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Determinants of Stock Splits' Ex-Date Returns: Empirical Evidence from Indonesian Stock Market

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ABSTRACT

This study analyzes the stock returns on the days surrounding stock split events to find whether there are price movement anomalies during the split event of Indonesian public companies and whether they follow a signalling hypothesis or a trading range/liquidity hypothesis. This study used the stock returns data for 60 days around 50 split events of publicly traded stock on the Indonesia Stock Exchange from 2010 to 2015. This study found an anomaly pattern of stock prices with the ex-date as the peak and a positive average return that could not be explained by the general market movement. The cross-sectional regression of the conservative capital asset pricing model (CAPM) and three other factors failed in explaining the ex-date return anomalies. The results of the empirical model indicate that ex-date return anomalies were not related to a firm's operating performance but were strongly related to the split factor, weakly related to trading volume, and also weakly related to the market value. Overall, these findings support the trading range/liquidity hypothesis.

Keywords: Event study, market reaction, stock split

INTRODUCTION

Stock splits are changes in the number of shares outstanding that theoretically does not change the value of a firm. Nevertheless, recent studies show that the market reacts positively to stock split announcements (Hu et al., 2017; Karim & Sarkar, 2016; Nguyen et al., 2017). Following the idea of an efficient market theory that the stock price will react to new information, the positive

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reactions show that the announcement of the split also signals favourable information about the firm (Fama, 1969). Two theory versions that explain these price movements are the signalling hypothesis and the trading range/liquidity hypothesis.

According to the signalling hypothesis, the firm's management wants to convey favourable private information about the firm's prospects and therefore signals undervaluation of the splitting firms (Brennan & Copeland, 1988; Ikenberry et al., 1996). Alternatively, the trading range/liquidity hypothesis suggests that the split is an attempt to increase the liquidity or trading volume of the stock because the stock price is beyond the optimal trading range (Copeland, 1979; Lakonishok & Lev, 1987). However, these two theories have been debated for two decades (Desai et al., 1998).

The stock market of Indonesia, which is chosen as the data sample of this study, has good growth in the number of listed companies and the market capitalization during the past decade (Triady et al., 2016). While the previous stock split studies on the Indonesian stock market analyzed stock returns upon the announcement dates (Fauzi et al., 2014; Janiantari & Badera, 2014), this paper instead focuses on the ex-date returns to find whether there were stock return anomalies. Besides, this research seeked if the ex-date returns followed the prediction of the signalling hypothesis or the trading range/liquidity hypothesis. To the best of the authors' knowledge, there are limited studies regarding this context, notably that used the Indonesian stock market data.

Literature Review

The stock splits should be purely cosmetic since the multiplication of the shares numbers would not affect the firms' cash flows, proportionate shareholder ownership and the value of the firms. Nevertheless, the previous studies show that stock splits happened during the period when the stock prices increased abnormally more than would be explained by the typical relationship with the general market behaviour (Fama, 1969; Grinblatt et al., 1984; Lamoureux & Poon, 1987). The following studies were trying to find the cause of these abnormal returns using two versions of explanation.

The signalling hypothesis postulates that the abnormal returns during the stock split events are considered as signals from the firm's management that convey favourable private information about the firm's prospects. The increasing stock prices after the split are followed by increased future dividends that assume the firms had better performance (Fama et al., 1969). The favourable signals, such as changes in dividend payout from the prior cash dividends, are positively related to the abnormal return on the split events (Grinblatt et al., 1984). Splitting firms yield higher earnings growth than similar, non-splitting firms in the five years before the split (Lakonishok & Lev, 1987). Split announcements of abnormal returns are significantly correlated with split factors and with earnings forecast errors. However, the significant coefficient on the uncorrelated split factor component suggests that a signalling explanation is incomplete (McNichols & Dravid, 1990).

The trading range hypothesis suggests that there is an optimal trading range, and that splits realign share prices. At the optimal trading range, the stock will be more frequently traded, thus increasing the trading volume activity while decreasing the liquidity risk of the stock. Firms set split factors to achieve a target range for their share price, and the target range is higher for larger firms (McNichols & Dravid, 1990). Stock splits generate lower stock prices and increase brokerage fees (Brennan & Copeland, 1988). Thus it can attract the attention of security analysts who discover the good news and inform their clients through earnings forecasts (Brennan & Hughes, 1991). The abnormal returns on the ex-date of the splits are caused by a massive number of small trades (Schultz, 2000) and numbers of uninformed trades (Easley et al., 2001) immediately following the split. The increasing trading volume after the splits is mostly contributed by individual investors rather than institutional investors (Dhar et al., 2005). Stock splits improve trading continuity, alleviate liquidity risk, and give more benefit to the less liquid stocks, which is consistent with the trading/range hypothesis (Lin et al., 2009).

Other studies have alternative explanations for abnormal returns on the split events. The ex-date of the split abnormal return is explained by the announcement effect, which is related to the abnormal return on the announcement day, and the ex-date effect, which is related to the clientele shifting, the percentage change in several shareholders due to the tax option (Lamoureux & Poon, 1987). The abnormal return on split announcements is negatively related to the target share price after the split associated with trading costs, which is assumed as an increasing cost of selling the odd stocks by the investors who hold the round lots before the split (Brennan & Copeland, 1988). In the emerging market cases, the abnormal return and trading volume, even coming before the split announcement, raises strong suspicions of insider trading existence (Nguyen et al., 2017).

The following studies were more focused on a long-term investigation of stock split events. Consistent with the signalling hypothesis, splits are associated with excess returns in the three years following the announcement, which also suggests that the splitting firms perform better in the future (Ikenberry et al., 1996). Little evidence is found that stock splits signal improvement in long-run operating performance and are more consistent with the trading range/liquidity hypothesis (Huang et al., 2009). Contradictory to the signalling hypothesis, split firms are overvalued in pre-announcement years, and the overvaluation reaches its peak in the split announcement year as compared to the years surrounding the split announcements (Karim & Sarkar, 2016). However, this study has more focus on short term variables that may relate to the ex-date of stock split events.

METHODS

The data analyzed in this study was the stock prices on each stock split event of publicly traded stock on the Indonesia Stock Exchange from 2010 to 2015. The stock split dates were derived from Indonesia Stock Exchange public information. The stock and market prices were derived from Yahoo Finance. The daily stock return and market return were calculated by a simple stock return formula (adjusted with the split factors during the ex-date).

The theory of an efficient market (Fama, 1969) postulates that the stock prices have a random walk movement. Thus, if the stock returns are clustered according to the day surrounding the split events, the return average would be zero. Following Lamoureux & Poon (1987) that analyzed whether there were return anomalies on those days, this study used the one-sample t-test on each of the clusters of the days surrounding the ex-date.

Hypothesis 1: There are Non-Zero Average Returns on the Day Clusters

Following recent studies (Fama et al., 1969; McNichols & Dravid, 1990), this study also analyzed the average residuals of time-series regressions of the single-index model (Sharpe, 1964), which was empirically tested by Jensen (1968). We ignored the risk-free return (Rf) since the number was insignificant in calculating the daily excess return.

$$R_{it} - R_{ft} = \alpha_i + \beta_i\left[R_{mt} - R_{ft}\right] + u_{it}$$

Where R_{it} = daily return of stock i at day t, R_{mt} = daily return of market at day t and u_{it} = regression residual. According to the model, if the market return can explain the stock return, it may result in tiny regression errors. So if these errors are clustered according to the day surrounding the split events, the return average error will be zero. This study used the one-sample t-test on each of these error clusters to find whether the abnormal errors existed.

Hypothesis 2: There are Non-Zero Average Regression Residuals

In the first attempt, this study used the conservative cross-sectional single-index model and the single-index model with two additional factors, book-to-market, and market capitalization, proposed by Fama & French (1992) (later mentioned as the three-factor model) to explain the ex-date returns.

$$R_i - R_f = \alpha + \beta\left[R_{mt} - R_{ft}\right] + u1_i$$

$$R_i - R_f = \alpha + \beta\left[R_{mt} - R_{ft}\right] + \frac{hBE}{ME_i} + s\ln(ME)_i + u2_i$$

Where R_i = daily return of stock i at ex-date, R_m = daily return of market at ex-date, BE/ME_i = book to market ratio of stock i, $\ln(ME)_i$ = natural log of the market value of stock i, and u_i = regression residual. All book value variables were annualized and taken from the last published quarterly financial report before the ex-date.

Hypothesis 3: The Market Return, Book-to-Market, and Market Capitalization have a Significant Effect on Excess Stock Return on the Ex-Date

In identifying what hypothesis worked best in explaining the abnormal returns on the ex-date, this study built an empirical model with the regression errors from the previous regressions as the dependent variable. Then independent variables that are added might represent each hypothesis. In this case, it is expected that these independent variables might explain the part which cannot be explained by CAPM or the three-factor model. For the second empirical model, variables are added from the three-factor model as additional independent variables.

$$u_i = \beta_0 + \beta_1 PER_i + \beta_2 PM_i + \beta_3 TATO_i + \beta_4 EM_i + \beta_5 \ln(VOL)_i + \beta_6 SF_i + e_i$$

$$u_i = \beta_0 + \beta_1 \left[R_m - R_f\right] + \beta_2 \ln(ME)_i + \beta_3 BE/ME_i + \beta_4 PER_i + \beta_5 PM_i + \beta_6 TATO_i + \beta_7 EM_i + \beta_8 \ln(VOL)_i + \beta_9 SF_i + e_i$$

where PE_i = price-earnings ratio of stock i, PM_i = profit margin of stock i, $TATO_i$ = total asset turnover of stock i, EM_i = equity multiplier of stock i, $\ln(VOL)_i$ = natural log of 30 days total trading value before the ex-date of stock i, SF_i = split factor of stock i and e_i = error term. All book value variables were annualized and taken from the last published quarterly financial report before the ex-date.

Hypothesis 4: The Price-to-Earning, Profit Margin, Total Assets Turnover, Equity Multiplier, Trading Volume, and Split Factor have a Significant Effect on the Regression Residuals from Cross-Sectional CAPM and the Three Factors Model

To test the signalling hypothesis, this study used price to earnings ratio and Du Pont ratio as independent variables. The price-to-earnings ratio may act as a parameter whether the firm is considered undervalued before the split events according to its earnings. Assuming that it has a negative relation with the stock return because the investors would respond positively to the undervalued signal. To test the signalling hypothesis, following Huang et al. (2009), this study used a return on equity (ROE) variable to measure the operating performance of the firm. However, in this empirical model, the ROE was extended according to Du Pont analysis: three variables profit margin ratio as an operating efficiency measurement; total asset turnover as the asset use efficiency; and equity multiplier as a financial leverage measurement.

$$ROE = \frac{Net\ income}{Total\ equity} = \frac{Net\ income}{Sales} \times \frac{Sales}{Total\ assets} \times \frac{Total\ assets}{Total\ equity}$$

$$ROE = PM \times TATO \times EM$$

This study expects that these operating performance variables would have a positive relationship with the stock return since the investors would respond positively to the signal that the firm would have even better performance in the future.

To test the trading range/liquidity hypothesis, this study used total trading volume 30 days before ex-date (Dhar et al., 2005) and the split factors (McNichols & Dravid, 1990) as independent variables. If it follows the trading range/liquidity hypothesis, the total trading value before the ex-date would have a negative relation with the stock return. It is because investors would respond positively to the previous low trading volume stock before the split. The study also expected that the split factor would have a positive relationship with stock returns (McNichols & Dravid, 1990). It is because of the higher the split factor, the more liquidity risk reduction of the stock after the split (Lin et al., 2009).

RESULTS AND DISCUSSIONS

There were 50 events of the stock split in total during the period from 2010 to 2015. The number of stock splits in each year, and the split factors can be seen in Table 1. The daily stock return during the ex-date each year and each split factor can be seen in Table 2. Similar to findings in previous studies (Fama et al., 1969; Grinblatt et al., 1984; Ikenberry et al., 1996; McNichols &

Table 1
Number of a stock split for each split factors in 2010 - 2015

Split factor						
	2:1	4:1	5:1	10:1	>20:1	Total
2010	2	1	1	-	-	4
2011	1	3	5	-	-	9
2012	1	2	3	3	-	9
2013	2	1	5	2	2	12
2014	2	1	-	-	-	3
2015	4	1	2	4	2	13
Total	12	8	16	9	4	50

Source: Researcher processed data

Table 2
Average stock returns the ex-date for each split factors and each year

Split Factor						
	2:1	4:1	5:1	10:1	>20:1	Average
2010	-1.83%	0.43%	4.71%	-	-	0.37%
2011	3.23%	-1.12%	1.92%	-	-	1.05%
2012	-3.13%	-2.07%	-0.51%	4.55%	-	0.54%
2013	1.54%	-0.61%	3.66%	2.06%	9.82%	3.71%
2014	7.14%	-1.00%	-	-	-	4.43%
2015	0.71%	-0.91%	0.01%	6.67%	5.84%	2.65%
Average	1.39%	-1.07%	1.94%	4.29%	7.83%	2.16%

Source: Researcher processed data

Dravid, 1990), this study found that there was a 2.16% change on average on stock split event days. Confirming McNichols and Dravid (1990), price changes with stock dividend and split announcements were significantly correlated with split factors. This study also found that there was a tendency that the average return increased in higher split factors, except for the split factor of 4:1. It suggests that the liquidity of the stock increases for higher split factors.

The average stock returns were the highest on the ex-date in comparison to the other 59 days surrounding the split events and then became the lowest on day three after the split events, as can be seen in Figure 1. The curve pattern of the average stock returns was quite randomly different in comparison to the curve pattern of the average market return. To identify the price movement during the split event, this study calculated the average percentage stock price (after adjusting for the split factors) and also market price differences of surrounding days and ex-date. As can be seen in Figure 2, on average, the stock prices were slightly higher only for three days after the split. Starting on the day -24, the average price dropped at the lowest on day -12, then there were increasing patterns until day +3 before making a decreasing pattern afterwards. It was also found that the average stock price created a non-parallel curve pattern in comparison to the average market returns.

The average return on the days surrounding the ex-date is presented in Figure 3. Confirming Grinblatt et al. (1984) and (Lamoureux & Poon, 1987), this study found a significant positive difference in the ex-date, which also occured in day -30. Meanwhile, a significant negative difference was found on day -17, day -16, day -12, day three and day 14. In this case, further explanation is needed on why the return suddenly dropped on the third day after the ex-date.

The average residual of time-series regression of the single-index model indicated that there was a significant positive error on the ex-date, which could not be captured by the market return movement,

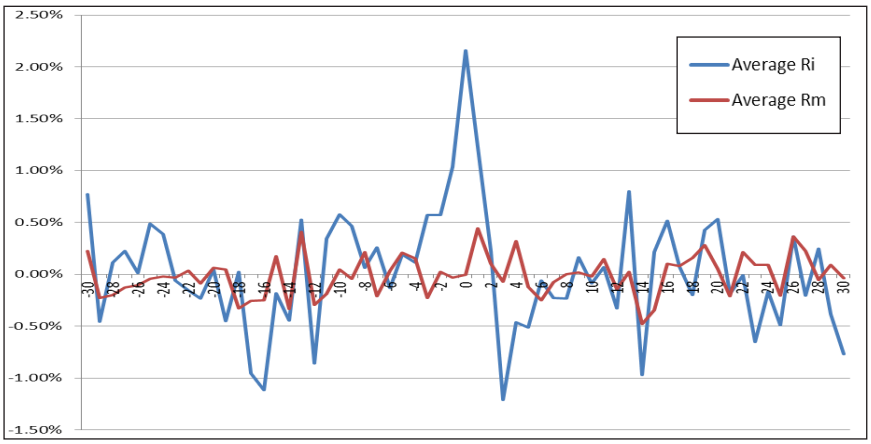

Figure 1. Average return on day surrounding the stock split

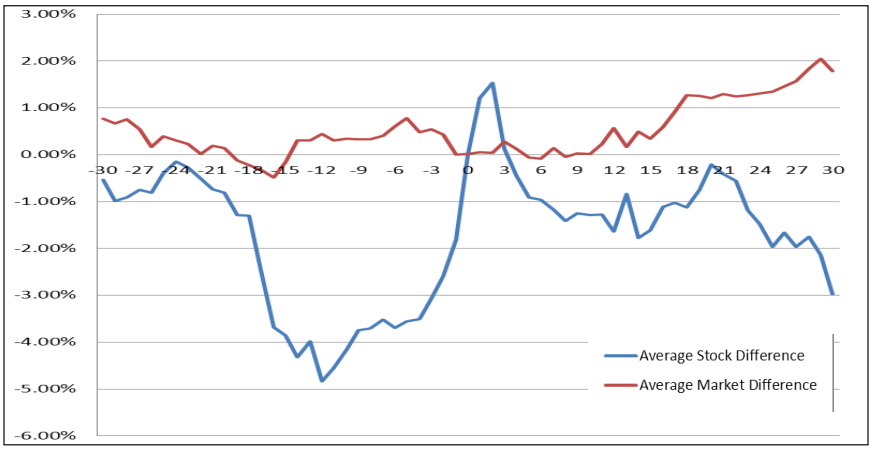

Figure 2. Average percentage price difference of surrounding days with the ex-date

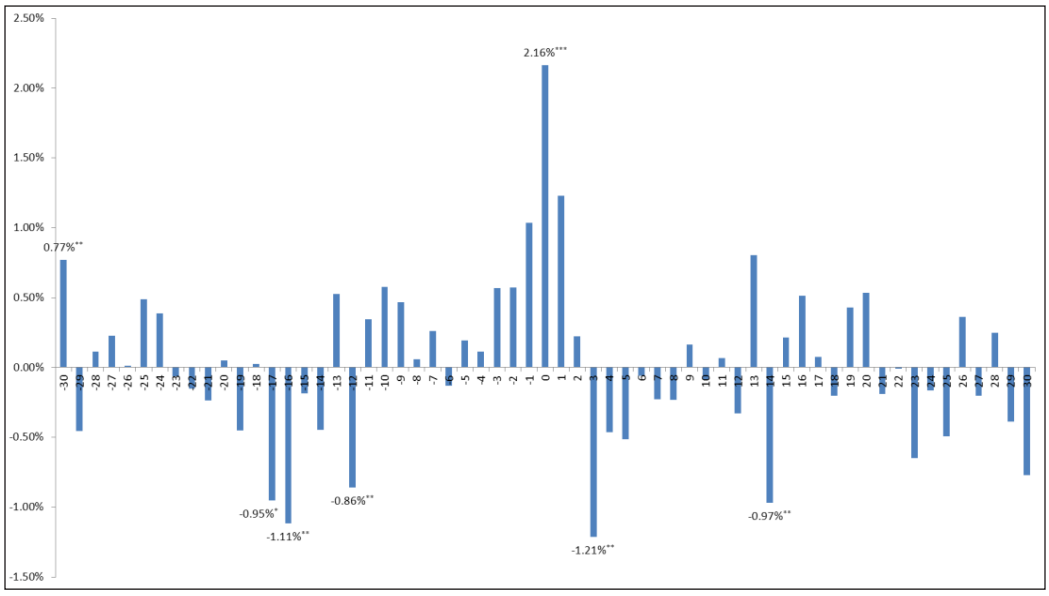

Figure 3. Average stock return
*Notes: *, **, and *** denote statistical significance at 10%, 5%, and 1% levels respectively*

as shown in Figure 4. Nevertheless, the average residual of surrounding days created a random pattern. Thus it is temporarily concluded that the market return alone could not explain the abnormal return on ex-date.

The results for cross-sectional CAPM regression and three factors model regression are presented in Table 3. Both of the models failed to explain the abnormal return on the ex-date of split events. The positively significant alpha on CAPM showed that the single market return variable could not explain the stock return. Nevertheless, the significant alpha disappeared when market value and book-to-market variables were added.

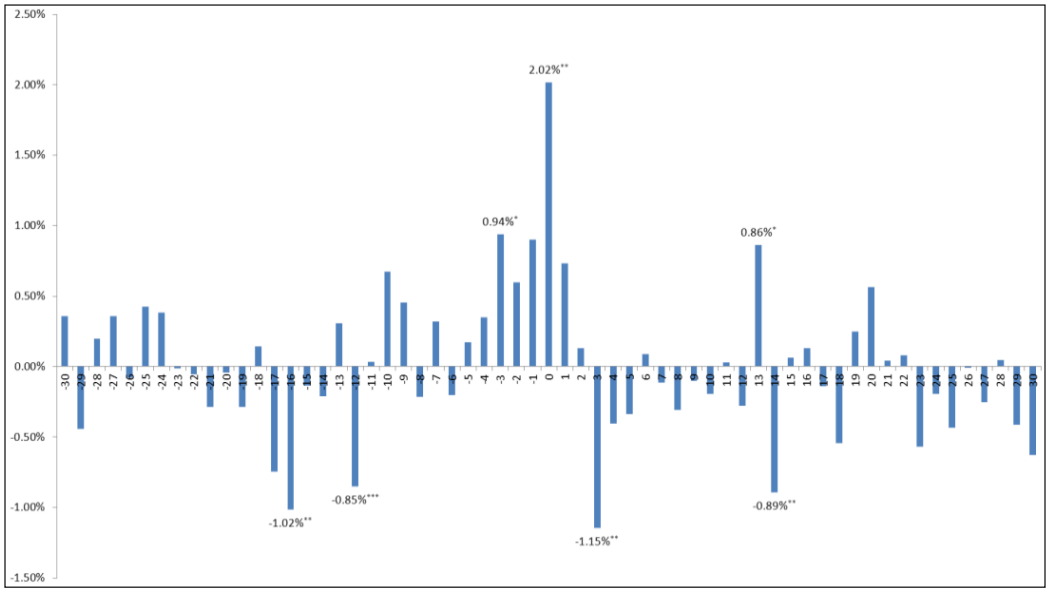

Figure 4. Average residual regression
*Notes: *, **, and *** denote statistical significance at 10%, 5%, and 1% levels respectively*

Table 3
CAPM and three factors model

Independent Variables	Expected Sign	Coefficient (CAPM)	Coefficient (3F Model)
Alpha		0.023**	-0.083
		(2.662)	(-0.653)
Rm	+	0.345	0.199
		(0.396)	(0.240)
Ln(ME)	-		0.004
			(0.903)
BE/ME	+		0.002
			(0.080)
R^2		0.005	0.017
F-statistic		0.240	0.271
Durbin-Watson stat		1.851	1.881

*Notes: *, **, and *** denote statistical significance at 10%, 5%, and 1% (p-value) levels respectively. Rm is the market return. Ln(ME) is the natural logarithmic of market capitalization. BE/ME is the book-to-market ratio* (*Source:* Researcher processed data)

Table 4 shows the results for the empirical model regressions using residual of CAPM regression as a dependent variable (Laura & Fahad, 2017). The regression output of model 1 shows that the independent variables failed to explain the dependent variable, except for the split factors with a positively strong significant explanation and equity multiplier with a weak significant explanation. The regression output of model 2 had quite similar results. Nevertheless, the market value variable had

Table 4
Results of the empirical model using CAPM regression residual as the dependent variable

Independent Variables	Expected Sign	Model 1	Model 2
Alpha		-0.018 (-0.509)	-0.269** (-2.397)
Rm	+		0.405 (0.955)
Ln(ME)	-		0.011*** (2.713)
BE/ME	+		0.011 (0.566)
PER	-	6.65×10^{-5} (0.684)	6.37×10^{-6} (0.065)
PM	+	3.81×10^{-5} (0.313)	9.24×10^{-5} (0.705)
TATO	+	4.34×10^{-4} (0.318)	-1.05×10^{-4} (-0.062)
EM	+	0.005* (1.829)	0.004 (1.441)
Ln(VOL)	-	-9.9×10^{-4} (-0.524)	-0.004* (-1.742)
SF	+	0.002*** (7.316)	0.002*** (5.746)
R^2		0.400	0.466
F-statistic		4.771***	3.885***
Durbin-Watson stat		1.941	1.959

*Notes: *, **, and *** denote statistical significance at 10%, 5%, and 1% (p-value) levels respectively. Rm is the market return. Ln(ME) is the natural logarithmic of market capitalization. BE/ME is the book-to-market ratio. PER is the price-to-earning ratio. PM is the profit margin. TATO is the total assets turnover. EM is the equity multiplier. Ln(VOL) is the natural logarithmic of the trading volume. SF is the split factor* (Source: Researcher processed data)

a positively strong significant explanation, and volume trading had a positively weak significant explanation.

Table 5 shows the results for the empirical model regressions using the residual of three-factor model regression as a dependent variable. These results are quite similar to Table 4, except for the explanatory power of the market volume variable turned into being weakly significant.

The results seem to favour the trading/range hypothesis rather than the signalling hypothesis. Confirming McNichols and Dravid (1990), the return on ex-date has a positive relationship with the split factor. This explanation of the split factor confirms Lin et al. (2009) findings that stock split gave more benefit to the less liquid stocks by decreasing the liquidity risk. The significant positive relationship on the market value indicates that the firm with more significant capitalization generates a higher return. It is contradictive with the expectation of negative relation from assuming that the split event of a more prominent firm is more positively anticipated by the stock trader,

Table 5
Results of the empirical model using the three-factor model regression residual as the dependent variable

Independent Variables	Expected Sign	Model 1	Model 2
Alpha		0.002 (0.062)	-0.164 (-1.448)
Rm	+		0.552 (1.301)
Ln(ME)	-		0.007* (1.800)
BE/ME	+		0.009 (0.472)
PER	-	4.22×10^{-5} (0.443)	6.37×10^{-6} (0.064)
PM	+	6.35×10^{-5} (0.509)	9.24×10^{-5} (0.704)
TATO	+	2.66×10^{-4} (0.191)	-1.05×10^{-4} (-0.062)
EM	+	0.004* (1.706)	0.004 (1.441)
Ln(VOL)	-	-0.002 (-1.095)	-0.004* (-1.742)
SF	+	0.002*** (7.180)	0.002*** (5.746)
R^2		0.416	0.460
F-statistic		5.114***	3.781***
Durbin-Watson stat		1.980	1.959

*Notes: *, **, and *** denote statistical significance at 10%, 5%, and 1% (p-value) levels respectively. Rm is the market return. Ln(ME) is the natural logarithmic of market capitalization. BE/ME is the book-to-market ratio. PER is the price-to-earning ratio. PM is the profit margin. TATO is the total assets turnover. EM is the equity multiplier. Ln(VOL) is the natural logarithmic of the trading volume. SF is the split factor* (Source: Researcher processed data)

compared to a smaller firm. Even though only a weak explanatory power, the study still finds a negative relation trading volume before the ex-date with the ex-date return. It shows that there is an increasing demand for less traded stock on the ex-date that may increase the stock price. On the other hand, the independent variables that act as a proxy of a firm's operating performance supporting the signalling hypothesis have no explanation for ex-date returns, except for a weak relation from the equity multiplier variable.

CONCLUSIONS

This study examines the stock return behaviour on 60 days surrounding the split events using the sample of 50 stock splits from 2010 to 2015. It finds that there is a positive abnormal return on average during the ex-date. The average of time-series regression residual of conservative CAPM also shows a similar pattern. It suggests that the stock market movement could not explain the stock price anomalies during the split event.

The cross-sectional regression of conservative CAPM and three factors fail in explaining the ex-date return anomalies. By using the regression residuals of both models as dependent variables, this study builds two empirical models with the independent variables that may represent the signalling hypothesis and trading range/ liquidity hypothesis. It is found that the PER and other proxy variables for a firm's operating performance have no relation to the regression residual. Thus, the findings do not support the signalling hypothesis. On the other hand, the split factor and the trading volume have a strong and weak relation accordingly to the regression residual, while the market value has a weak relation. It suggests that the findings support the trading range/liquidity hypothesis.

Our findings suggest that the Indonesian stock market is semi-strong efficient since the firm characteristics, other than the split factor, could not predict the ex-date returns. However, the positive ex-date returns, on average, can be considered as the anomaly puzzle. For further studies, this research can be extended using longer-term data a few years prior and after the split event in proofing the signalling hypothesis and trading range/liquidity hypothesis. Such data may include company profitability and operating performance, the number of stock analyses by stock analysts, and trading volumes.

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