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Article

Stock Split Rule Changes and Stock Liquidity: Evidence from Bursa Malaysia

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Abstract: We test the impact of stock split rule changes on liquidity behavior in Bursa Malaysia during 2004–2020. Using event study methodology, this study examines stock liquidity on and around stock split days through three subperiods of study, including the first (2004–2006), second (2007–2009), and third (2010–2020) period. We find that liquidity improvement is short-lived in the first and second periods, while it is a long-lived phenomenon in the third period. Firms in the first and second period experienced liquidity improvement only on the split announcement day, while it lasts up to a year after the Ex-date for firms in the third period. Our findings also show a liquidity improvement after the Ex-date only in the third period for the groups of firms categorized based on the liquidity, split factor, and other simultaneous announcements. The findings suggest a positive effect of stock split rule changes implemented by the Securities Commission.

Keywords: stock split; stock liquidity; securities regulation; Bursa Malaysia



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1. Introduction

Managers are still implementing stock splits, a cosmetic accounting change, and rationalizing them by a positive effect on liquidity, while scholars report a short-lived improvement on split days which declines after the split execution date (Ex-date). Previous studies (Copeland 1979; Lakonishok and Lev 1987; Huang et al. 2013) report an increase in liquidity on split announcements, but this declines after the announcement. Consistent with previous studies, Tabibian et al. (2020) (hereafter Tabibian et al. 2020) find a decrease in liquidity following the split Ex-date that could be interpreted as stock splits not being effective in attracting new investors. On the other hand, most of the managers in Bursa Malaysia detail an expectation of liquidity improvement in split proposals. Meanwhile, following the changes and improvements in the regulations implemented by the Securities Commission (SC) in 2006 and 2009, Bursa Malaysia was evaluated by the IMF under the Financial Sector Assessment Programme (FSAP) and achieved the highest rank in 2013. The contradiction between managers' beliefs and the findings of the study by Tabibian et al. (2020), in addition to the SC achievement, are a strong motivation to investigate liquidity behavior following stock split rule changes.

Securities regulation aims to protect investors against fraud and to increase stock returns and decrease the risk of investment. Although the study by Stigler (1964) found insignificant changes in stock returns prior to and following the 1933 Securities Act declared by the U.S. Securities and Exchange Commission (SEC), Friend and Herman (1964) indicated a variance reduction and concluded that it led to a low-risk environment for investors, which is a desirable effect of the Act. Ingram and Chewing (1983) also reported positive monthly cumulative abnormal returns for the Securities and Exchange Act of 1933–1934 during the pre- (1926–1933) and post-Act (1935–1940). Consistent with this, Eleswarapu et al.'s (2004) study indicated that Regulation Fair Disclosure reduced return volatility at earnings announcements. Moreover, Bushee and Leuz (2003) found that firms

listed on the Over-The-Counter Bulletin Board (OTCBB) experienced liquidity improvement and positive stock returns following the regulatory changes regarding mandated disclosure. Verrecchia (2001) also found that greater market liquidity and a lower cost of capital are substantial benefits of corporate disclosures. Inconsistent with previous studies, the study by Garner et al. (2017) reports that under the SEC regulatory requirements, U.S. firms experienced negative stock returns around event dates that announced the SEC regulation, pertaining to financial expert definitions. Furthermore, Sloan (1987) found zero abnormal Ex-date returns in the Australian market. The author mentions that the difference between his study finding and that for the US market might be due to a difference in securities regulations between the two markets.

Stock split rules have experienced two main changes in Bursa Malaysia in recent years. Firstly, in 2006, the SC mandated firms to submit the application within a month after the announcement day, and when they receive Bursa's approval, they have to dispatch a circular to obtain shareholders' approval. In the circular, firms declare a date for announcing the book closing date, which releases the Ex-date. Secondly, in December 2009, the SC issued a decree that requires firms to ensure that the value of post-split par value must be no less than RM 0.50, while it was RM 0.10 in 2006. Tabibian and Zhang (2018) find greater abnormal returns around stock splits in the period between 2010 and 2014 compared to prior to 2010, but they present no evidence regarding the impact of rule changes on stock liquidity. The contradictory results of previous studies regarding the SEC's new rules on US capital markets and a lack of studies in Bursa Malaysia motivate us to test liquidity behavior around stock splits before and after split rule changes during three sub-periods, including 2004–2006, 2007–2009, and 2010–2020, respectively.

This study aims to examine the impact of rule changes on stock liquidity behavior on and around stock splits in Bursa Malaysia. We utilize event study methodology for 217 stock splits during 2004–2020 and find a significant increase in liquidity on the split announcements in all the periods. However, there is a liquidity improvement on the Ex-date only in the third period. We also find that liquidity declined in a year following the Ex-date in the first and second periods, while there is an improvement in the third period. Consistent with these results, we find liquidity improvement on and after the Ex-date only in the third period for the subsamples provided based on liquidity prior to announcement, split factor, and purity of split announcement. Moreover, we find that liquidity improvement drives abnormal returns on the Ex-date and post Ex-date only in the third period. We re-examine the relationship by using a panel data approach and find that diagnostic checks provide no evidence of problems, including heteroskedasticity, multicollinearity, and serial correlation in all the datasets.

The remainder of this paper is structured as follows. Section 2 delivers a review of the literature on stock liquidity and securities regulation as well as the development of three hypotheses. The analytical framework and datasets used in the study are discussed in the third section. The analysis of the estimation results is presented in Section 4. Section 5 concludes with a recommendation for future research.

2. Literature Review and Hypotheses

Financial regulations are designed to enhance return on investment as well as to reduce its risk. Previous studies have demonstrated a significant association between financial regulations and stock returns (Stigler 1964; Jakob and Whitby 2017; He et al. 2016; Ansary and Mervat 2017). If analyzed further, Ingram and Churning (1983) discovered a relationship between stock returns and positive cumulative abnormal returns after the Securities and Exchange Act of 1933–1934. Moreover, the same phenomenon appeared from 1926 to 1933 and in the later period of 1935–1940 as well. Furthermore, Verrecchia (2001) documented that companies disclosing their information to the public enjoy important components of profitability, such as higher liquidity and lower cost of capital.

In August 2000, the SEC announced the creation of the Regulation Fair Disclosure (RFD). The most important task of the RFD is to ensure that all firms in the stock market

disclose new information to the public during the period of the event. However, these disclosures should avoid insider trading and disclosing new information to a certain group of people or a selected investor (both individual and institutional investors) before other investors are informed of that event. In this regard, [Eleswarapu et al. \(2004\)](#) show that the RFD reduces return volatility and asymmetry information during the capital gain period. Ironically, a study by [Bushee and Leuz \(2003\)](#) found that regulatory changes, which mandate listed firms in the market to disclose their information to the public, are costly for those firms, which registered as Over the Counter Bulletin Board (OTCBB). In addition, they documented that by developing disclosure regulations, firms which are newly registered enjoy higher liquidity and returns with lower asymmetrical information. In a more recent study, [Garner et al. \(2017\)](#) investigated the economic effects of issue dates of the SEC on the traded equity exchanges and concluded that firms are experiencing negative returns around SEC financial regulation event dates in the US. As can be seen, there are contradictory results from previous studies on US capital markets. Moreover, although these researchers have studied the impact of securities regulation on the whole market in general, none of them have assessed the impacts of rule changes on market reactions to a specific firm's stock splits. Therefore, it is the purpose of this study to fill in this gap by investigating the impact of regulatory changes on the market reaction to stock splits in Bursa Malaysia.

Stock split has been a common practice in stock markets for decades, a perplexing topic, and an unsolved phenomenon that has attracted researchers' attention. The study of [Dolley \(1933\)](#) is among the first studies that investigated stock splits for firms that reduced their par value a century ago in 1915. Five decades later, [Lakonishok and Lev \(1987\)](#) documented that 150 companies from 837 listed companies on the New York Stock Exchange implemented stock splits from 1921 to 1930. In a more recent study, the determinants of stock split were investigated by [Hu et al. \(2017\)](#). According to their investigation, good market conditions and business cycle variations are the dominant determinants of stock splits. Evidentially, it is considered that stock markets are likely to treat stock split announcements as positive news, especially if these announcements take into consideration stock liquidity and stock returns.

The cosmetic nature of stock splits along with their cost leads to the question of why managers implement them and shareholders approve them. In response to this question, [Amihud \(2012\)](#) asserts that shareholders expect an increase in share price that might be caused by an increase in liquidity. At this point, early investigations by [Fama et al. \(1969\)](#) and [Grinblatt et al. \(1984\)](#) highlight the importance of liquidity in stock split announcements. On the same occasion, a well-documented investigation by [Copeland \(1979\)](#) documented the existence of a relationship between stock splits and stock liquidity and revealed that liquidity declined after a stock split announcement. In a much later study, [Huang et al. \(2013\)](#), by utilizing a large sample of the US stock market companies for the period of 50 years from 1960–2010, investigated the liquidity effect of stock split and found that liquidity increased around the stock split announcement; however, it decreased in the year after the split Ex-date. Their findings conclude that the liquidity effect of stock splits is a short-lived phenomenon in US markets. Meanwhile, there is a lack of study on the impact of stock split rule changes on liquidity behavior in Bursa Malaysia.

Stock split rules have experienced two main changes in Bursa Malaysia. Firstly, in 2006, the SC mandated firms to submit their application within a month after the announcement day, and when they receive Bursa approval, they have to dispatch a circular to obtain shareholders' approval at an extraordinary general meeting. In the circular, firms declare a date for announcing the book closing date (Ann-BC day), which releases the Ex-date. As all the announcements are available to the shareholders on Bursa's Website, they are frequently informed of the stock split. In this situation, it seems that firms are forced to talk. Accordingly, SC executive chairman Datuk Ranjit Ajit Singh stated in 2013 that the major objectives of the SC are to further strengthen disclosure deadlines. Furthermore, the SC might force firms to produce accurate information. Due to the

point that splitting firms must document their rationale for stock split (stock liquidity improvement), forcing firms to reveal accurate/achievable information/goals might have an impact on managers' decisions to implement a stock split. If a market improves its securities regulation, managers who are more confident about liquidity enhancement for their stock will implement a stock split.

According to Tabibian and Zhang (2018), investors view stock splits as good news in the Malaysian stock market. If the split rule changes were in line with the investors' viewpoint of stock split as good news, the liquidity improvement would be stronger in the third period than in the first and second periods. Meanwhile, Tabibian et al. (2020) find that abnormal announcement returns are driven by an increase in liquidity. However, both studies provide evidence that shows a decline in liquidity after a split announcement as well as an insignificant market reaction on and after the Ex-date. As they provide evidence of an ambiguous market reaction on an Ann-BC day, we also test the impact of rule changes on liquidity around this event. Moreover, Tabibian et al. (2020) find no stock liquidity improvement on the Ex-date and explain that the Ann-BC absorbs a part of the market reaction, which leads to an insignificant market reaction on the Ex-date. On the other hand, the SC changed the split rule of the par value from RM 0.10 to RM 0.5, which means firms with pre-split high prices will be allowed to implement a stock split. When a greater price is subdivided into a lower price, it is then more likely to attract more investors when the prices are already low.

Furthermore, the price subdivision on the split Ex-date is supposed to attract retail/small investors and subsequently lead to an increase in liquidity, while researchers' (i.e., Huang et al. 2013) findings indicate a decline in stock liquidity on and after the Ex-date. According to Chittenden et al. (2010), stock prices are too affordable compared to the past, so post-split prices do not look attractive anymore to attract new small/retail investors. However, Murphy and Thirumalai (2017) found that retail traders were attracted to the lower prices after stock splits on the National Stock Exchange of India (NSE). Studying Bursa Malaysia, Tabibian et al. (2020) and Tabibian and Zhang (2018) report no significant abnormal returns or liquidity improvement after the Ex-date. On the other hand, in Bursa Malaysia, a majority (above 90%) of firms' managers believe in liquidity improvement following stock splits. With regard to these studies and split rule changes, we designed the following hypothesis to test the impact on liquidity behavior on and around three split event days in all the three sub-periods:

Hypothesis 1 (H1). *There is/is not a liquidity improvement on and around a split day in the third/first–second period.*

The split factor has a significant role in the market reaction to the stock split (i.e., Brennan and Copeland 1988; Hausman et al. 1971; Huang et al. 2013; Johnson 1966; McNichols and Dravid 1990). Moreover, Grinblatt et al. (1984), and Tabibian and Zhang (2018) report greater abnormal returns for the subsamples which had simultaneous announcements such as bonuses, rights, and warrants than for the firms with pure split announcements. Furthermore, Tabibian et al. (2020) report a liquidity improvement after the Ex-date for firms with a low liquidity prior to announcement day. In addition to the liquidity, we examine the role of split factor and purity of split announcement. To test if the results differ among all the three periods, we designed the following hypothesis:

Hypothesis 2 (H2). *There is/is not stock liquidity improvement in the third/first–second period.*

Previous researchers (Black 1986; Huang et al. 2013; Tabibian et al. 2020) find a positive relationship between abnormal announcement returns and liquidity improvement, but they provide no evidence of such a relationship on and after the Ex-date. Regarding split rule changes, we expect a different relationship between the three periods. Accordingly, we propose the following hypothesis:

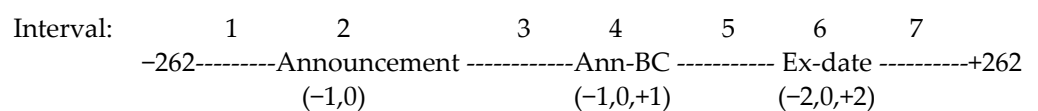
Hypothesis 3 (H3). *There is/is not a relationship between abnormal returns and liquidity in the third/first–second period.*

3. Data and Methodology

The Bursa Malaysia website provides all types of announcement information such as event dates that are publicly available. We extracted the list of firms, split dates, split factors, and other simultaneous announcements from the website and cross-checked them with DataStream. The study sample consists of 217 stock splits that executed a stock split between 2004 and 2020. Other data items, including stock price, trading volume, and outstanding shares are collected from the database of DataStream. In regard to the split rule changes in 2006 and 2009, the study period is subdivided into three subperiods, including the first (2004–2006), second (2006–2009), and third (2010–2020) periods. We examine the effect of stock split rule changes on stock liquidity in the three study periods. We expect a short-term increase in liquidity, consistent with the literature, in the first and second periods and a long-term improvement in the third period.

Investors in Bursa Malaysia are frequently informed of the process and progress of stock splits over six days, including initial announcement, Bursa approval day, circular day, announcement of book closing day, execution date, record day, and payable date. Previous studies (Tabibian and Zhang 2018; Tabibian et al. 2020) present evidence that there is market reaction to split announcement, Ann-BD day, and Ex-date, so we focus only on these three days as event days. We consider one day prior to announcement day to cover effect of experts’ telephone calls to managers, and one day before and after Ann-BC, as on the Bursa website, we find some repeated split announcements around Ann-BC. We also consider two days around Ex-date, as the record date and payable date are the two days following Ex-date. To calculate abnormal returns, 262 days prior to split announcement, and for a long-term investigation, 262 days after Ex-date, are included.

In Bursa Malaysia, firms repeatedly inform investors of each step of the stock split process, specifically on three days, including announcement day, Ann-BC day, and Ex-date. This study, following Tabibian and Zhang (2018), defines an event window around each day: for instance, as a three-day period, from day (−1) to day (+1), for Ann-BC day, (day 0). This covers the effect of telephone calling by expert analysts to the managers before split day, and the delay in informing market after split day as well. To find a better explanation for liquidity behavior, we examine the change in stock liquidity over a period, which starts from a year prior to the announcement day till a year after Ex-date. We then subdivide the period into seven intervals, including Pre-announcement period (Interval 1), Announcement period (Interval 2), Announcement to Ann-BC period (Interval 3), Ann-BC period (Interval 4), Ann-BC to Ex-date period (Interval 5), Ex-date period (Interval 6), and post Ex-date period (Interval 7).



We examine, for each study period, the change in liquidity measurements, including turnover ratio (TER) and relative spread (RLS), among the Intervals 2–7 compared to Interval 1. In this study, a liquidity improvement is identified when there is an increase in TER and a decrease in RLS. We also provide subsamples to make our analysis robust for each period and focus on control variables, including liquidity prior to split announcement, split factor, and purity of split announcement. We use level approach (25%-50%-25%), which provides three subsamples, including low liquidity, medium liquidity, and high liquidity. Two subsamples are provided based on split factor, including firms with a split factor equal to and greater than two. Additionally, if there was not another simultaneous announcement with a firm split announcement, it is classified as pure sample (Pure), otherwise as not pure (~Pure). We propose the following specifications to investigate

abnormal returns and liquidity changes on and around split days among the subsamples in the study periods:

$$\Delta\text{TER}_{(it)}/\Delta\text{RLS}_{(it)}/\text{AR}_{(it)} = \lambda_0 + \text{PER}_{(j)} + \text{LIL}_{(i)} + \varepsilon_{(it)} \quad (1)$$

$$\Delta\text{TER}_{(it)}/\Delta\text{RLS}_{(it)}/\text{AR}_{(it)} = \lambda_0 + \text{PER}_{(j)} + \text{PUR}_{(i)} + \varepsilon_{(it)} \quad (2)$$

$$\Delta\text{TER}_{(it)}/\Delta\text{RLS}_{(it)}/\text{AR}_{(it)} = \lambda_0 + \text{PER}_{(j)} + \text{SF}_{(i)} + \varepsilon_{(it)} \quad (3)$$

where $\text{PER}_{(j)}$ is a study period with a value of 1, 2, or 3, and $\text{LIL}_{(i)}$, liquidity level in the period prior to announcement, is a control variable with a value of 1, 2, or 3. Additionally, $\text{PUR}_{(i)}$ and $\text{SF}_{(i)}$, purity of announcement and split factor, are control variables with a value of 0 or 1. $\text{AR}_{(it)}$ is abnormal return in an interval, and $\Delta\text{TER}_{(it)}/\Delta\text{RLS}_{(it)}$ is the change in TER/RLS for each interval compared to Interval 1: a positive/negative change indicates liquidity improvement. To examine the relationship between abnormal returns and stock liquidity changes for the three study periods, we propose the following specification for three intervals:

$$\text{AR}_{(it)} = \lambda_0 + \lambda_1 \quad (4)$$

where λ_1 and λ_2 present the coefficients of the linear regression model, and a positive λ_1 and negative λ_2 indicate a strong relationship between abnormal returns and liquidity improvement that we expect in the third period.

4. Empirical Analysis

In this section, we present the results of the market reaction, abnormal returns, and stock liquidity on the stock split days in four sub-sections. To study the rule changes' impact on the market reaction, we first evaluate the changes among the firms that are sub-categorized into the three sub-periods of study. Then, we investigate the market reaction among the firms categorized based on liquidity for each study period. Moreover, we examine if the market reaction on and around the split days differs among the firms categorized based on purity of announcement and split factor. Finally, we investigate the relationship between abnormal returns and stock liquidity among the three study periods. The diagnostic checks in all the datasets provide no evidence of problems, including heteroskedasticity, multicollinearity, and serial correlation. Moreover, we run various appropriate robust tests but make no changes to the results.

4.1. The Impact of Split Rules Changes

In this section, we test the impact of changes to securities regulations regarding stock splits on stock liquidity. If the split rule changes were in line with investors' viewpoint of the stock split as good news, the liquidity would improve stronger in third period than in the first and second periods. Most of the managers in Bursa Malaysia assert, in the split proposals, that the stock split leads to liquidity improvement, while previous studies present contradictory results. In addition, [Tabibian et al. \(2020\)](#) and [Huang et al. \(2013\)](#) show that an increase in liquidity is a short-lived phenomenon as liquidity declines after the Ex-date. As stock split rules faced changes in 2006 and 2009, the market reaction might be different among the sub-period of study. We focus on three split days, including announcement day, announcement of book closing date, and the Ex-date, and the test turnover ratio (TER) and relative spread (RLS) to define the impact of rules on liquidity behavior in Bursa Malaysia during the three periods. Table 1 presents abnormal returns and mean value of the TER and RLS as liquidity measurements.

Table 1. Abnormal returns (%) and liquidity measurements (%) in three sub-periods of study.

Period	AR			TER			RLS		
	1	2	3	1	2	3	1	2	3
Interval									
2	1.77 *** (−6.977)	1.46 *** (−4.421)	1.33 *** (−6.216)	1.95 *** (−3.627)	0.76 ** (−2.68)	1.00 *** (−8.059)	−0.54 (−1.206)	−0.49 (−0.673)	−0.97 *** (−5.241)
3	−0.21 *** (−5.027)	−0.11 (−1.773)	−0.03 (−0.758)	−0.51 *** (−5.630)	−0.21 *** (−3.892)	−0.03 (−1.115)	−0.39 *** (−5.318)	−0.2 (−1.486)	−0.89 *** (−23.421)
4	0.46 (−2.23)	0.42 (−1.554)	0.41 (−2.298)	0.20 (−0.489)	0.59 (−2.565)	0.30 ** (−2.984)	−0.78 (−2.206)	−0.25 (−0.425)	−0.82 *** (−5.005)
5	0.00 (−0.002)	0.48 (−2.397)	−0.05 (−0.418)	0.95 *** (−3.948)	0.66 *** (−4.139)	0.24 *** (−3.543)	−1.09 *** (−5.280)	−0.4 (−0.966)	−1.13 *** (−11.263)
6	−0.08 (−0.521)	0.11 (−0.539)	0.13 (−0.951)	0.1 (−0.312)	0.99 *** (−5.538)	0.22 ** (−2.716)	−0.32 (−1.156)	0.11 (−0.245)	−0.78 *** (−6.443)
7	−0.17 *** (−5.325)	−0.18 *** (−4.282)	−0.08 ** (−3.043)	−1.53 *** (−22.437)	−0.74 *** (−20.650)	−0.35 *** (−21.200)	0.64 *** (−11.587)	2.02 *** (−22.413)	−0.53 *** (−21.940)

Note: The period of study is subdivided to three sub-periods, including Periods 1, 2, and 3. The abnormal returns (AR) are the predicted residuals, and the liquidity measures consist of turnover ratio (TER) and relative spread (RLS). Change in TER/RLS is the difference between its value in Interval 2–7 and Interval 1. *** and ** represent significance at 1% and 5% levels, respectively. The *t* for *t*-test is shown in parenthesis.

As can be seen in Table 1, in all three periods, there are significantly positive abnormal returns—AR (1.77%, 1.46%, 1.33%) on the announcement day (Interval 2)—which is consistent with the findings of previous studies (i.e., [Tabibian and Zhang 2018](#)). However, there is a strong liquidity improvement on announcement day only in the third period. Although significantly positive TER indicates liquidity improvement in all the periods (1.95%, 0.76%, 1.00%), RLS in the first (−0.54%) and second periods (−0.49%) is insignificant and only shows a significant liquidity improvement in the third period (−0.97%). The significant increase in TER (1.00%) and significant decrease in RLS (−0.97%) on the split announcement indicate a strong liquidity improvement in the third period, which is consistent with the findings of previous studies (i.e., [Tabibian et al. 2020](#)) that report a liquidity improvement on the announcement day for the whole study sample. The insignificant decline in RLS in the first and second periods indicates that stock splits had no success in conveying information, resulting in a decline in information asymmetry to decrease transaction costs.

In Interval 3, between the announcement and announcement of the closing date, Table 1 shows that there is a significantly negative abnormal return in the first period (−0.21%) but an insignificant one for the second (−0.110%) and third (−0.03%) periods. Although there is a significant decrease in TER for the first (−0.51%) and second (−0.21%) periods, it is not significant in the third period (−0.03%). The decrease in RLS for all the periods in Interval 3 indicates a decline in information asymmetry indicating liquidity improvement, but as there is a significant decline in TER in the first and third periods, we could conclude that liquidity improvement happened in Interval 3 only in the third period. The result of the third period for Interval 3 is inconsistent with the finding of the study by [Tabibian et al. \(2020\)](#) that reports a significant and negative AR and TER in Interval 3.

Table 1 shows that there is no significant AR in all three periods in Intervals 4, 5, and 6; however, the results of liquidity measures vary among the periods. Although there is liquidity improvement in these intervals, it is insignificant in the first and second periods. There is only a strong liquidity improvement in the third period, as TER/RLS is significantly positive/negative in Interval 4 (0.30%/−0.82%), Interval 5 (0.24%/−1.13%), and Interval 6 (0.22%/−0.78%). The result of the third period is consistent with findings of previous studies and could be interpreted as the lower prices induced on the EX-date attracting new investors.

Additionally, it can be seen in Table 1 that in the post Ex-date (Interval 7), there is a significantly negative abnormal return in the three periods (−0.17%, −0.18%, −0.08%). Moreover, there is a decline in TER (−1.53%, −0.74%, −0.35%) in all the periods and an increase in RLS in the first (0.64%) and second (2.02%) periods, but a significant decrease in the third period (−0.53%). These results indicate that there is a strong decline in stock liquidity a year after the Ex-date in the first and second periods but not in the third period, as RLS (−0.53%) shows liquidity improvement. This could be interpreted as stock splits in the third period conveying information leading to a decrease in information asymmetry that led to a decrease in transaction costs. In sum, the findings indicate a liquidity improvement in all the intervals in the third period, which could be interpreted as the managers reaching their goal of liquidity improvement.

4.2. The Impact of Pre-Split Liquidity: By Study Period

[Tabibian et al. \(2020\)](#) studied the impact of liquidity on the market reaction to stock splits and found that liquidity improved after the Ex-date for firms with a low liquidity in the year prior to the announcement. In this regard, using Equation (1), we test the role of the liquidity level among the sub-periods of study to make our analysis of the results in Section 4.1 robust. Following [Tabibian et al. \(2020\)](#), to identify the level, we consider both liquidity measurements: turnover ratio (TER) and relative spread (RLS). The level approach (25%, 50%, 25%) based on the values in Interval 1 provides three subsamples in each period, including low, medium, and high liquidity groups.

On the announcement day (Interval 2), as can be seen in Table 2, firms with a medium liquidity level experienced a positive AR, but it is significant only in the first period (2.21%). Additionally, firms with a low liquidity level experienced a significantly positive AR only in the third period (1.73%). The significant AR for the low-level liquidity group in the third period is consistent with the findings of previous studies that frequently report a significantly positive AR on the announcement day. In addition, AR is positive but insignificant for the group with a high liquidity level among all the periods, which is consistent with the finding of the study by Tabibian et al. (2020) for the whole study sample. Furthermore, there is a significant increase in TER for the low-level liquidity only in the third period (0.63%). Moreover, there is a significant increase in TER for the medium group (1.5%, 0.76%, 1.48%), while it is insignificant for the high-level group (3.28%, -0.33%, 0.74%) in all the three periods. Additionally, the result of RLS indicates that there is a significant decrease only in the third period for the low (-2.49%) and medium (-0.64%) groups, which is insignificant for the high-level liquidity firms (-0.24%). The significant increase in TER (0.63%) and decrease in RLS (-2.49%) indicate a strong increase in liquidity on the announcement day for the low liquidity group only in the third period.

The result of AR on the Ex-date (Interval 6) for all the groups in all three periods is insignificant, but it is positive for all the groups only in the third period (0.12%, 0.07%, 0.51%). On the Ex-date (Interval 6), the result of all the periods indicates a significant increase in TER for the low liquidity group (0.49%, 12.83%, 0.54%), while it is insignificant for the medium group (-0.05%, 0.07%, 0.16%). For the high liquidity level, there is an insignificant increase in TER in the third period (0.66%), but there is a decrease in the first (-3.11%) and second periods (-1.44%). Moreover, there is a significant decrease in RLS only in the third period for the low (-3.42%) and medium (-0.66%) groups. These results indicate that only in the third period, stock liquidity strongly improved on the Ex-date for the low liquidity group (TER: 0.54%, RLS: -3.42%).

In the post Ex-date (Interval 7), AR is insignificant among all the groups except for the high liquidity group in the first period (-0.70%). The insignificant negative AR (-0.06%, -0.03%, -0.07%) among all the groups in the third period is inconsistent with the results of Table 1, which presents a significantly negative AR (-0.08%). Furthermore, as can be seen in Table 2, there is an increase in TER only for the low liquidity group, which is significant in the first (0.16%) and third (0.11%) periods. Additionally, there is a decrease in RLS only for the low liquidity group, which is significant in the third period (-1.49%). These results show a strong stock liquidity improvement on the post Ex-date only in the third period for the low liquidity group (TER: 0.11%, RLS: -1.49%). In sum, the result of this section is consistent with the finding of the study by Tabibian et al. (2020) that the low liquidity level group experienced liquidity improvement. However, the result is inconsistent with the finding of the study by Dennis (2003) that indicates a liquidity improvement for the firms with a high liquidity level prior to announcement. Finally, the result consistent with the result in Section 4.1 emphasizes that the low-level group experienced liquidity improvement only in the third period, which could be inferred as firm managers in the low-level group achieving their goal of liquidity improvement only in the third period.

Table 2. Abnormal returns (%) and liquidity measures (%) by study period control variable: liquidity prior to announcement.

Liquidity	Low			Medium			High		
	1	2	3	1	2	3	1	2	3
Interval 2									
AR	−0.77 (−0.720)	1.12 (−0.855)	1.73 *** (−3.827)	2.21 *** (−6.387)	0.73 (−1.36)	1.54 (−1.736)	0.87 (−0.968)	0.73 (−0.784)	0.77 (−1.694)
TER	−0.03 (−0.135)	0.07 (−0.042)	0.63 *** (−4.23)	1.50 *** (−7.817)	0.76 *** (−3.669)	1.48 *** (−9.127)	3.28 (−2.05)	−0.33 (−0.284)	0.74 (−0.922)
RLS	3.23 (−0.981)	−1.34 (−0.374)	−2.49 ** (−2.716)	−0.31 (−1.157)	−0.2 (−0.189)	−0.64 ** (−2.993)	0.07 (−0.221)	−0.16 (−0.063)	−0.24 (−2.041)
Interval 6									
AR	0.88 (−1.284)	0.59 (−0.702)	0.12 (−0.401)	−0.29 (−1.307)	0 (−0.014)	0.07 (−0.132)	−0.74 (−1.288)	−0.03 (−0.052)	0.51 (−1.764)
TER	0.49 *** (−3.606)	12.83 *** (−12.497)	0.54 *** (−5.753)	−0.05 (−0.435)	0.07 (−0.555)	0.16 (−1.519)	−3.11 ** (−3.216)	−1.44 (−2.360)	0.66 (−1.3)
RLS	−0.7 (−0.343)	4.35 (−2.152)	−3.42 *** (−5.703)	0.26 (−1.478)	0.46 (−0.708)	−0.66 *** (−4.643)	0.38 (−2.054)	0.05 (−0.04)	−0.08 (−1.025)
Interval 7									
AR	0.09 (−0.695)	−0.06 (−0.393)	−0.06 (−1.082)	−0.09 (−2.143)	−0.12 (−1.860)	−0.03 (−0.268)	−0.70 *** (−6.138)	−0.19 (−1.639)	−0.07 (−1.213)
TER	0.16 *** (−4.846)	0.33 (−1.606)	0.11 *** (−5.231)	−0.44 *** (−18.072)	−0.39 *** (−14.611)	−0.30 *** (−13.842)	−5.30 *** (−25.998)	−2.17 *** (−17.297)	−1.63 *** (−16.513)
RLS	−0.31 (−0.766)	3.16 *** (−8.027)	−1.49 *** (−12.327)	0.27 *** (−7.749)	2.21 *** (−17.029)	−0.55 *** (−19.609)	0.77 *** (−20.053)	1.97 *** (−7.354)	0.05 *** (−3.333)

Note: The values are the constants based on Equation (1): $\Delta TER_{(it)}/\Delta RLS_{(it)}/AR_{(it)} = \lambda_0 + PER_{(j)} + LIL_{(i)} + \epsilon_{(it)}$. $PER_{(j)}$ is a study period with a value of 1, 2, or 3, and $LIL_{(i)}$ is a control variable, and the level approach based on liquidity in the year prior to the announcement provides three groups, including low, medium, and high liquidity levels. *** and ** represent significance at 1% and 5% levels, respectively. The t for t -test is shown in parenthesis.

4.3. Control Variables

In this section, we provide groups of firms that are categorized based on two control variables, including split factor and purity of split announcements. Then, we use Equations (2) and (3) and test the market reaction in each study subperiod to make our analysis of the results in Section 4.1 robust.

The market reaction to a pure split announcement might differ from the stock splits that have simultaneous announcements. Based on the information we collected from the Bursa website, a group of firms had simultaneous announcements, such as bonuses, rights, and warrants. As can be seen in Table 3, on announcement day (Interval 2), the stock splits contaminated by other events in the first and second periods (2.26% and 1.87%, respectively) experienced greater AR than the pure sample within the same period (1.29% and 1.05%, respectively). This is consistent with the finding of the study by Grinblatt et al. (1984), which found that stock splits simultaneously announced with stock dividends experienced a greater excess return. However, there is a significant and positive AR for both groups (1.40% and 1.27%) in the third period. Moreover, there is a strong liquidity improvement only in the third period for both groups, as there is a significant increase in TER (0.58%/1.30%) and a significant decrease in RLS (−1.16%/−0.84%). In the first and second periods, the result of TER is significant for the not pure (2.68% and 0.98%) sample, while it is insignificant for the pure (1.2% and 0.53%) sample; however, RLS is insignificant for both groups. These results indicate that there is a strong market reaction to the stock split announcements in the third period, either for pure or not pure samples.

Table 3. Abnormal returns (%) and liquidity measures (%) by study period control variable: purity of announcement.

Period	Pure			~Pure		
	1	2	3	1	2	3
Interval 2						
AR	1.29 *** (−3.295)	1.05 (−2.144)	1.40 *** (−6.822)	2.26 *** (−7.071)	1.87 *** (−4.21)	1.27 *** (−3.729)
TER	1.2 (−1.44)	0.53 (−1.224)	0.58 ** (−2.52)	2.68 *** (−3.938)	0.98 ** (−2.749)	1.30 *** (−9.736)
RLS	−0.18 (−0.224)	−0.39 (−0.391)	−1.16 *** (−3.541)	−0.9 (−2.529)	−0.61 (−0.569)	−0.84 *** (−3.969)
Interval 6						
AR	−0.04 (−0.148)	0.14 (−0.434)	0.27 (−2.045)	−0.13 (−0.652)	0.09 (−0.324)	0.03 (−0.124)
TER	0 (−0.007)	2.05 *** (−7.339)	0.16 (−1.064)	0.21 (−0.497)	−0.04 (−0.197)	0.26 ** (−3.013)
RLS	−0.38 (−0.770)	−0.14 (−0.226)	−0.92 *** (−4.346)	−0.23 (−1.064)	0.36 (−0.549)	−0.68 *** (−4.913)
Interval 7						
AR	−0.10 (−2.068)	−0.18 ** (−2.892)	−0.11 *** (−4.031)	−0.24 *** (−5.954)	−0.18 ** (−3.180)	−0.07 (−1.498)
TER	−1.77 *** (−16.787)	−0.96 *** (−17.280)	−0.20 *** (−6.702)	−1.29 *** (−14.882)	−0.52 *** (−11.460)	−0.46 *** (−26.109)
RLS	1.37 *** (−13.867)	2.02 *** (−16.393)	−0.65 *** (−15.269)	−0.11 (−2.391)	2.01 *** (−15.359)	−0.46 *** (−16.547)

Note: Abnormal returns (AR) and liquidity changes (TER and RLS) on announcement day (Interval 2), Ex-date (Interval 6), and post Ex-date (Interval 7) for each subsample in every period are presented based on Equation (2): $\Delta TER_{(it)} / \Delta RLS_{(it)} / AR_{(it)} = \lambda_0 + PER_{(i)} + PUR_{(i)} + \varepsilon_{(it)}$. For each period ($PER_{(i)}$), the sample is categorized based on the purity of a split announcement ($PUR_{(i)}$), in which P and ~P identify pure/not pure split announcement, respectively. *** and ** represent significance at 1% and 5% levels, respectively. The t for t -test is shown in parenthesis.

On the Ex-date (Interval 6), Table 3 presents an insignificant AR for both groups in all three periods, though it is negative in the first period and positive in the second and third periods. Additionally, there is a strong liquidity improvement only in the third period for the not pure sample (TER: 0.26% and RLS: −0.68%), while there is a significant decrease

in RLS (-0.92%) in the third period for the pure sample that could be interpreted as a reduction in transaction costs. Thus, the lower prices on the Ex-date could catch investors' attention only in the third period, specifically strong in terms of the stock splits that had other announcements in addition to the stock splits.

In the post Ex-date (Interval 7), as can be seen in Table 3, there is a negative AR in all the periods for both groups, although it is insignificant in the third period (-0.07%) for the not pure sample. Moreover, there is a significant decrease in TER for all the periods for both groups that could be interpreted as a decrease in liquidity. However, it is not a strong reduction for all the groups, as there is a significant decrease in RLS in the third period for both pure (-0.65%) and not pure (-0.46%) samples. The results in the post Ex-date indicate a strong decrease in liquidity in the first and second periods, but there is a liquidity improvement as the decrease in RLS shows a decrease in transaction cost in the third period regardless of the purity of sample. This result is consistent with that in Section 4.1, which shows a liquidity improvement only in the third period but provides no evidence regarding the role of the purity of the split announcement on the liquidity behavior in the third period.

To examine the impact of the split factor (SF) on the market reaction in the three periods, we categorized firms into two sub-samples. Group 2 includes firms with an SF equal to 2 and group ~2 consists of firms with an SF not greater than 2. As Table 4 shows, on announcement day (Interval 2), there is a significantly positive AR among all the subsamples except in the second period of group ~2. Both groups present a significant AR in the third period, 1.48% and 0.95% , which is consistent with the results of the whole sample in the third period. Additionally, there is a strong liquidity improvement only in the third period for both groups. There is a significant increase/decrease in TER/RLS for group 2 ($0.95\%/ -1.04\%$) and group ~2 ($1.13\%/ -0.80\%$) as well, which is consistent with the result of the whole sample in the third period on announcement day. Nonetheless, the result is inconsistent with the findings of previous studies (i.e., Brennan and Copeland 1988; Hausman et al. 1971; Huang et al. 2013; Johnson 1966; McNichols and Dravid 1990), which found a stronger market reaction to the splits with a higher split factor.

On Ex-date (Interval 6), there is no significant AR among all the subsamples, which is consistent with that for the whole sample study in each period (Please see Section 4.1). In addition, there is a strong liquidity improvement (TER: 0.61% , RLS: -0.74%) only in the third period for the group ~2. Moreover, there is a significant decrease in RLS in the third period for group 2 (-0.79%), which indicates a reduction in transaction costs; however, the insignificant increase in TER (0.05%) does not support a strong liquidity for the sample. Regardless of the magnitude of split factor, the result of Ex-date is consistent with that of the whole sample (please see Section 4.1), which shows a liquidity improvement on the Ex-date in the third period.

In the post Ex-date (Interval 7), Table 4 presents for both groups a significantly negative AR in the first ($-0.11\%/ -0.28\%$) and second ($-0.16\%/ -0.20\%$) periods, while this is insignificant in the third period ($-0.09\%/ -0.07\%$). Furthermore, TER is significantly negative for all the subsamples, which shows a liquidity reduction, while there is a significant decrease in RLS in the third period for both groups ($-0.50\%/ -0.56\%$). This result could be inferred as a decline in transaction costs in the third period, which is a sign of liquidity improvement consistent with the finding for the whole sample in the third period (please see Table 1). In sum, the result indicates a liquidity improvement in the third period regardless of the magnitude of the split factor and the purity of the split announcement.

Table 4. Abnormal returns (%) and liquidity measures (%) by study period control variable: split factor.

Split Factor	2			~2		
	1	2	3	1	2	3
Interval 2						
AR	0.98 *** (−3.498)	1.72 *** (−4.591)	1.48 *** (−5.195)	3.31 *** (−6.446)	1.07 (−1.768)	0.95 *** (−4.035)
TER	0.41 (−0.744)	0.87 *** (−3.813)	0.95 *** (−8.455)	5.10 *** (−4.308)	0.59 (−0.962)	1.13 *** (−3.426)
RLS	−0.38 (−0.704)	−0.35 (−0.374)	−1.04 *** (−4.463)	−0.84 (−1.103)	−0.72 (−0.613)	−0.80 ** (−2.810)
Interval 6						
AR	−0.04 (−0.222)	0.17 (−0.73)	0.07 (−0.412)	−0.17 (−0.523)	0.02 (−0.057)	0.27 (−1.793)
TER	−0.36 (−1.078)	0.13 (−0.917)	0.05 (−0.634)	0.98 (−1.378)	2.11 *** (−5.627)	0.61 ** (−2.979)
RLS	−0.12 (−0.350)	0.36 (−0.625)	−0.79 *** (−5.165)	−0.71 (−1.511)	−0.27 (−0.360)	−0.74 *** (−4.060)
Interval 7						
AR	−0.11 ** (−3.166)	−0.16 *** (−3.399)	−0.09 (−2.406)	−0.28 *** (−4.381)	−0.20 ** (−2.687)	−0.07 (−2.411)
TER	−1.22 *** (−17.519)	−0.30 *** (−10.383)	−0.39 *** (−26.027)	−2.15 *** (−14.495)	−1.43 *** (−18.522)	−0.28 *** (−6.698)
RLS	0.27 *** (−3.988)	1.86 *** (−16.293)	−0.50 *** (−16.330)	1.37 *** (−14.386)	2.25 *** (−15.482)	−0.56 *** (−15.430)

Note: Abnormal returns (AR) and liquidity changes (TER and RLS) on announcement day (Interval 2), Ex-date (Interval 6), and post Ex-date (Interval 7) for each subsample in every period (PER_(i)) are presented based on Equation (3): $\Delta TER_{(it)}/\Delta RLS_{(it)}/AR_{(it)} = \lambda_0 + PER_{(i)} + SF_{(i)} + \epsilon_{(it)}$; 2 and ~2 identify split factor (SF_(i)) equal to 2 and greater than 2, respectively. *** and ** represent significance at 1% and 5% levels, respectively. The *t* for *t*-test is shown in parenthesis.

4.4. Relationship between Abnormal Returns and Liquidity Measures

In this section, we use Equation (4) to examine the relationship between abnormal returns and stock liquidity measures for Intervals 2, 6, and 7 in each period. According to Black’s (1986) viewpoint, abnormal returns are driven by stock liquidity. Since an increase/decrease in TER/RLS indicates liquidity improvement, we expect a positive/negative coefficient for TER/RLS in relation to AR. Table 5 provides the regression estimates for Equation (4). As can be seen, there is a significantly positive coefficient for TER (0.47, 0.48, 0.59) and an insignificantly negative RLS (−0.09, −0.15, −0.40) in relation to abnormal announcement returns (Interval 2). Although the sign of liquidity measure is consistent with the finding in Tabibian et al. (2020), the significant TER and insignificant RLS indicate that an increase in trading activity is more effective in driving abnormal announcement returns in all the study periods.

Table 5. By Study period: relationship between abnormal return and liquidity measures.

Period	TER			RLS		
	1	2	3	1	2	3
Interval						
2	0.47 *** (−8.522)	0.48 ** (−2.66)	0.59 *** (−6.068)	−0.09 (−0.761)	−0.15 (−1.226)	−0.40 (−2.031)
6	0.12 *** (−4.567)	0.08 ** (−3.193)	−0.07 (−0.810)	0.08 (−1.184)	0 (−0.064)	−0.34 *** (−7.092)
7	0.17 *** (−10.412)	0.10 *** (−4.61)	0.21 *** (−10.747)	0.02 *** (−3.532)	0.01 *** (−3.81)	−0.01 (−1.375)

Note: The values (λ_1 and λ_2) are the coefficient (regression estimates) of ΔTER and ΔRLS in each period (PER_(i)) for the Intervals 2, 6, and 7 based on Equation (4): $AR_{(it)} = \lambda_0 + \lambda_1 \Delta TER_{(it)} + \lambda_2 \Delta RLS_{(it)} + PER_{(i)} + \epsilon_{(it)}$. *** and ** represent significance at 1% and 5% levels, respectively. The *t* for *t*-test is shown in parenthesis.

Nevertheless, the magnitude of the liquidity measures' coefficient in the third period is greater than in the first and second periods. The Ex-date result shows that the relationship differs among the periods. In the first and second periods, there is a significant and positive TER (0.12, 0.08) but an insignificant and positive RLS (0.08, 0.00), while in the third period, TER (−0.07) is insignificant and negative, but RLS (−0.34) is significant and negative. The results on the Ex-date indicate that trading activity in the first and second periods, but a reduction in transaction costs in the third period, drive abnormal returns. The result on the Ex-date in the first and second periods is consistent with the finding of the study by [Tabibian et al. \(2020\)](#) for the whole sample.

In the post Ex-date, the coefficients in the first and second periods for both TER (0.17, 0.10) and RLS (0.02, 0.01) are significant and positive but could not strongly explain abnormal returns. However, in the third period, there is a significantly positive value for TER (0.21) and an insignificantly negative RLS (−0.01), which could explain abnormal returns in the post Ex-date. The insignificant RLS coefficients led us to re-examine the relationship by using a panel data approach for robustness check. The diagnostic checks in all the datasets provide no evidence of problems, including heteroskedasticity, multicollinearity, and serial correlation. Moreover, we run various appropriate robust tests but make no changes to the results. In sum, the results provide evidence that shows a stronger relationship in the third period than in the first and second periods.

5. Conclusions

We test the impact of changes in stock split rules on stock liquidity for 217 stock splits in Bursa Malaysia between 2004 and 2020. Tightening the disclosure deadlines by the Securities Commission in 2006 and a change in minimum stock price requirements in 2009 led us to subdivide the study period into three periods, including the first (2004–2006), second (2007–2009), and third (2009–2020) periods. To evaluate the market reaction, we examine abnormal returns and liquidity changes on and around split event days. The results show a significant and positive abnormal return on announcement day in the three periods, which indicates that investors' viewpoints are positive toward the stock splits. Additionally, there is an insignificant decrease in relative spread in the first and second periods, while this is significant in the third period. The decrease in relative spread on and around all the split days could be interpreted as a decline in information asymmetry, resulting in a decrease in transaction costs in the third period. Furthermore, there is a significant increase in the turnover ratio on all the split days only in the third period. Thus, there is a strong improvement in liquidity on the split days only in this period. At the post execution date, firms in the first and second periods experienced a strong decline in liquidity, while firms in the third period experienced a decrease in transaction costs, as there is a significant decrease in relative spread. These findings indicate a short-lived liquidity improvement for the firms in the first and second periods, which is only on the announcement day, while stock liquidity improved for the firms in the third period on and after the announcement day till a year after execution date. The finding in the third period confirms managers' beliefs in liquidity improvement, which is contradictory to the findings of previous studies. As previous studies present the significant role of stock liquidity in the year prior to split announcements on the market reaction, we make our analysis robust and test if our findings, especially in the third period, are in line with the role of liquidity. The results indicate a strong liquidity improvement in the third period, which is significant for the low and medium liquidity levels and insignificant for the high-level group on and around split days. The finding shows a significant and strong liquidity improvement in the post execution date for the low-level group only in the third period. We also examine if the results are similar for the firms categorized based on the purity of split announcement and split factor. For the subsamples, we find a strong increase in stock liquidity on the announcement day and Ex-date only in the third period. Moreover, consistent with the findings over the whole samples of each period, the finding indicates a reduction in transaction costs as a sign of liquidity improvement in the post Ex-date in the third period. However, for all the subsam-

ples in the first and second periods, there is either an insignificant decrease or an increase in relative spread, indicating that there is no evidence that shows a liquidity improvement. Finally, we find a positive relationship between abnormal returns and liquidity only in the third period, and using the panel data approach, the diagnostic checks provide no evidence of problems, including heteroskedasticity, multicollinearity, and serial correlation in the datasets. In sum, this study presents strong evidence suggesting that changes in split rules led to a long-term stock liquidity improvement that could be interpreted as an improvement in securities regulation and a success for the Securities Commission in Malaysia. This finding provides insight for policy makers in other capital markets in terms of implementing similar rule changes. Regarding the positive role of rule changes, the findings provide a clear and insightful direction to managers, shareholders, and investors with regard to stock liquidity behavior in Bursa Malaysia. The findings also provide insight for researchers considering the impact of rule changes on the market reaction to a firm's event. Previous researchers (Chen et al. 2020; Jian and Li 2020; Stoian and Iorgulescu 2020) studied the market efficiency in stock markets, but there seems to be limited attention given to the impact of securities regulation changes on market efficiency. Hence, future studies should examine whether market efficiency revolves around rule changes.

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