

Examining the Effect of Stock liquidity on the Relationship between Stock Split and Stock Market Performance

Ahmed EzzElDin¹ & Hayam Wahba²

¹ Researcher, Faculty of Business, Ain Shams University, Cairo, Egypt

² Professor of Finance, Faculty of Business, Ain Shams University, Cairo, Egypt

Correspondence: Ahmed Ezz ElDin, Faculty of Business, Ain Shams University, Cairo, Egypt.

Received: March 20, 2022

Accepted: April 8, 2022

Online Published: April 15, 2022

doi:10.5539/ijef.v14n5p42

URL: <https://doi.org/10.5539/ijef.v14n5p42>

Abstract

The effect of stock liquidity on the relation between stock split and stock market performance is puzzling. This paper examines the factors that affect the relationship between stock split and stock market performance. The data are gathered from the Egyptian Stock Exchange listed companies, based on their market capitalization from all sectors in Egypt during 2010 to 2020. This event study employs multiple regression analysis. Liquidity is measured by volume and number of transactions. Announcement date is considered for stock split as independent variable. Also, firm size, split factor, Industry type as control variables have been tested in the model. The research is event study; The time window is based on twenty days and five days.

Results indicate that liquidity as moderator is positively affect the relationship between stock split and stock market performance for five- and twenty-days' time windows. A robustness check has been performed for every regression model. Showing significant effect of liquidity as moderator, measured by volume of transactions, on the relationship for the sample period between 2010 and 2019 for twenty days' time window.

Results support the easiness and enhancing the process of stock split. For example, Financial Regulator Authority could waive its approval for stock split to companies' general assembly as the market would correct itself for disturbance in liquidity after stock split announcement. Also, Minimizing the number of companies that don't execute stock split affect the investors' behavior which affects the relationship of stock split announcement and stock market performance.

Keywords: stock split, EGX, stock liquidity

1. Introduction

Theoretically, Increasing the numbers of shares that are outstanding is a decision of company's management by issuing more shares to current shareholders. Fundamentally, companies undertake stock splits when the company is confident that the momentum of the company's earnings will continue to push the stock prices upward. Therefore, companies that are interested in lowering the trading cost will lower their cost of capital because of liquidity. In which stock splits will attract small investors and increase the liquidity of the stocks and automatically the cost of capital will be reduced (Company's beta). According to Copeland (1979), stock liquidity is less than before the stock split announcement date. Hence, this finding contradicts the street lore that stock split increase liquidity with no plausible explanation.

On the other hand, Desai et al. (1998) found stock liquidity (the bid-ask spread) increases directly after stock split which means higher liquidity than before stock split in addition to number of trades. That's why the effect of liquidity is contradicting in past research. The effect of stock liquidity on stock market performance around the announcement date is affected by investors' experience on the execution of the split of the company and sample period.

Many scholars address the effect of different moderators on stock splits and stock market performance and many studies focus on the relationship between stock split and liquidity directly. Other researchers studied the effect of stock split around execution date. Therefore, we try to investigate the effect of liquidity on the relationship between stock split and stock market performance around announcement date in EGX.

The main question mark of this paper can be addressed as follows: Does liquidity has a significant effect on the

relationship between stock split and stock market performance in the EGX? The research question could be addressed as follows: Does liquidity affect the relationship between stock split and stock market performance?

Following this introduction, the literature review will be discussed in section 2, though variables and developing hypotheses are shown in section 3. Section 4 illuminates the descriptive and diagnostic statistics, hypotheses' testing in section 5 while concluded remarks are referred in section 6.

2. Literature Review

The concern of many scholars is with the effect of liquidity on the relationship between stock split and stock market performance. Copeland (1979) studied the liquidity change after stock split announcement arguing that stocks that are traded with the optimal price range should be more liquid. Also, Copeland (1979) shed a light that there are other factors that affect liquidity other than the number of shareholders for example, the psychological aspect in which every trader sees the opportunity. However, the factors which were considered in his study was the share volume trading and the changes in transactions costs as a percentage of value trade. Copeland (1979) found that stock liquidity is less than before the stock split announcement date. Hence, this finding contradicts the street lore that stock split increase liquidity. There was no plausible explanation for the finding; however, the only explanation that companies' performance maybe extraordinary before the split.

Dennis (1998) studied the effect of stock split on stock liquidity after announcement date, arguing that the some of the past research assumed increase in liquidity after stock split announcement date. They found no noteworthy change in trading volume after stock split announcement date. Which contradicts Desai et al. (1998) study which examined the effect of stock split on liquidity, or the bid-ask spread taking those two triggers for enhancement in trading which are liquidity and information. Desai et al. (1998) found that the bid-ask spread increases directly after stock split which means higher liquidity than before stock split in addition to number of trades.

In consideration that the signaling theory cannot affect index. Hence, Dennis (2003) studied stocks liquidity of a tracking index (NASDAQ 100) to separate the signaling aspect from the liquidity aspect. Accordingly, the Index will be affected only by the liquidity aspect. He argued that stock split can lead to liquidity for either of the two reasons; the first reason is the lower price can encourage small investors to trade in the split stock, while the second reason is that stock liquidity may increase/decrease as a result of signaling aspect. Dennis (2003) found that the arithmetic average daily turnover was 23.95% prior to the split and 22.8% following the split. On the other side, it has been found that the number of trades following the split is below twice prior to the split. Along with share volume, the average is nearly twice before the split. In other words, the number of small investors increase after stock split while the turnover was not affected but when classifying trading volume and share volume to trade size, the liquidity appears to be increased to small investors only.

Also, Dennis and Strickland (2003) examined the relationship between ownership structure and abnormal return at announcement date in addition to the alteration in liquidity after stock split. Their concern wasn't the reason behind the management decision regarding stock split rather than the effect of stock split on stock volume and abnormal return. The data was gathered from NYSE, AMEX, and NASDAQ between Jan. 1990 and Dec. 1993. Nevertheless, Dennis and Strickland (2003) studied a time series analysis of liquidity for their sample. Additionally, a turnover as a measure of liquidity were used which is the monthly volume divided by the number of outstanding shares. They argued that turnover measure equalizes the measurement between different companies while considering their size. Dennis and Strickland (2003) found that institutional ownership share in the ownership structure increase post stock split and this maybe a reason for the increase in liquidity after split. Additionally, the level of liquidity increase is dependent on the percentage of institutional ownership structure.

Recently, Goyenko et al. (2006) studied the extent in which stock split improve liquidity on longer term time windows by shading a light that past research studied shorter term windows. They measured liquidity by the average cost of trade which is the percentage of spread. Also, they studied the stock performance after the split for 6 years before the split and the first year after the split. They used the matched sample methodology to measure liquidity, in which they search for a matching stock and study liquidity of the two stocks. Additionally, they used Fama and MacBeth (1973) regression approach which relates the stock liquidity to different factors and control variables. Goyenko et al. (2006) found that the deterioration in liquidity is not permanent and it may continue up to the first year only while they found gains in liquidity based on longer terms.

3. Measuring Variables and Developing Hypotheses

The independent variables have been measured by "stock split announcement date", on five- and twenty-days' time windows. while the dependent variable has been measured by log of sector index of EGX. According to previous analysis, the big majority of past research tested stock split on stock performance, while taking different

proxies of stock performance. While The reason for considering sector index instead of normal Egyptian stock Indices, such as: EGX30, 70, and 100, is that there are stock split cases that are OTC and because there is no index for OTC, log of sector index has been used to indicate the market performance. Moderator is measured by volume and number of transactions. Other control variables are firm size, split factor, Industry type. stock markets of Egypt are the source of data on daily basis during the period from Jan 1, 2010, to July 24, 2020 noting that two companies listed in EGX30 was excluded due to data unavailability. Table 1 shows the research variables, as follows:

Table 1. Research variables

Variable	Calculation	Sign
Stock market index *	Log of sector index	LOGSector i,t
Stock Split *	Announcement date (Dummy variable)	AnnouncementDatei,t
Liquidity*	Number of transactions and volume of transactions	Liquidity i,t

*Data collected from: EGX.

The number of stock indices and stock splits used to estimate the variables and moderator are shown in Table 2 as follows:

Table 2. Research sample

Stock index	No. of split stocks
EGX 30 (EGX30)	17
EGX 70 (EGX70)	19
NILEX	3

Source: EGX.

This paper seeks at testing the importance of the liquidity on the relationship between stock split and stock market performance in the EGX. This has been accompanied by testing the following hypothesis:

- There is no significant impact of liquidity on the relationship between stock split and stock market performance. This means that null hypothesis $H_0: \beta = 0$ and the alternative hypothesis $H_1: \beta \neq 0$, where β is the regression coefficient as the subsequent function:

$$\text{LOGSector } i,t = \alpha + \beta_1 \text{AnnouncementDatei,t} + \beta_2 \text{LiquidityNumber} + \beta_3 \text{Liquidity Volume} + \beta_4 \text{AnnouncementDatei,t} * \text{Liquidity Number} + \beta_5 \text{AnnouncementDatei,t} * \text{Liquidity Volume}$$

We have tested the impact of each moderator and independent variable in a multiple regression model, as shown in table 3.

4. Descriptive and Diagnostic Statistics

The whole research period and for the sub-periods are shown in table 3 of the correlation between the independent variables, as follows:

Table 3. Correlation coefficients between independent variables

Time Window	variables	LOGSector i,t	AnnouncementDatei,t	Liquidity Volume	Ann-Liquidity Number	Liquidity Volume	Ann-Liquidity Volume
Five days	LOGSector i,t	1.00					
	AnnouncementDatei,t	-0.003	1.00				
	Liquidity Volume	0.006	-0.071	1.00			
	Ann-Liquidity Volume	-0.009	-0.538	0.471	1.00		
	Liquidity Number	-0.026	-0.051	0.745	0.376	1.00	
	Ann-Liquidity Number	0.017	-0.521	0.359	0.749	0.485	1.00
Twenty days	LOGSector i,t	1.00					
	AnnouncementDatei,t	-0.02	1.00				
	Liquidity Volume	0.00	-0.04	1.00			
	Ann-Liquidity Volume	0.02	-0.54	0.491	1.00		
	Liquidity Number	-0.00	-0.02	0.764	0.375	1.00	
	Ann-Liquidity Number	0.051	0.04	0.045	0.03	0.078	1.00

Source: outputs of data processing using Stata version-17.

Table 3 shows that correlation coefficients between of liquidity measured by volume which is negative and moderator liquidity measured by number of transactions which is positive for five days' time window. For twenty days' time window, correlation coefficients between of liquidity measured by volume and number of transactions is positive. While Tables 4 explains the descriptive statistics variables for the research variables, as follows:

Table 4. Descriptive statistics

Variable	Five Days					Twenty Days				
	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
Sector Index (LOG)	381	3.0	0.2	2.7	3.3	1,455	3.0	0.2	2.7	3.3
Liquidity_Volume	381	0.2	0.8	(0.6)	1.8	1,455	0.1	0.6	(0.5)	1.0
Liquidity_Number	381	0.1	0.6	(0.6)	1.1	1,455	0.1	0.4	(0.4)	0.7
announcement_Liquidity_Volume	381	(0.0)	0.0	(0.0)	-	1,455	0.0	0.0	(0.0)	-
announcement_Liquidity_Number	381	-	-	-	-	1,455	0.0	0.2	(0.6)	7.1

Source outputs of data processing using Stata version-17.

Since the value of "F-Test" for five days' time window is 62.401 with significance level at zero for five days' time windows and twenty days "F-Test" 242.098 with significance level at zero too; then the researcher concludes that the moderator and stock split announcement date affect the stock market performance. It would be useful in determining the value of the dependent variable coefficient and moderators' coefficient in the regression model.

In order to ensure the non-existence of relationship between the dependent variable, VIF (Variance Inflation Factor) was needed to measure the multicollinearity. The larger the variance inflation factors, the more severe the multicollinearity. Some statisticians argue that if any variance inflation factor exceeds 10, then multicollinearity is a problem. Other statisticians argue this value to be liberal and suggest that the variance inflation factors should not exceed 4 or 5. The value of VIF is less than 10, then the model is not suffering from multicollinearity problem for five days' time windows. On the other hand, for twenty days' time windows, the value of VIF is less than 10, then the model is not suffering from multicollinearity problem too.

5. Testing Hypotheses

This paper aims to test the significance of the effect of liquidity on the relationship between stock split announcement date and stock market performance in EGX. Using multiple regression model in this event study for two-time windows which is five and twenty days, Results indicated that liquidity as independent variable and moderator accepted in the model and explain 74.5% at $\alpha = 0.05$ significance for five days' time window while 74.1% at $\alpha = 0.05$ significance for twenty days' time window. This means that the moderator affects the relation between the independent variable and dependent variable and explain the change in the dependent variable by 74.1% for twenty days and 74.5% for five days' time window.

In five days', time window heteroskedasticity Chi is 10.51 and its prob is 0.0012 while Durbin Winston is 0.339. While In twenty days' time window heteroskedasticity Chi is 39.19 and its prob is zero While Durbin Winston is 0.103. since a value of 2.0 means that there is no autocorrelation detected in the sample. Values from 0 to less than 2 indicate positive autocorrelation and values from 2 to 4 indicate negative autocorrelation. Hence, auto autocorrelation is positive and heteroskedasticity is out of range that's why FGLS regression model was also applied.

Looking at the sample from a more holistic approach, since the value of "F-Test" for five days' time window is 62.4 at significance level zero and 242.09 for twenty days' time window at significance level zero too. then it can be concluded that the moderator and stock split announcement date affect the stock market performance. It would be useful in determining the value of the dependent variable coefficient, moderators, and control variables' coefficient in the regression model. Since the significance value of the test statistic lower than 0.05, then the null hypothesis would be rejected. After robustness check has been conducted and splitting the research period into two-time windows two regression models have been tested as shown from tables from as follows:

Table 5. FGLS for twenty days' time window

sector_index	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
AnnouncementDate	0.007	0.007	0.98	0.326	-0.007	0.022	
LiquidityVolume	-0.014	0.009	-1.58	0.115	-0.03	0.003	
LiquidityNumber	-0.002	0.011	-0.2	0.839	-0.024	0.019	
ann_liq_volume	89.71	309.186	2.9	0.004	291.188	1503.173	***
ann_liq_number	0.006	0.013	0.46	0.646	-0.019	0.031	
FirmSize	-0.059	0.005	-12.98	0	-0.068	-0.05	***
SplitFactor	-0.004	0.001	-3.47	0.001	-0.006	-0.002	***
RealEstate	0.413	0.012	33.7	0	0.389	0.437	***
PersonalandHousehods	0.569	0.016	34.88	0	0.537	0.601	***
IndustrialGoods	0.118	0.011	10.32	0	0.096	0.141	***
Healthcare	0.413	0.013	32.27	0	0.388	0.438	***
FoodandBeverage	0.415	0.013	32.63	0	0.39	0.44	***
FinancialServices	0.112	0.013	8.6	0	0.087	0.138	***
Chemicals	0.484	0.019	25.69	0	0.447	0.521	***
BasicResources	0.208	0.018	11.78	0	0.174	0.243	***
Banks	0.675	0.026	26.35	0	0.625	0.725	***
Materials	0.607	0.016	38.51	0	0.576	0.638	***
Constant	3.26	0.038	84.68	0	3.185	3.335	***
Mean dependent var		3.029			SD dependent var		0.217
R squared		0.741			Chi-square		4167.218
Prob > chi2		0			Akaike crit. (AIC)		-2242.75

Source outputs of data processing using Stata version-17.

As shown in Table 5, that liquidity measured by calumet of transaction is significant as moderator in addition to all the control variables in the relationship between stock split announcement date and stock market performance measured by sector index.

Table 6. FGLS regression for five days' time window

logsectorindex	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
AnnouncementDate	0.02	0.014	1.39	0.166	-0.008	0.048	
LiquidityVolume	0.005	0.011	0.43	0.667	-0.017	0.027	
LiquidityNumber	-0.025	0.016	-1.54	0.123	-0.058	0.007	
ann_liq_volume	0.217	0.548	0.4	0.692	-0.858	1.292	
ann_liq_number	55.579	47.752	1.16	0.244	-38.013	149.171	
FirmSize	-0.055	0.009	-6.34	0	-0.072	-0.038	***
SplitFactor	0	0.001	-0.33	0.744	-0.002	0.002	
RealEstate	0.428	0.023	18.58	0	0.383	0.473	***
PersonalandHousehods	0.574	0.031	18.49	0	0.514	0.635	***
IndustrialGoods	0.119	0.022	5.34	0	0.076	0.163	***
Healthcare	0.415	0.025	16.43	0	0.365	0.464	***
FoodandBeverage	0.414	0.024	17.19	0	0.367	0.462	***
FinancialServices	0.104	0.025	4.08	0	0.054	0.154	***
Chemicals	0.478	0.038	12.52	0	0.403	0.553	***
BasicResources	0.189	0.033	5.66	0	0.124	0.255	***
Banks	0.661	0.047	13.96	0	0.568	0.754	***
Materials	0.601	0.032	18.76	0	0.538	0.663	***
Constant	3.207	0.073	43.65	0	3.063	3.351	***
Mean dependent var		3.039			SD dependent var		0.215
R squared		0.745			Chi-square		1113.425
Prob > chi2		0			Akaike crit. (AIC)		-576.5

Source outputs of data processing using Stata version-17.

As shown in table 6, Liquidity as moderator is insignificant in the relationship between stock split announcement date and stock market performance.

After a robustness check has been conducted for each time window all through the entire period, showing significant impact of liquidity on the relationship between stock split and stock market performance in the EGX. showing significant effect in the regression model significant effect of liquidity on the relationship between stock split and stock market performance. So, for the hypothesis, we can reject the null hypothesis and accept the alternative one.

6. Summary and Concluded Remarks

This paper aims to develop a model, using regression model through OLS method to examine liquidity effect the relationship between stock split and stock market performance. Two time-windows were used to examine short term and long-term impact on stock market performance, where it is measured by proxy, which is sector index. While announcement date is a dummy variable for this event study. Liquidity as moderator, is measured by volume and number of transactions. This has been applied on EGX on daily basis throughout the period from Jan 1, 2010, to July 24, 2020.

Liquidity measured by volume of transactions is significant in twenty days' time windows while number of transactions is insignificant. This indicates that stock split affects stock market performance by the volume of transactions as a result that current investors increase their investments in stock split share after announcement date in twenty days' time window which is consistent with (Dennis, 2003). While results for five days' time window shows that liquidity is insignificant in the relationship between stock split and stock market performance which indicates that investors don't respond to stock split announcement in five days' time window which is consistent with (Copeland, 1979). On the other hand, control variables were significant in this relationship.

Results indicate that liquidity is insignificant on stock market performance around the announcement date. There are three explanations: first, the explanations maybe that the stock price still too high for small investors. Second, explanations could be that investors experienced same companies that announce stock split but don't execute as a trial for stock price increase. Third, market response around announcement date maybe affected by investor's relations manager inefficiency to market well for investors about the reasons behind stock split.

There are other factors that may affect the relationship between stock split and stock market performance other than liquidity. for example, the psychological aspect in which every trader sees the opportunity. However, Future researchers may consider the following points First, Exclude the companies that didn't execute stock split. Second, exclude companies that performed stock split execution during your time window. Third, the number of days between stock split announcement date and execution date can be used as control variable. Fourth, Future research may consider another control variable which is the weight of the stock in its index in a time around the stock split announcement as for Asquith et al. (1989). Fifth, future researchers could also consider carrying out a similar study in a different stock exchange to assess any variation in responses.

Acknowledgments

Praise be to God, who has guided us to the means to perform this paper. To Prof. Hayam Wahba Who guided me scientifically and personally.

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