when the firms have deficit (excess) funds from the investment, as the external financing is (not) required.

RESULTS AND DISCUSSION

Results

Descriptive Statistics

The 11-year scope of the research from 2008 to 2018, 418 companies in the sample resulted in 3725 observations that fulfilled the required criteria. The collective of the summarized statistics are as follows:

Table 4. Collective Descriptive Statistics Results

Variables	Mean	Std Deviation	MIN	MAX
Growth Opportunities	2.254467	3.810721	-1.78359	27.3285
CAPEX	0.132564	0.276001	0	1.659145
ACQ	0.008482	0.048947	0	0.423823
SALEPPE	0.009758	0.037614	0	0.294101
InvMain	0.5315507	1.181048	0.0029853	9.02591
Leverage	0.2044547	0.4163725	0	2.94799
Cash	0.2420936	0.4539327	0.001025	2.64715
Age	15.7353	8.491023	2	69
Size	6.102625	0.7431956	4.30319	7.7884
Stock Returns	0.4570792	1.995008	-1	15.8281
Investment Inefficiency	-0.3930824	0.993715	-3.052269	2.120054

Source: Processed by Author

Table 5. Statistic Result in Each Firm Life Cycle

Variables	Introduction	Growth	Maturity	Shake-Out	Decline
Growth Opportunities	2.169934	2.182131	2.59	1.751717	1.216677
CAPEX	0.097342	0.203992	0.133146	0.061219	0.0284133
ACQ	0.0150252	0.016964	0.034933	0.0020594	0.0016632
SALEPPE	0.004748	0.006258	0.007993	0.020168	0.0327465
InvMain	0.478259	0.377338	0.475799	0.835174	1.409209
Leverage	0.2721215	0.2463831	0.1756827	0.1412295	0.1615582
Cash	0.1681027	0.2166766	0.2939077	0.2586026	0.1442046
Age	15.20951	14.77466	16.50031	15.55402	16.0087
Size	6.042632	6.219412	6.148254	5.901257	5.75984
Stock Returns	0.5849686	0.6109945	0.4191291	0.150941	0.2418112
Investment Inefficiency	-0.5101933	-0.230345	-0.3140057	-0.6581178	-0.9203831

Source: Processed by Author

Variables shown in Table 4 are based on previous research conducted by Richardson (2006). The growth opportunities derived from the market capitalization divided by total common

equity; the mean of growth opportunities is 2.254467 with the standard deviation of 3.810721. The negative sign in the minimum value explains that there are companies with negative total common equity. Our result compared to table 5 shows that firms at maturity stage have the most significant growth opportunities from all firm life cycle stages with the mean of 2.59, where we expected in the growth stage, which only resulted in 2.182131, will be the highest. This growth is caused by the number of sample observations of maturity firms that far exceeded the other stages.

CAPEX is the firm's capital expenditure that is deflated to the firm's total asset. The mean of CAPEX is 0.132564. As we can see in table 5, firms in growth stages have the highest CAPEX. This evidence shows that firms in the growth stage are the most active firms that convert their investment opportunity to the asset in place.

The acquisition is also another way for firms to invest. ACQ is the cash outflow used by firms to conduct an acquisition transaction. In comparison with CAPEX, the mean of ACQ is relatively small. In other words, Indonesian firms prefer to invest by purchasing new fixed assets rather than acquiring existing firms. Table 5 show us that mature firms have the highest ACQ. It is possible since mature firms tend to be more profitable and hold higher cash to conduct cash acquisition transaction (Dickinson, 2011)

SALEPPE is the cash inflow received by selling the firm's PPE. As we can see in table 5, decline firms are higher than other life cycle stage firms. This data can be taken as a piece of evidence that decline firms are the most active in selling their PPE. Decline firms tend to suffer negative income (Habib and Hasan, 2017). Thus, they sell their PPE to increase their survival rate.

InvMain is the proxy of the firm's maintenance cost calculated using depreciation and amortization divided by the total asset. Table 5 show us that decline firms have the highest InvMain. Decline firms have lower investment opportunity (Dickinson, 2011; Habib and Hasan, 2017), other than investing in a negative NPV project. This firms will also try to survive by maintaining their current investment.

Leverage is calculated by adding up the short-term and long-term debt, divided by the total book value of total debt and the book value of total equity. Leverage means a capital borrowed by the firm as sources for financial support. In table 4, the mean of the Leverage is 0.2044547 indicates that the average of firms' debt is 20.44547% from total debt and equity used to finance their activities. The result shown in table 5 suggests that firms in the introduction stage will have the highest Leverage is real. The mean of 0.2721215, compared to other stages, since they will heavily rely on external funding to fund their activities, rebalance their capital structure, and keep up with the high investment opportunities.

The result of cash is total cash and short-term investment deflated by the total assets at the beginning of the year. The average of money held by firms is 24.20936% of their total asset. This percentage refers to the value of the company's cash or can be easily converted to cash, as the short-term investment, to finance firms when needed. Table 4 shows that in the maturity stage, they hold the highest cash with 0.2939077. This number can be related as the maturity stage firms have been more stable in their sales, opportunities, and increased profitability, giving them more surplus financial cash flow and making them more efficient in their activities. This cash flow can be caused as anticipation of shortage funds in the future. The firm chooses to hold more cash.

The average age of companies listed on the Indonesia Stock Exchange (IDX) is 15.7353 years with a minimum of 2 years and a maximum of 69 years. The results show that firms in the maturity stage with the mean of 16.5 years are longer listed in IDX than growth stage with the mean of 14.77, due to more stability in their financial and performance which attracts investors'

interest, that helps them last longer. The longer listed in IDX might also indicate that the company has the information transparency that captures the investors' interest.

The size derives from the total asset of the firm at the beginning of the year. The mean for the size is 6.102625 with a standard deviation of 0.7431956. The result in table 4 shows that in the introduction, growth, maturity, shake out, and decline, the mean is 6.043632, 6.219412, 6.148254, 5.901257, and 5.75984, respectively. It indicates that growth and mature firms' total assets are larger than the other firms' average size.

The stock return, which can be derived as the return or profit (loss) to the investment, is calculated by the difference from current market capitalization with previous market capitalization, then deflated by previous market capitalization. The mean is 0.4570792 indicates that firms in Indonesia could provide 45.70792% return to their investors. The results in Table 4 imply that firms in the growth stage have the highest value of stock return due to their high investment opportunities related to Indonesia. The negative minimum value of -1 indicates the declining market capitalization of certain companies in a certain period, and the maximum value is 15.8281.

Next, companies' investment inefficiency in Indonesia, the mean -0.3930824 and standard deviation of 0.993715 show that companies' average tends to be underinvested. This number can be related to Indonesia, which is still an emerging country and needs more prominent financing and investment opportunities. According to Jain et al. (2017), Indonesia, as an emerging country, has low investment opportunities and low availability of long-term debt that can impact firms' investment performance in Indonesia.

Data Analysis Results

This paper utilizes the firm life cycle by Dickinson (2011) and overinvests activities of free cash flow by Richardson (2006). First, to estimate investment inefficiency, we apply Richardson (2006) new investment model (Equation (1)). Table 6 shows the relationship between the new investment as the dependent variable and the independent variables that consist of growth opportunities, Leverage, cash, age, size, and stock return. Hence, we have solved the heteroskedasticity and autocorrelation problem by applying the fixed effects regression Driscoll and Kraay standard error.

Table 6. Panel Data Regression Results to generate investment inefficiency

New Investment	Coefficient	Std. Err.	t	P>t
Growth Opportunities	0.0001686	0.0032131	0.05	0.958
Leverage	-0.0200479	0.07677	-0.26	0.794
Cash	0.5871035	0.1074241	5.47	0.000***
Age	-0.3746193	0.110986	-3.38	0.001***
Size	1.331766	0.1212673	10.98	0.000***
Stock Return	0.0296265	0.0080638	3.67	0.000***
_cons	-8.271519	0.7014223	-11.79	0.000

***significant at the 1% level; **significant at the 5% level; *significant at the 10% level

Source: Processed by Author

The probability of the F-stat of this model is 0.000, indicating that the model used to predict new investment is valid. The panel regression result in table 6 shows that variable Cash, Age, Size and Stock Return have a significant effect ($p = 0.000$) to new investment. While Growth

opportunities and Leverage p-value ($p > 0.10$) show that these variables do not significantly affect new investment.

This model's residuals are used as the proxy investment inefficiency, which is the equation's dependent variable (2).

Additionally, as stated by Richardson (2006), the firm level of investment will increase as it is easier to obtain fund or cash, and vice versa, as shown by the significant result of the firm's age, cash, and size. Then, to capture the firm life cycle's investment performance, we input companies' free cash flow into the firm life cycle on each stage to estimate equation (2). The results of equation (2) are presented in table 7. Overall, the result has shown that companies in Indonesia tend to underinvest, except decline stage firms.

Table 7. Fixed Effect Regression for Investment Inefficiency

Investment inefficiency	Coefficient	Std. Err.	t	P>t
Introduction	-.2494197	.0980652	-2.54	0.011**
Growth	-.0954971	.0315402	-3.03	0.003***
Maturity	-.1386754	.0274933	-5.04	0.000***
Shakeout	-.3865402	.1087373	-3.55	0.000***
Decline	.2698997	.0923913	2.92	0.004***
_cons	-.3712925	.0501019	-7.41	0.000

***significant at the 1% level; **significant at the 5% level; *significant at the 10% level

Source: Processed by Author

Discussion

On this section, we will discuss and analyze further our regression results. Table 6 shows the relationship between growth opportunities and new investment, it turns out to be positive, and there is an insignificant relation. The difference result might occur due to the different measurement method and reference benchmark. We use the market-to-book ratio to calculate the growth opportunities, which might be the limitations in comparing the USA's conditions, as a developing country, and Indonesia as an emerging country. Different calculation results are then done manually and through downloaded data, which might become this research paper limitation.

On table 6, variable Leverage is proven to have a negative relationship with the new investment. It indicates that Leverage's existence can reduce the overinvestment by adding the manager's responsibilities to pay interest and increase its value. Opler et al. (1999) also state that as firms fund their cash activities, its Leverage falls. However, our results in Table 6 showed an insignificant relationship between Leverage and new investment by 1%, 5%, and even 10%. According to John and Muthusamy (2011), the insignificant relationship could occur because of the enormous amount of cash flow owned by a firm. The manager prefers to use internal funding for their activities. Odit and Chittoo (2008) also stated that firms with recognizable growth opportunities could obtain funds quickly, so they do not have to rely heavily on Leverage to boost their investments.

A significant positive relationship with new investment is shown; it indicates that firms with high internal funding will have high investment activities. As stated by Richardson (2006), managers prefer to take in more investment projects for self-benefiting (empire building) or the cheaper cost of using internal funding. Opler et al. (1999) state that managers will choose to hold more cash to finance the future positive net present value investment. Especially when their cash

flow is insufficient or low and found that firms with high excess cash flow tend to invest more, despite their growth opportunities, to increase their benefit, discretion, and decrease firm's risk at once.

Similarly, Richardson (2006) result, it shows a significant negative relationship between age and new investment, as shown in Table 6 above. An empirical study by Schoubben and Van Hulle (2008) reports that newly listed firms invest more due to the significant substitution from internal to external financing since firms can reduce their financial constraints.

Table 6 shows a significant positive relationship between size and new investment. Consistent with previous research, smaller firms typically have a higher investment-cash flow sensitivity and rely heavily on external funding. However, the high cost and high risk hinder them from investing in positive net present value projects. Therefore, insufficient internal financing and the difficulty in raising external funding force them to pass away the good investment projects (Bulan and Yan, 2009; Hovakimian and Hovakimian, 2009; La Rocca et al., 2011). In contrast, the larger firms that typically have excess internal funding with easy access to external financing can quickly increase their size (Hovakimian and Hovakimian, 2009).

Next for stock return, it has a significant positive relationship with new investment. Firms are investing can gain several benefits from gaining competitive advantage, more profit, and reduce cost. Supported by Liu et al. (2015), which reports capital investment positively influences stock returns. However, it may also lead to excessive or abnormal returns that trigger sub-optimal investment. Overinvest occurs when firms have low investment opportunities but high free cash flow. Moreover, underinvest occurs due to asymmetric information when managers must satisfy shareholders by distributing additional dividends until the market finally realizes the actual value.

Next, the negative and positive signs in Table 7 indicate that there is investment inefficiency. The positive sign means overinvestment and a negative sign indicates underinvestment. Based on our first hypothesis, firms at introduction tend to underinvest, and our results have supported the first hypothesis with introduction is $-.2494197$. And our second hypothesis where the firms at growth stage tend to underinvest is also proven with $-.0954971$.

Some reasons can cause underinvestment behavior in the introduction and growth phase with a high investment-cash flow sensitivity. The reasons are limited or unliquidated internal funding resources (La Rocca et al., 2011). Next, the firm does not have any good credit histories (Bulan and Yan, 2009). The lower market-to-book ratios, high Leverage, and high cost of debt (Hovakimian and Hovakimian, 2009). Lastly, less accessible external financing hinders them from investing in a risky project with positive net value and become underinvest (Bulan and Yan, 2009b; Hovakimian and Hovakimian, 2009; La Rocca et al., 2011).

However, our third hypothesis is not proven because Indonesia's mature firms turn out to be underinvested. This result supports the study by (Hovakimian and Hovakimian, 2009), arguing that firms in the maturity stage with high flow years turn out to be underinvest because managers are investing less to anticipate shortage funds the future. The ability of mature firms to borrow debt quickly might be one reason they could be underinvested. According to Occhino and Pescatori (2015), high debts can depress the investment activities due to the debt overhang that can cause the firm to pass up profitable investment opportunities. When a firm with high Leverage invests more in new investment, the firm's value will benefit the creditors more than the firm. Therefore, the manager's cautious act to avoid the risk of default may lead to underinvest.

Moreover, a country's economic background can also be one of the determinant factors affecting a country's investment activities. Research by Jain et al. (2017) shows that emerging countries have limited capital funding options, higher volatility and higher cost of capital. This research reports that Indonesia has shallow investment opportunities, with moderate pricing information, shallow depth in capital market, and deficient long-term debt, which is one of the crucial sources for firms to increase their capital.

Then, the shakeout stage itself turns out to be under-invest with the mean of $-.3865402$. It means Indonesian's firms experiencing a decline in growth rates that make them inefficient, use the internal funding to keep operates and face financial distress with a probability of more challenging external financing to obtain (Drobetz et al., 2016), which cause them to become underinvest.

Lastly, for the fourth hypothesis, the results are aligned with our hypothesis, which captures firms in the decline stage tend to over-invest, due to the characteristics of the firm's survival in the decline stage. Firms in decline stage have negative profitability and low efficiency (Dickinson, 2011; Drobetz et al., 2016), which pushes them to survive by making a positive free cash flow by selling the tangible assets to support their cash flow and also increasing investment cash flow, which leads to overinvest (Hasan et al., 2015).

Collectively, the firm level of investment in Indonesia will increase as it is easier to obtain fund or cash, and vice versa, as shown by the significant result of the firm's age, cash, size, and insignificantly with firm's Leverage. Our empirical research about the investment efficiency and firm life cycle has shown that firms in Indonesia tend to under-invest, with the shakeout phase place the highest score of under-invest performance. Firms in developing countries like Indonesia may tend to suffer financing constraints (Levine, 2005). Regulators should acknowledge and solve this problem by promoting better developed financial systems that will decrease financing frictions and increase firms' ability to grab their investment opportunity. As results, more effective growing firms will also accelerate economic growth.

This research paper aims to capture the investment inefficiency within-firm life cycle in Indonesia, and the results are interesting to be proven different from U.S. firms. The future researchers can expand this paper by carrying out the cross-countries' analysis, including private firms into the sample or adding other important variables that might impact the investment decision.

CONCLUSIONS

This study proved a relationship between overinvestment and underinvestment in certain firm life cycle phases. The empirical analysis utilizes overinvestment and free cash flow by Richardson (2006) and firm life cycle theory by Dickinson (2011). This research observes a highly significant relationship between cash, age, size, stock returns to new investment, and insignificantly relationship between Leverage and new investment for Indonesian's firms. Yet, the measurement of growth opportunities is different from our research benchmark due to different and incomplete information used in the measurement. We also documented the measurement to examine the relationship between free cash flow and investment efficiency in each firm's life cycle stages resulting in both firms in the introduction and growth stage tends to underinvest and firms in decline stage tends to overinvest. However, the result for mature firms in Indonesia turned out to

be underinvest. This could be caused by the cautious act of managers in avoiding bankruptcy, shortage of funds in the future, and the true nature of Indonesia's economy conditions which overall has low investment opportunities, low availability of long-term debt, and moderate quality of pricing information. This point also brings out evidence where the differences might be caused by a different economic background in Indonesia, as an emerging country while USA, our research benchmark is a developing country.

This research paper's limitations are limited and ambiguous information about the shakeout stage (Hasan et al., 2015). Different methods of measuring growth opportunities due to incomplete information to calculate growth opportunities might be the reason for different growth opportunities between Indonesia and the United States. Lastly, our research sample excluded Indonesia's private company due to the limited information about the firm's financial statements. Private firms tend to have higher financial constraints (Drobetz, Janzen, & Meier, 2019). Thus, it will be interesting for future research exploring private firms versus public listed firms' investment inefficiency behavior.

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