Journal of Economics, Business, and Accountancy Ventura Vol. 19, No. 3, Decmber 2016 – March 2017, pages 335 – 348

Analysis of asset growth anomaly on cross-section stock returns: Evidence from Indonesia Stock Exchanges

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A R T I C L E I N F O

Article history:
Received 25 June 2016
Revised 23 November 2016
Accepted 24 January 2017

JEL Classification:
G11

Key words:
Asset Growth Anomaly,
Returns Predictability,
Efficient Market, and
Two Stage-Cross-Section Regression.

DOI:
10.14414/jebav.v19i3.515

A B S T R A C T

This study aims to examine asset growth anomaly where stocks with high asset growth will be followed by low returns in the subsequent periods. This study, using Indonesia Stock Exchanges data, found that an equally weighted low-growth portfolio outperforms high-growth portfolio by average 0.75% per month (9% per annum), confirming existence of asset growth anomaly. The analysis was extended at individual stock-level using fixed-effect panel regression in which asset growth effect remains significant even with controlling other variables of stock return determinants. This study also explores further, whether asset growth can be included as risk factor. Employing two-stage cross-section regression in Fama and Macbeth (1973), the result aligns with some the previous studies that asset growth is not a new risk factor; instead, the anomaly is driven by mispricing due to investors' overreaction and psychological bias. This result imply that asset growth anomaly is general phenomenon that can be found at mostly all stock market but in Indonesia market asset growth anomaly rise from investors' overreaction, instead of playing as a factor of risk.

A B S T R A K

Riset ini bertujuan untuk menguji apakah anomali pertumbuhan asset dimana saham-saham yang memiliki pertumbuhan asset yang tinggi akan mencetak imbal hasil yang rendah pada periode berikutnya. Dengan menggunakan data Bursa Efek Indonesia, riset ini menemukan portfolio saham dengan pertumbuhan rendah yang dihitung secara equally-weighted memiliki imbal hasil yang lebih tinggi dibandingkan portfolio saham dengan pertumbuhan tinggi dengan rata-rata 0.75% per bulan (9% per tahun), membuktikan adanya asset growth anomaly. Analisis menguak lebih dalam pada tingkat saham individu dengan menggunakan regresi panel efek tetap yang menunjukkan asset growth effect tetap signifikan bahkan setelah dikontrol dengan variable-variabel determinan imbal hasil saham lainnya. Riset ini juga menguji lebih jauh apakah pertumbuhan asset dapat dimasukkan sebagai faktor risiko. Menggunakan two-stage cross-section regression yang dibangun oleh Fama and Macbeth (1973), hasilnya sejalan dengan beberapa riset sebelum ini yang menunjukkan bahwa pertumbuhan asset bukanlah sebuah faktor risiko baru; anomali tersebut didorong oleh kesalahan penilaian harga karena investor mengalami overreaksi dan bias psikologi. Hasil riset ini membuktikan bahwa anomali pertumbuhan asset adalah sebuah fenomena umum yang ditemukan pada hampir semua bursa saham di dunia namun, khusus di bursa saham Indonesia, anomali tersebut muncul karena faktor individual investor, bukan berperan sebagai sebuah faktor risiko.

1. INTRODUCTION

Markowitz (1952) built the analysis of modern portfolio theory in which the academic literatures have developed theories for asset pricing. The well-known one is capital asset pricing model (CAPM), developed independently by Sharpe (1964), Lintner (1965), and Mossin (1966). The model argues that, in a portfolio that has been well-diversified, the return of an asset is a function of its non-diversifiable risk (systematic risk or market risk) represented by beta (β). The relevant risk factor in stock market is only market risk or β.

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However, some empirical findings show contradictory results. Other phenomena observed in stock markets that cannot be explained by market beta, a measure of return elasticity subject to market risk premium changes, are categorized as market anomaly (Frazzini & Pedersen 2014). Existing theory fail to explain these anomalies

In order for such model to correctly price an asset, it needs a sufficient platform related to the clarity of the market (Fama 1970, 2012). It is efficient market hypothesis (EMH), claiming that market is so efficient that market prices always fully reflect all relevant information. Stock prices move only because of new information, which is assumed impossible to predict its content and incoming flow even in immediate future. Several empirical studies have challenged the proposition of efficient market that it is impossible to predict return (Belo, Lin & Bazdersch 2014). Some studies show stock returns are predictable such as the finding of weak returns correlation over short periods (Hou, Xue & Zhang 2015), serial correlation of momentum property over 3-12 months period (Asness, Moskowitz & Pedersen 2013), and reversal patterns over long periods (DeBondt & Thaler 1985). Some empirical researches also show that there are some risk factor besides market risk which have significant influence to stock market movement (Fama & French 2015). Such findings, for example: firm size, book to market ratio, asset growth, profitability and investment, are known as market anomalies: factors or information beyond relevant information that seemingly predict abnormal returns.

Because of some persistent anomalies, Fama and French (2015) propose a five-factor model which includes, besides market risk, four other risk factor: size, book to market ratio, profitability, and corporate investment. Profitability as a return predictor is not a new issue in investor point of view, but profitability as risk factor that must be included in an asset pricing model is a new step in modeling empirical condition in stock market and has not enough theoretical foundation. Investment as a risk factor is in similar phase. Huge capital investment that is intended to boost future company production capacity and grab higher market share usually got a negative response from investors. Aggressive investment is a source of uncertainty concerning whether those investment decisions are a good decision or those investment will be executed smoothly and timely. Some studies show that profitability and investment were significant factor that affect stock return fluctuation, such as Lam and Wei (2013), Fama and French (2015, 2006), Novy-Marx (2013), and Belo, Xiaoji & Bazdresch (2014).

Asset growth effect is a new kind of market anomaly. Titman, Wei & Xie (2004) found that firms exercising capital expenditures that make their assets grow exhibit low return on their stocks in the following period, while divesting firms with contracting assets are inclined into higher return on their stocks. Their finding is a puzzling phenomenon. Stock prices are considered a function of present value of future cash flow, so firms realizing investment should be expected to generate higher earnings and cash, improving its future prospects and reflect such projection into current stock prices. Asset growth should be compensated in higher stock prices. An efficient market should have captured decision of the firms in making real investments but the reality evidently shows a fundamental bias in the market.

The impact of asset growth on stock return has been explained in some empirical works, but through disaggregated components of assets. From the investing side, Hirshleifer et al.(2004) shows that net operating asset has negative correlation with stock return. From the financing side, Pontiff and Woodgate (2008) found negative correlation for debt issuance, stock issuance, stock repurchase, and merger on stock return. But the use of total asset growth as means in examining stock return started with Cooper, Gulen & Schill (2008). Researches on this anomaly have been done not only in developed nation but also in emerging stock markets. It should be tested with other data than US stock markets so we can assure this phenomenon are not specific US stock market situation (Watanabe et al. 2013; Hou, Xue & Zhang 2015); Lipson, Mortal & Schill 2011; Griffin 2002). Indonesia stock market with its unique characteristics such as low liquidity and significant role of foreign investor in inducing price movement, is an interesting sample to empirically test the asset growth anomaly generalizability overall stock market in the world.

All this time, the dilemma of asset growth and stock return is associated with two types of explanation: risk-based phenomenon and investor's behavior. The former explanation is related with classical conception in finance about systematic risk. Firms with limited investment choices, usually operate in matured industry, which has limited technology advancement and stable competitive dynamics, may seem less risky than firms that have converted their investment choices into true

investment in order to anticipate probable future demand. Because return is merely compensation for risk, firms who put their investment into realization, which face relatively unpredictable future prospect, generate lower return. On the other hand, anomaly can also be explained through investors' behavior that may overreact on firms' announcement of investment decision. As investors expect firms will always throttle with high growth, there comes mispricing in which stock return in the following period is basically correction for the real value of investment.

The main interest in this study is to test empirically asset growth effect in Indonesia Stock Exchanges. The test includes aggregate market level, which show the anomaly exists among size-based stock portfolio and individual stock level which show whether the anomaly is spread equally among individual stocks. Later analysis gives stronger argument of the anomaly existence. This study contributes in risk-return relation debate, especially in emerging stock market. The results of this study fill the research gap whether asset growth reflects a specific risk factor. The results imply a more robust empirical expected return model. For practitioners, this study may give a clearer market situation and trend as a foundation of their investment strategy.

As an emerging market, stock market in Indonesia may arguably be less efficient. Many empirical tests on Indonesia stock market have been performed using traditional model like CAPM, but analysis of anomalies is merely found in handy, limited into size and book-to-market effect either as specific variables or from Fama-French three-factor model (Amanda & Husodo 2014). This study aims to examine whether the asset growth anomaly is also found in Indonesian market that is dynamic and still developing in nature and whether it play as a significant risk factor or just reflects contemporary investors 'behavior. As originality of this study, this relationship will be examined, not only, through portfolio analysis of aggregate level but individual stock level analysis also.

2. THEORETICAL FRAMEWORK AND HYPOTHESES

Large empirical studies have examined market anomalies that are associated with cross-section stock returns, such as value stock, price momentum, and accruals profitability (Fama & French 2006), size effect (Banz 1981), liquidity effect (Batten & Vo 2014), earnings announcement drift (Balakhrisnan, Bartov & Laurel 2010), post bank loan announcement (Billet, Flannery & Garfinkel 2006), price momentum (Asness, Moskowitz & Pedersen 2013), financing activities and analysts' forecasts (Bradshaw, Richardson & Sloan 2006), There are also persisting calendar effects such as January effect (Ritter 1988) and day-of-the-week effect (Keim & Stambaugh 1984). Anomaly is also found in relation with how stock is valued by investors in the market, in which stock returns are negatively correlated to price-to-earnings (Basu 1983) and positively correlated to book-to-market (Fama & French 1992). However, findings of factors or information beyond relevant information have evidently been able to predict abnormal returns and are referred as market anomalies. These anomalies even are available at low cost and easily accessible by investors and were found in considerable long range of time. Anomaly persistency contradicts basic assumption of efficient market hypothesis. When there is new information in the market it should be incorporated into the current price in a rapid manner. This anomalous phenomenon contradicts with common logic and foundation of finance theory. Aforementioned anomalies have made certain stock prices experience consistent deviation from what should be predicted by asset pricing theories

Under the presence of these anomalies, it is questionable whether abnormal returns as the result of easily accessible statistics are suspected as violation of an efficient market. However, Fama and French (1993) argued that the existence of anomalies does not mean that a market is inefficient; rather market anomalies are manifestation of risk premiums. Their findings led into the subsistence of Fama-French three-factor model, in which size and value (by book-to-market) are incorporated as risk premiums in addition to existing market risk premium (Fama & French 1993). Some studies with other data show similar results, such as Cakici, Fabozzi & Tan (2013) and Hanauer and Linhart (2015) with emerging market data, Docherty, Chan & Easton (2013) with Australia market data, Nartea, Gan & Wu (2008) with Hongkong data, and Amanda and Husodo (2014) with Indonesia data. Amanda and Husodo (2014) found liquidity premium is important risk factor compensation in Indonesia stock market. Liquidity premium is a vital factor that affects return in emerging market context, which are usually thin and have low liquidity (Batten & Vo 2014). Vu, Chai & Do (2014) develop liquidity adjusted asset pricing model as a response liquidity premium

existence.

In a response of documentation of some market anomalies and risk factors other than market beta, Fama French (2015, 1993) propose an empirical model, an alternative pricing model in comparison to traditional and theoretical CAPM. Whether assets should be fairly priced and stock risks would be multidimensional, Fama and French (1993) argue, they include three important risk factors that are proved to affect systematically stock: market risk premium, size, and book to market ratio, this model called as Fama-French Three Factor Model (Ang & Chen 2007)

The Fama French Three Factor Model has β (beta) that is parallel to the classical beta but will not have equivalent value, as there are two other factors taken into account in the model. SMB is the proxy of size measured by market capitalization and is the ellipsis for "small minus big", return of small firm stock portfolio minus big firm stock portfolio return. HML is the proxy of investor consensus on company prospect that are reflected by book-to-market ratio (B/M) that stands for "high minus low", return of high B/M ratio stock portfolio minus return of low B/M ratio stock portfolio. The model has become a standard model in empirical capital market research. Griffin (2002) and Nartea, Gan & Wu (2015) asked how generalizability of Fama-French three factor models successfully explains 90% of the portfolio results, in comparison to only 70% explained by CAPM in the sample. There are logical rationales behind these factors that contributed into the determination of stock returns. Small firms have higher costs of financing whenever they would like to borrow or issue new equities in the secondary markets. Book-to-market ratio is associated with distressed firms (Novy-Marx 2013) that have bad prospects, unfavorable financial performance, sporadic earnings, and meager management. The riskier the firms, it is conceivable that investors should be compensated by higher returns.

In their latest model development, to accommodate two pervasive anomaly factors, Fama and French (2015) include two other factors that have significant impact on stock return: profitability and investment. These two factors are proved play as significant risk factor that affects return in many capital market (Fama & French 2006)

Among market anomalies that are tested, asset growth anomaly has been attracted special attention of many researchers. The negative correlation between asset growth and stock returns can be traced back into some previous studies. Several initial works documented the effect of investing and divesting activities that affect asset growth, into stock returns. It is found that the impact of investing activities such as acquisition (Asquith 1983), equity offerings (Loughran & Ritter 1995); Pontiff & Woodgate 2008), debt offerings (Spiess & Affleck-Graves 1999), and bank loan announcement (Billet, Flannery & Garfinkel 2006) has negative impact on stock returns. However, the impact of divesting activities has been positive towards stock returns, such as spin-off restructuring (Cusatis, Miles & Wooldridge 1993), debt repayments (Affleck-Graves & Miller 2003), and dividend initiations (Michaely, Thaler & Womack 1995). The determination of stock return by paying attention to asset growth using total asset growth instead of its components began with Cooper, Gulen & Schill (2008) using stocks listed in NYSE, Amex, and NASDAQ, then followed by Gray and Johnson (2011) in Australian stock market and Muangsri (2010) in Thai stock market.

Titman, Wei & Xie (2004) established the link of the agency problem to the anomalous return-investment relationship. Investors are likely to overreact into investment decisions of a firm without fully considering the existence of agency problem of overinvestment. Therefore, firms that in fact exercise negative NPV investments would in turn have been overvalued in terms of future cash flow; therefore, the low subsequent return is the form of market correction towards the overvaluation.

Some researchers argue that asset growth anomaly is an extension of market timing on capital structure decision, in which firms tend to make external equity financing when their stock market values are high relative to book and past market values, and to repurchase equity when their stock market values are low. The investors should not take into consideration such management opportunism in financing behavior; there exists a negative relation between external financing that translated into change of total assets with subsequent stock returns.

Watanabe et al. (2013) pointed out that investors may excessively extrapolate from firms' stock price growth in the past in their assessment of firm investment decision. Some studies show that growth stocks, which is firms with historical high stock price growth tend to be overvalued therefore the return in the following periods for such stocks are consequentially lower due to price correction. In this point of view, asset growth anomaly and price momentum anomaly both have same origin:

investor overreaction. Because usually companies with high asset growth are companies that the stock price have already jumped previously, then when investors realize their wrong assessment they make a big correction on their stock valuation. Price corrections after subsequent price increases create negative relationship between return and investment. Asset growth anomaly just only other facet of price momentum anomaly

However, there are two sorts of explanation underlying the asset growth anomaly in cross-section stock returns: risk-based and mispricing. Risk-based factor identifies the relation between the extents of risk embed in the change of total assets of the firm, which is characterized by two concepts: growth options model and optimal investment model. The other is mispricing explanation driven by irrational investors' behavior in the market.

If it is proved that asset, growth anomaly exists in the market and it persists in all observation period, investors may have used them in order to generate excess returns. Therefore, the first hypothesis in this research is as follows:

Hypothesis 1: In aggregate portfolio level, subsequent stock returns where asset growth is low are higher than subsequent stock returns where asset growth is high.

The researchers investigate the first hypothesis further whether asset growth anomaly can be found on aggregate level or individual stock level, and whether this anomaly can be categorized as a risk factor or just an anomalous investor behavior.

Hypothesis 2: In individual stock level, there is negative effect of total asset growth to the subsequent stock returns.

Hypothesis 3: Asset growth anomaly is a representation of a risk factor, not due to mispricing investment decision.

Berk, Green & Naik (1999) developed *growth options model* in which firms have two types of assets: existing cash-flow-generating assets and options to make positive net present value (NPV) of investments in the future. Investment is attractive when the overall outlook of risk is low and the firm becomes more valuable. However, in making the investment there is lowered average risk for the next post-investment periods that lead into lower average returns. On the contrary, when the firm loses its assets, its value will subsequently drop therefore the average risk will increase.

The model infers that firms that do not exercise its growth options to realization of investment in assets will look riskier than those making investments. Risk is in turn compensated by return therefore the return for riskier firms will be higher.

Another possible explanation of asset growth anomaly derives from *optimal investment model*. Developed by Lam and Wei (2011), the model assume two periods in which firm makes investment I_{i0} in period 0 and incur investment adjustment cost. The firm's capital is $K_{i1} = I_{i0} + (1 - \delta) K_{i0}$, in which δ is capital depreciation rate. The investment adjustment cost is $C(I_0, K_0) = (\lambda/2) (I_{i0}/K_{i0})^2 K_{i0}$. Consequently, the higher λ means the higher level of investment friction. The operating profit of the firm is given by ΠK_{it} (t=0 and t=1), in which Π is marginal productivity of capital. Following this information, the free cash flow of the firm can be identified for period 0 and period 1. The free cash flow of the firm for the period 0 is $K_{i0} - I_{i0} - (\lambda/2) (I_{i0}/K_{i0})^2 K_{i0}$ and for the period 1 is $\Pi K_{i1} + (1 - \delta) K_{i0}$.

The objective of the firm is to maximize the present value of free cash flow is a follow.

$$\max \Pi K_{i0} - I_{i0} - \frac{\lambda_i}{2}\left(\frac{I_{i0}}{K_{i0}}\right)^2 K_{i0} + \frac{1}{R_i}[\Pi K_{i1} + (1-\delta)K_{i1}] \quad (1)$$

Ri is the discount rate, the first-order condition of the optimal investment of the firm is given by following equation:

$$R_i = \frac{\Pi + 1 - \delta}{(1 + \lambda I^*_{i0} / K_{i0})} \quad (2)$$

The attributes of above equation should be noted that the left-hand side is the cost of capital and the right-hand side is the marginal cost of investment. Hence, the optimal level of investment will be achieved when the cost of capital equals the marginal return on investment. Holding Π (profitability) and δ (depreciation) constant, in an optimality condition firms with higher investments are those with lower discount rates. Therefore, there exists negative relationship between investment and return.

Some experts make another conjecture about asset growth anomaly, which state that this type of anomaly reflects only a investors' psychological bias rather than a specific unknown investment risk factor. Mispricing concept is related to the projection of investors towards the value of stocks with growing assets. As investors believe that stocks with growing investments will keep growing in the foreseeable future, they may overestimate the true value of the investments or the firm itself (Lam & Wei 2011; Lipson, Mortal & Schill 2011).

Titman, Wei & Xie (2004) states the idea of *overinvestment*: investors are likely to overreact into investment decisions of a firm without fully

considering the existence of agency problem of overinvestment. The nonlinearity of objective between managers and shareholders of the firm may result into negative NPV investments that are misjudged by investors.

Aharony, Grundy & Zeng (2013) assessed the relation between market timing and capital structure, in which firms tend to make external equity financing when their stock market values are high relative to book and past market values, and to repurchase equity when their stock market values are low. The investors should not take into consideration such management opportunism in financing behavior, there exists a negative relation between external financing translated into change of total assets with subsequent stock returns that leads into mispricing due to *market timing in financing decision.*

Watanabe et al. (2013) pointed out that investors may engage in *extrapolation bias*: excessively extrapolating from firms' growth in the past in their investment decision. Similarly explained in the earlier subchapter about the growth stock, firms with historical high growth tend to be overvalued therefore the earnings in the following periods for such stock are consequentially lower due to price correction.

Relationship between stock return and asset growth is usually influenced by some company characteristic such as asset size and amount of accruals that is created by specific accounting policy that the company implemented and also some other market anomalies, such as price momentum (subsequent return has strong correlation) and Book to Market ratio (reflect investor consensus on prospect of a company). Asset size gives a context on asset growth, investors' response in different fashion between small firm with high asset growth and big firm with low asset growth (Watanabe et al. (2013). Amount of accruals gives investor deeper information about quality of profitability. Hafzalla, Lundholm & Van Winkle (2011) find discretionary accruals are associated with several performance measures, and accrual accounting report policy choices increase the in formativeness of accounting earnings. They show that the 'Jones model' that usually used as accrual measurement was systematically misfeasors discretionary accruals.

There are conflicting interpretations on accruals. Some believe that amount of accruals are provides evidence of earnings management, others argue that research design ambiguities limit the extent to which we can rely on these studies. Moreover, it is still unclear *why* managers choose to intervene in the reporting process. Some scholars argue that managers' accruals choices are 'opportunistic', and reflect their bad intention to bloat the reported earnings, others believe that managers exercise their discretion to *improve* the informational value of accounting numbers (Hafzalla, Lundholm & Van Winkle 2011).

3. RESEARCH METHOD

This study utilizes data from publicly listed firms in Indonesia Stock Exchange within the observation period of 2010 – 2014. Firms listed prior to 2010 or delisted within observation period are not included. The sample will not include financial firms as the nature of assets observed as capital investments, not financial investments. This method is also consistent with prior studies such as in Fama and French (1992) and Cooper, Gulen & Schill (2008).

The sample also will only include firms that publish accounting reports within the observation period. Both market data (e.g. adjusted closing price, market capitalization, Jakarta Composite Index/IHSG) and accounting data (e.g. total assets, book value of equity) are retrieved from Thomson Reuters Eikon. The number of stocks included in the sample is 283 publicly listed firms in Indonesian within five years observation period. Therefore, sample comprises of 1415 firm-year.

To achieve research objective mentioned initially, the researchers intend to examine stock return in two levels: aggregate and individual, by following procedures in Gray and Johnson (2011). In addition, this study also will examine whether asset growth anomaly is due to risk-based concept or mispricing caused by investor behavior. Therefore, different research models are used in order to achieve the examination on different objectives.

Examination of Asset Growth Anomaly in Aggregate Level

When cross-section anomalies are found in the capital market, past empirical studies commonly tested those anomalies using portfolio analysis. This analysis is to explore whether asset growth can predict the behavior of stock returns. Following the procedure in Gray and Johnson (2011), aggregate examination is performed by creating several portfolios containing stock sample in observed periods. The creation of portfolio is conducted annually in which the classification is based on annual asset growth level:

$$AG = \frac{\text{Total Asset}(t) - \text{Total Asset}(t-1)}{\text{Total Asset}(t)} \quad (3)$$

After the value of asset growth is computed, there will be positive AG and negative AG. Stocks with positive AG are divided into five portfolios cut-crossed in equal-interval quintile. Stocks with negative AG are put into two portfolios with median as interval cut-cross point. Each portfolio is reconstructed each year in all observed periods. Every year there are seven portfolios, listed from lowest to highest asset growth value: Negative 1, Negative 2, Positive 1, Positive 2, Positive 3, Positive 4, and Positive 5.

In each portfolio, monthly stock return is computed in each year. In order to know whether asset growth is negatively correlated with stock return, comparison of monthly stock return is made between two portfolios: Negative 1 and Positive 5. Research model used in this aggregate examination on portfolio is independent t-test, as both sample groups are independently correlated and changing in each observed year period. The calculations will require different formulas for different assumption of equal variance. Hence, after inter-sample variances are observed, the samples with equal variances will be calculated using Student t-test while the samples with unequal variances will be calculated using Welch t-test.

This part of analysis will also divide stocks into three groups based on their market capitalization: big stocks, small stocks, and micro stocks. Big stocks are those making up 90% of total market capitalization, small stocks with 7% market capitalization, and micro stocks of 3% market capitalization. This procedure follows the idea of Grey and Johnson (2011) that states the importance of stock-grouping analysis.

Examination of Asset Growth Anomaly in Individual Stock Level

Examination of total asset growth that effects stock returns in individual level is performed using panel regression between total asset growth (AG) one-year as independent variable on yearly stock return as dependent variable. Some control variables are also presented accordingly following Grey and Johnson (2011).

$$R_i = \beta_0 + \beta_1 AG + \beta_2 LogMV + \beta_3 BM + \beta_4 RET12 + \beta_5 NOA + \beta_6 ACCRUALS + \varepsilon_i \quad (4)$$

The dependent variable Ri is lagged one-year to the independent and control variables, in which asset annual return at time t is regressed into independent and control variables at time $t - 1$. The independent variable is only AG that is percentage of annual total asset growth.

The control variables are derived from Fama-French three-factor model. LOG MV is proxy for size as natural logarithm of market value of a stock (stock price multiplied by outstanding shares volume) and BM is book-to-market value (book value of equity per market value of equity). RET12 represents control variable for momentum property, which is buy-and-hold return in twelve months prior to portfolio formation. The other two control variables are alternative proxies for asset growth. NOA is net operating assets: total assets excluding financial assets (e.g. marketable securities) subtracted by total liabilities excluding financial liabilities (e.g. notes payable, bonds), while ACCRUALS are net accrued assets: accrued assets (e.g. accounts receivables, prepaid expenses) subtracted by accrued liabilities (e.g. accounts payables, accrued income).

In this regression, it is expected that the regression coefficient of variable AG (β1) is negative in order to support the second hypothesis of this study that has already stated above.

Examination of Asset Growth Anomaly as Risk-Based Factor

To identify whether the cause of asset growth anomaly is risk-based factor or due to investor behavior, two-stage cross-sectional regression (2SCR) model can be applied following Fama and Macbeth (1973). The first regression is used to estimate factor beta then the second regression is performed to identify the validity of each factor beta as risk factor.

The first stage is to conduct time-series regression with this model:

$$R_p - R_f = \alpha + \beta_{p,\,MRP}\,(R_{m,t} - R_{f,t}) + \beta_{p,\,SMB}\,SMB + \beta_{p,\,HML}\,HML + \beta_{p,\,AG}\,AGfactor_{,t} + \varepsilon_t. \quad (5)$$

Rp,t, Rm,t, and Rf,t are, respectively, return of asset p portfolio, return of market portfolio, and risk-free asset in period t. SMB (small minus big) and HML (high-minus-low) are size and book-to-market factors based on Fama and French (1992). AGfactort is factor-mimicking portfolio based on total asset growth. This model is basically derived from Fama-French three-factor model but enhanced with an asset-growth factor.

Estimation of factor betas in Equation (5) for the first-stage regression needs to follow independent steps different from previous regression and statistical tests in the previous sub-analysis. Therefore, a separate test asset is needed with a con

Table 1
Descriptive Statistics for All Variables

	AG	MV	BM	Ret12	NOA	ACCRUALS
All Stocks						
Mean	0.279	10,481	0.983	0.210	-0.208	0.145
Median	0.109	1,381	0.645	0.015	0.685	0.058
Std. Dev	1.896	30,896	2.628	0.811	4.068	0.605
Big Stocks						
Mean	0.415	29,800	0.858	0.633	0.714	0.102
Median	0.069	10,381	0.510	0.350	0.719	0.042
Std. Dev	2.754	48,292	1.269	1.16	0.449	0.231
Small Stocks						
Mean	0.525	3,870	0.922	0.226	0.294	0.263
Median	0.109	3,720	0.450	0.000	0.743	0.065
Std. Dev	4.335	1,982	1.609	0.691	2.772	1.413
Micro Stocks						
Mean	0.224	1,099	1.126	0.175	-0.759	0.149
Median	0.082	384	1.019	0.000	0.616	0.066
Std. Dev	0.998	3,468	3.271	0.857	5.087	0.306

struction of new portfolios. The test asset used in this part of analysis is the construction of portfolios based on cross-sorting stocks on firm size, book-to-market, and asset growth. Following the procedure in Gray and Johnson (2011), stocks are categorized into three parts based on each characteristic with 30th and 70th percentiles as the cutoff points; resulting into 18 portfolios from 2 × 3 × 3 sorting procedure. Monthly return is computed for each portfolio every year in the observation period. Thereby, the excess return of portfolio that is the dependent variable Rp,t – Rf can be obtained. Monthly market risk premium, Rm,t – Rf, is computed by subtracting monthly market return (IHSG return) to the monthly risk-free rate (SBI rate).

Several other portfolios are to be constructed to estimate other risk premiums predicted by the model. Portfolios are to be constructed by cross-sorting size and book-to-market (BM) to obtain SMB and HML. Gray and Johnson (2011) states that asset-growth premium is considered as BM neutral because asset growth is related to size less than to book-to-market. Henceforth, portfolios are further constructed by cross-sorting asset growth (AG) and book-to-market to obtain AGfactor.

Factor betas obtained in the first-stage regression is utilized as the independent variable in the second-stage regression. The model for the second-stage regression is as follows.

$$R_p - R_f = \lambda_0 + \lambda_1\beta_{p,MRP} + \lambda_2\beta_{p,SMB} + \lambda_3\beta_{p,HML} + \lambda_4\beta_{p,AG} + \nu_p \quad (6)$$

The purpose of this second stage regression is to estimate λ4. When the value is greater than zero and statistically significant asset growth anomaly is caused by risk factor. Otherwise, it is explained by mispricing due to investor behavior.

4. DATA ANALYSIS AND DISCUSSION

To find the aggregate level analysis, stocks were divided into three categories based on market capitalization. Big stocks were those making up 90% of total market capitalization, small stocks with 7% market capitalization, and micro stocks of 3% market capitalization. This procedure produced portfolio groupings in which the proportions of big stocks, small stocks, and micro stocks are around 25%, 15%, and 60% of total numbers of stocks, respectively. Size grouping are necessary because of the existence of abundant numbers of stocks with very low market capitalization. Small stocks also tend to be less liquid due to high transaction costs. Table 1 shows descriptive statistics that explain all observations.

The degree of asset growth (AG) subtly varies across size categories. Assets grow by average 42% and 53% respectively for firms in big and small groups, while assets for firms in micro group only grow by average 22.4%. In terms of size, micro stocks generally have tiny market capitalization (MV), only Rp 1.1 trillion in average. On the other hand, small stocks and big stocks are Rp 3.87 trillion and Rp 29.8 trillion in average value.

The value of book-to-market (BM) ratio is

Table 1
Statistics Summary for Return Differentials between Portfolio and Difference-Test

	Average Monthly Returns		Spread	t-statistic	t-critical
	Negative 1	Positive 5			
All	2.63%	1.88%	0.75%	5.640**	1.658
Big	4.08%	2.95%	1.13%	5.112**	1.658
Small†	3.68%	1.83%	1.85%	1.008	1.663
Micro	2.27%	1.55%	0.72%	3.960**	1.658

**Statistical significance at 5% level
†Small stocks are tested using Welch-t-test because the variance equality test (not presented in the report) shows statistical significance of different inter-samples variances.

Table 2
Asset Growth Anomaly in Individual Stock Level Regression Statistics Summary

$$R_i = \beta_0 + \beta_1 AG + \beta_2 LogMV + \beta_3 BM + \beta_4 RET12 + \beta_5 NOA + \beta_6 ACCRUALS + \varepsilon_i$$

AG is percentage of annual total asset growth. Log MV is proxy for size as natural logarithm of market value of a stock. BM is book-to-market value. RET12 represents control variable for momentum property, which is buy-and-hold return in twelve months prior to portfolio formation. NOA is net operating assets ACCRUALS is net accrued assets.

Variable	Hypothesis	Coefficient	p-value
Intercept		-26.6677	0.0154**
AG	(-)	-0.1027	0.0006*
LOGMV		0.9690	0.0130**
BM		0.1541	0.0090*
RET12		-0.2761	0.0061*
NOA		0.0486	0.1032
ACCRUALS		-0.0410	0.7500
Adjusted R-squared			0.1070
Prob. (F-stat)			0.0000

*Statistical significance at 1% level
**Statistical significance at 5% level
The regression employs White's heteroscedasticity-consistent standard errors in order to generate robust results.

slightly increasing towards smaller stock group, from 0.86 for big stock group to 1.13 for micro stock group. Value stocks (stocks with high book-to-market ratio) and growth stocks (stocks with low book-to-market ratio) should jointly present in each size group. But there is a leniency in which big stocks and small stocks that generally have higher asset growth also have lower book-to-market ratio. This may indicate that stocks with high asset growth are also "growth" stocks based on Fama-French three-factor model because they have low book-to-market ratio.

Variable RET12 shows that the momentum property of big stock is distinctive in comparison to other size groups. The average twelve-month buy-and-hold returns before portfolio formation for big stock group is 63.3%. Meanwhile small and micro groups have 22.6% and 17.5%, in average, respectively.

NOA and ACCRUALS are also presented as alternative proxies for asset growth. The value of NOA is monotonically declining towards the smaller size group. The smallest group of stocks tends to hold less operating assets than operating liabilities, indicating less solvency or heavy reliance on debt financing. ACCRUALS show the degree of short-term operating asset over short-term operating liabilities. Small stock has the highest average value (26.3%) over the other groups.

Aggregate Level Analysis

Analysis of asset growth anomaly in aggregate level was done by dividing stocks into several portfolios based on annual asset growth in the previous year. The analysis was then performed by analyzing the difference of average monthly returns between portfolio with the most negative asset growth (Negative 1) and portfolio with the most positive asset growth (Positive 5). The statistics summary for difference t-test of return differentials between Negative 1 and Positive 5 portfo-

Table 1
Statistics Summary of First-Stage Regression

$$R_p - R_f = \alpha + \beta_{p,MRP}(R_{m,t} - R_{f,t}) + \beta_{p,SMB}SMB + \beta_{p,HML}HML + \beta_{p,AG}AG\,factor_t + \varepsilon_t$$

Rp,t, Rm,t, and Rf,t are, respectively, return of asset p portfolio, return of market portfolio, and risk-free asset in period t. SMB (small minus big) and HML (high-minus-low) are size and book-to-market factors based on Fama and French (1992). AGfactort is factor-mimicking portfolio based on total asset growth.

Variable	Coefficient	Estimated Average Coefficient	p-value
Intercept	αp	0.01134	0.0013**
Rm,t – Rf,t	βp, MRP	0.01227	0.0318**
SMBt	βp, SMB	0.01529	0.0069*
HMLt	βp, HML	0.01332	0.0043*
AGfactor	βp, AGfactor	-0.00919	0.0006*
Adjusted R-squared			0.63647
Prob (F-stat)			0.00139

*Statistical significance at 1% level.

**Statistical significance at 5% level.

Table 2
Statistics Summary of Second-Stage Regression

$$R_p - R_f = \lambda_0 + \lambda_1\beta_{p,MRP} + \lambda_2\beta_{p,SMB} + \lambda_3\beta_{p,HML} + \lambda_4\beta_{p,AG} + \nu_p$$

Variable		Average Coefficient	t-stat	t-critical
Intercept	λ0	0.00113	2.28571**	1.67100
βp, MRP	λ1	0.01227	1.24838	1.67100
βp, SMB	λ2	0.01523	1.92369**	1.67100
βp, HML	λ3	0.01323	1.74998**	1.67100
βp, AGfactor	λ4	-0.00919	-1.24997	-1.67100

**Statistical significance at 5% level.

lios are described in Table 2.

Asset growth premium is 0.75% per month in average, which is around 9% per annum. This indicates that asset growth premium is economically and statistically significant. Fama and French (2006) and Gray and Johnson (2011) brought the importance of assessing stock return anomaly across different size grouping. Sorting into different size categories, asset growth premium is stronger within big stocks group, which is 1.13% per month or 13.56% per annum. Asset growth premium for micro stock group is 0.72% per month or 8.64% per annum, close to the value without size groupings. This reaffirms that micro stocks are numerous and may essentially drive the whole market. Incongruously, asset growth premium in small stocks group is substantially large but does not produce statistical significance. This may be affected by higher volatility possessed by stocks in the sample group.

For the first step analysis, the researchers found asset growth anomaly, particularly in the big stocks group. Therefore, the results support the first hypothesis that stocks with lower asset growth will subsequently have higher stock returns in aggregate level. Considering its unique characteristic, asset growth anomaly existence in Indonesia stock market indicates the anomaly is quite general in aggregate market level, it appears in almost all of world stock market (Lam & Wei 2011). As stated above, this anomaly contradicts asset pricing theory and efficient market hypothesis. If this anomaly represents a significant specific risk factor, we must reformulate a more robust empirical asset pricing model.

Individual Stock-Level Analysis

For the second sub-part of analysis, Table 3 summarizes the regression results using fixed-effect panel regression. The major interest of this research is significant effect of asset growth to the subsequent yearly individual stock returns (p-value = 0.0154). The coefficient of AG (0.1027) implies that 100% increase in asset growth results into 10.27% decrease in the next annual stock return. This affirms the existence of asset growth anomaly in Indonesia not only in the aggregate portfolio level, but also in individual stock level.

The extent in which asset growth is statistically significant is also higher in comparison to other possible determinants of cross-section stock returns highlighted by control variables in the model. The statistically significant control variables are LOGMV, BM, and RET12 but none of them have higher degrees of statistical significance than that in AG. The other control variables, NOA and ACCRUALS, are not statistically significant therefore, they are incapable in replacing AG as a proxy for asset growth.

In conclusion, the result of individual stock level analysis using panel regression evidently supports the second hypothesis in which asset growth has a negative effect on cross-section stock returns in the individual stock level. The result confirms existence of asset growth anomaly in such emerging stock market like Indonesia stock market. Muangsri (2010) found similar findings in Thailand market but at lower magnitude. Nartea, Gan & Wu (2008) found almost same results in Hong Kong stock market. The result of this study confirms Watanabe et al (2013) which show asset growth anomaly in international context. This convey a serious implication to current empiric asset pricing model, especially in emerging market, and also to current investor strategy application in this region.

Exploring the Inclusion of Asset Growth as Risk-Factor

Up to this point it is identified that there exists a considerable asset growth effect in Indonesian stock market, whether in portfolio level or in individual stock level. This study attempts to find further whether the predictability power of asset growth is due to risk estimation by rational investors or due to mispricing caused by irrational behaviors of investors.

In order to examine whether asset growth is a risk-based factor we apply two-stage cross-section regression (2SCR) used in Fama and Macbeth (1973). The first step is regressing excess return of each test asset to its factor loading. The result of the first-stage time-series regression is given in the following Table 4.

The individual effect of each factor beta is significant that indicates asset returns are function of sensitivity to market risk premium, size premium, value premium, and asset growth premium. All factor betas from the firs-stage regression are derived to be put as independent variables in the second-stage regression. The result of the second-stage regression is given in the following Table 5.

From the second-stage regression, the regression coefficient of market risk beta (λ1) is not statistically significant. In the other hand, the coefficient of size beta (λ2) and value beta (λ3) have statistical significance. This is relevant and consistent to general findings in empirical finance, such as in Fama and French (1992).

The major interest in this two-stage cross-section regression is the coefficient of asset growth premium (λ4) that is not statistically significant. Therefore, there is no strong evidence to accede the alternate third hypothesis in which asset growth anomaly is caused by risk factor. The null hypothesis is not rejected that shows the asset growth anomaly is merely investor behavior overreaction in Indonesia capital markets. The result aligns with majority of empirical research on this anomaly (Watanabe et al 2013). Because it does not represent a significant specific risk factor, current empirical asset pricing model, such as famous Fama-French Five Factors Model and their previous Three Factor Model, does not include asset growth as one of risk factors (Fama & French 2015). This study reaffirms previous studies' results that in emerging markets asset growth anomaly are more significant and at higher magnitude. Considering level of market efficiency, number of investors and investors' sophistication, it may be a reason why emerging market tends to have a higher asset growth premise.

Asset growth anomaly in Indonesia stock market only reflects investors' miscalculation on the impact of firm's capital expenditure to firm's future prospect. Investor tend to overestimate and overoptimistic about the investment impact. Lower return in the subsequent period after a significant asset growth is a result of corrections made by investors to bring back stock price to its actual fundamental value, which fully reflect prospect created by undertaken investment. As Watanabe et al (2013) said investors always see capital investment as a necessary requirement for surviving in tough competition but they tend to overvalue the impact of investment, especially in high tech industry and growing market demand, which are difficult to make a clear prospect, competition, and direction of technology advancement.

5. CONCLUSION, IMPLICATION, SUGGESTION, AND LIMITATIONS

The main findings of this study confirm the previous studies that asset growth is negatively related to stock returns. Within 2010 – 2014 observa-

tion period, an equally-weighted portfolio of low asset-growth outperforms a portfolio of high asset-growth by 0.75% per month, equating to 9% per annum. Of particular interest, the asset growth effect is strongest amongst the largest Indonesian stocks. Big stocks group make up only around 25% of total firms listed in Indonesia Stock Exchange but hold 90% of all total market capitalization. The asset growth premium for big size group portfolios is 1.13% per month or 13.56% per annum. This facts contradicts asset pricing theory and efficient market hypothesis.

This study also examines whether the asset growth anomaly remains in the individual stock level. Using fixed-effect panel regression, the coefficient of asset-growth variable is negative and statistically significant when regressed to the subsequent yearly stock returns, suggesting their negative relationship. The effect of asset growth is still strong even after controlling with other variables recognized as determinants of stock returns. Asset growth anomaly on individual stock level reveals more serious contradiction between these empirical findings and asset pricing theory. Financial market tend to deviate from conventional efficient market hypothesis, investors tend to behave irrationally and drag asset price far enough from their fundamental value. Asset growth anomaly appears because investors make a correction on their previous wrong decision; they persistently tend to be overoptimistic about firms' investment.

The examination also explores further of the possibility of asset growth to be included as risk factor. This aims to test whether the negative relationship is caused by rational conception in which higher asset-growth stocks are deemed less riskier or only by mispricing from investors who overestimate those stocks. This study finds no supporting evidence for the inclusion of asset growth as additional risk factor. Using Fama and Macbeth-two-stage cross-section Regression (2SCR), asset growth is not a significant factor loading. This finding aligns with the conclusion of Gray and Johnson (2011) and Cooper, Gulen, and Schill (2008) that asset growth anomaly is caused by mispricing from investors' irrational behaviors.

The result of this study imply that asset growth anomaly is a general phenomenon that can be found at mostly all stock market, including in an emerging market such as Indonesia stock market but in Indonesia market asset growth anomaly rise from investors' overreaction, instead of playing as a factor of risk. From efficient market hypothesis (EMH) point of view, this findings challenge the basic assumption of EMH that investors always behave rationally. Low stock returns after significant incremental firm investment are reflection of investor irrational judgment about future company business and their position in the market.

Asset growth anomaly is closely related to some other anomalies that emphasize by behavioral finance paradigm such as price momentum, investor overreaction, and overconfidence. Subsequent low return after high asset growth may indicates a correction process done by investor after speculative or irrational assessment on value of a stock. In order to concluding with affirmation that there are asset growth anomalies, we should test whether this anomaly is not only a reflection of some behavioral anomaly. For further research, we suggest this confirmatory test so that we are able to separate this asset growth anomaly from other behavioral anomaly.

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