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3

Split on the Warsaw Stock Exchange

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1. Introduction

Stock split is a magic measure made by a company's management (Grudziński, 2016, p. 16) becoming more and more popular on the WSE. During the stock split the increase of equity and the shares of individual shareholders in stock rarely change. The main purpose of the split is to gain better liquidity of the stocks of a particular listed companies – individual investors will gain stocks more efficiently as they usually have low capital and the price of a single stock is decreased. This will cause the decrease in the bid-ask spread. The influence of the split on the stock prices is under an extensive discussion.

2. Literature review

Fama et al. (1969) has found out that together with the stock split there is also a period of faster growth of stock prices in terms of other companies from the sector, or the index. The beta coefficient, which will be explained later, is one of the methods of measurement of the price growth speed in regard of other companies. This situation is in correlation with the fact that the management of the company usually decides to implement a stock split during the company's prosperity times – the financial statements are good, and forecasting shows further improvement of the situation. Another observed phenomenon in Fama et al. (1969) study is the announcement of the stock splits by the companies which receive less attention from stock analysts than other companies.

The review of the research of event study for the Polish market made by Podgórski (2010) shows that the market reaction for splits was against the information effectiveness theory.

Huang, Liano and Pan (2009) show mostly the informative function of the stock splits. They noticed that the stock split can signal the increase in profit of the firm, but only in a short-term perspective. There is no research which would confirm the correlation with the split and the long-term profit increase announcement. Based on the data from American stock-exchanges between 1963 and 1999 researchers noticed that the split announcement has indicated the increase in profit for four years, but also shows that in the year, when the split was announced, there is a peak and then there is a four-year decrease in the price of the split.

Huang, Liano and Pan explains that there is such a thing as the optimum price range. Small individual investors are well-seen to achieve a better controllable ownership mix. The research proves that a higher number of shareholders after the split contribute to the increase in the number of analysts tracing the company

(Brennan and Hughes, 1991) and the improvement of the liquidity (Anshuman and Kalay, 2002; Dhar et al., 2003).

As it was mentioned in Huang, Liano and Pan research, Gurgul (2006) mentions the proper trading range. He suggests that there is a price range which is the most advantageous to and seen as the best by stakeholders. The price above this price range may turn out to be too high for individual investors and can show the overvaluation of the company. Too low a price, however, causes that even a little change in the price of the stock makes a high percentage change and may suggest a weak financial condition of the company.

Yagüe, Gómez-Sala, Poveda-Fuentes (2009) notice that the stock splits are contributed by the companies which are undervaluated for the analysts to do the revaluation of their foundations. They also observe that the companies doing splits have better operating profitability than companies of similar size and branch, which do not do splits. Basing on Yagüe, Gómez-Sala, Poveda-Fuentes's article concerning the Spanish market the conclusions can be drawn that managers in the companies do splits with high level of split factor to signal that the good profits before the split are constant and are not going to change in the near future. With the level of the lower split factor than the estimated by the market, the market reaction is not explained by the evolution of the profit of the company.

Hu, Chao, Malone and Young (2017) basing on the observation of American companies between 1926 and 2012 notice that the splits are done more often on the bull market, that is during the growth period. The observations of the previous researchers also confirm this conclusion – companies do splits when the company's situation is favorable. Hu, Chao, Malone and Young, however, say that the abnormal rates of return are higher only during the short-term period whereas in the long-term period they are lower. When the split is announced during the bear market, the market reaction is higher in the long-term. Companies like that are recognized as stable and strong, as they have a fair amount of certainty and courage to do the split, when the macroeconomic situation is unfavorable. The researchers have noticed that companies like that prosper better in the long term than their competitors who do the stock split during the growth period. What also needs to be mentioned is that the business cycle – high profits during the growth – is the key factor which decides about doing the stock split.

A different perspective is presented by Karim and Sarkar (2016). They noticed that companies, before doing a split, have a tendency to be overvaluated, not undervaluated, as previous researchers have shown. The overvaluated companies have too high a price of the stocks, which can move beyond the trading range and the stock split is then required to maintain the proper level of liquidity. The managers of the overvaluated companies can use the stock split to

manipulate the beliefs of investors that the company is undervaluted and not, just as in reality, overvaluated.

Hwang, Keswani and Shackleton (2008) present the results of the research carried out by, among others, Pilotte and Manuel (1996) and Navak and Prabhala (2001) who have examined short-term determinants of the market reaction after the stock split announcement. They have noticed that abnormal rates of return are lower in the companies which regularly pay off dividends than in the companies which do not do that. This is due to the fact that the pay-off of the dividend includes similar information about the financial condition of the company for the stakeholders, as the stock split.

Hwang, Keswani and Shackleton notice that there is a long-term difference in the market reaction between the anticipated stock split and the unexpected ones – the ones which stakeholders did not forecast. During the anticipated stock split, abnormal rates of return are – on average – one and a half times higher than in the unexpected splits. This may be due to the fact that the anticipated splits are found out as more reliable than the ones which were done by surprise. Investors invest significant amounts in stocks of the companies whose split was anticipated, whereas during the unexpected splits their investments tend to be more cautious.

3. Sample and methodology

Market Maker Model (MM Model) – called also Sharpe's model – was used to calculate the rates of return. It uses the method of OLS to estimate the coefficients of the model.

$$A_{jt} = R_{jt} - \alpha_j - \beta_j R_{mt} \qquad (1)$$

where:
α_j – alpha coefficient for valor j
β_j – beta coefficient for valor j
R_{jt} – the rate of income for securities j on the day t
R_{mt} – expected rate of return of market portfolio on the day t.

There are a few methods to calculate rates of returns, however, in this research only the classic method of calculation the rates of return – based on natural logarithms – will be used.

$$R_{i,t} = Ln\left(\frac{P_{i,t}}{P_{i,t-1}}\right) \tag{2}$$

where:
$P_{i,t}$ – the price of the securities on the day t
$P_{i,t-1}$ – the price of the securities on the day minus one.

The next step is to establish the event window. In the perfectly effective market the arrival of the new information should result in the immediate adjustment of the price to the market. The market, however, is not perfectly effective, so the arrival of the new information does not cause immediate market reaction. The adjustment to the new information does not occur immediately so the event window should be wider, covering the period in which the influence of given information on the price will cease to exist. The moment which ends the event window is not hard to choose, as it has no influence on the coefficients of the model. The moment, in which the event ends, should be chosen.

The best moment to establish the beginning of the event window is the situation in which the information leaks to stock investors for the first time. Choosing the proper moment is, however, hard to be done in practice. Gurgul (2006) suggests using the observation of the level of volume registered with high intensity.

To properly examine the influence of stock splits for the market price reaction, the disturbing events should be exluded as they have a separate influence on the stock price. Gurgul uses the estimating window period between 30 and 250 quotations.

The difficulty at the elimination of the disturbance is establishing their relevance. They can be eliminated ex ante, that is while creating the sample; or ex post, that is after creating the sample.

At the end, the hypotheses need to be verified. The method used to verify was a t-student test whose advantage, among others, is a low number of observations.

$$SAR_{it} = \frac{AR_{it}}{SD(AR_{it})} \tag{3}$$

AR_{jt} – abnormal rate of return for valor j on the day t

$$SD(AR_{it}) = \sqrt{\frac{1}{T_0 - 1}\sum_{t=0}^{T_0} AR_{it}^2} \tag{4}$$

$SD(AR_{it})$ – standard deviation of AR

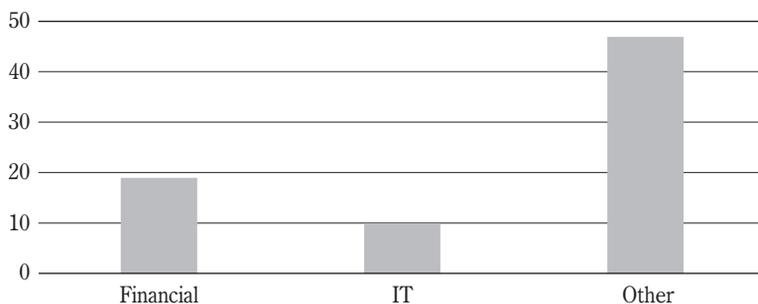T_0 – price on day 0
The remaining symbols as before.

4. Data and description

In the research of stock splits on Warsaw Stock Exchange there were taken into consideration 76 splits out of 166 splits between 2011 and 2016. This is due to the need of cleaning the sample from disruptive events and potential outlayer observations. The sample can be divided into three categories: financial, IT – new technologies and others – extraction, production, sale etc.

Their share in this research is presented as follows: there are 19 companies from the financial industry, 10 companies from the new technologies industry and – most of them – 47 from other categories (Figure 1). With such a division of companies into industries, firms with activity other than financial and technological ones are dominant here, because this is the category with the widest range of activities such as extraction, production, sale and various services (different, however, from IT and finances).

Figure 1. The number of splits with the division for industries
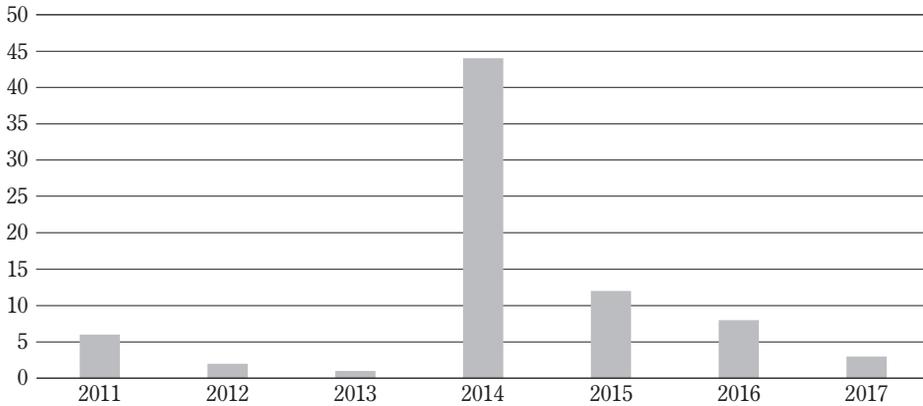
Presents the number of splits for the industry

Source: own preparation.

There is a relatively big number of companies from financial and new technologies industries as they are highly narrow categories. This can be a result of the fact that these are companies with relatively high-speed growth what can lead the management to make decisions such as the stock split. The split distribution in time is an important fact and it is presented in Figure 2.

Figure 2. The number of splits in the given years

Presents the number of splits in the year taken for this research

Source: own preparation.

In Figure 2 the data shows that the biggest number of splits was done in the year 2014, because there were 44 of them. Another year with the biggest number of splits is the year 2015, with the number of 12 splits. The fewest splits were done in 2013, when only one company did the split and it was Rubicon.

The next data refer to the level of the split factor, or how many new shares the old one was divided into. The biggest number of splits was done with the ratio 1:10. It can be due to the fact that companies do not want to make hasty decisions about the split with the lower level of ratio because of the costs of such an event. According to this fact the companies are waiting until the price of their stocks will rise to such a high level that the split of one stock for ten new ones will provide the expected price. The other reason may refer to the idea of splits, which is the increase in the liquidity of the stocks of a given company. The ratio 1:2, or even 1:5 may not been a sufficient incentive for investors to encourage them to trade on stocks of a given company, but the ratio 1:10 (e.g. 60 PLN for 6 PLN) may be such an incentive. An interesting issue is the split with the ratio 1:2000 which can be beyond doubt called above average. The split with such a high ratio was done only once, in 2014 year, and the company which did it is named Intakus.

To make sure the research is performed correctly and to give it an objective, the research hypothesis needs to be formulated. In this case the hypothesis assumes that there is no influence of the splits on the price of the stocks.

Scheme 1. The length of the estimation window and the event window

The scheme presents the length of the estimation window and the event window
and it places them relative to each other on the drawing

Source: own preparation.

In the research, the estimation window started 270 days before the split (which equals about one fiscal year) and it ended 20 days before the split (which equals about one fiscal month). The period of the estimation window lasted 250 days. The event window is between 5 days before the split and 5 days after the split, however in the research other periods were also taken into consideration (such as –1 to +1 or 0 to +2). The period between the estimation window and the event window lasted 15 days.

5. Empirical Results

The first stage in the research was to calculate abnormal rates of return. They present the difference between the stock behavior of a given company on the market (in this case all the companies in the sample were averaged) and the Market Model so the market behavior in a given moment. The period presented on this chart includes 11 days, 5 days before the split and 5 days after the split (Table 1, Figure 3).

Table 1. Abnormal rates of return in the event window

Presents abnormal rates of return, cumulated abnormal rates of return and p-value
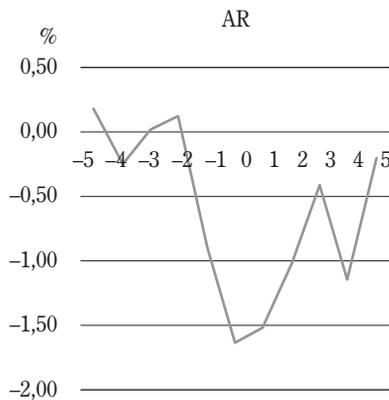in the window 5 days before and after the event occurred

Day	AR		p-value	CAR
–5	0,1764%		0,3244	0,1764%
–4	–0,2478%		0,1807	–0,0714%
–3	0,0198%		0,5627	–0,0516%
–2	0,1177%		0,2457	0,0661%
–1	–0,8975%		0,3994	–0,8314%
0	–1,6283%	**	0,0391	–2,4597%
1	–1,5168%	**	0,0198	–3,9766%
2	–,0210%		0,1804	–4,9976%

Day	AR		p-value	CAR
3	−0,4114%	0,4497		−5,4090%
4	−1,1442%	0,0638		−6,5532%
5	−0,2092%	0,7456		−6,7624%

Source: own preparation.

Figure 3. Rates of return in the event window

Presents abnormal rates of return in the window 5 days before and after the event occurred

Source: own collaboration.

In Figure 3 it is shown that companies' stock on average behave worse than the market on one day before the split and on the day of the split. The abnormal rate of return reaches even the level of 1.67% on the day of the split. During the next days, there is a growing tendency and that means the stock behavior is approaching the market reaction.

The difference between the rates of income and those estimated within the model on the day of the split (deprecation of 1.63%) and the day after (depreciation of 1.52%) are statistically significant. On the remaining days, abnormal rates of return do not occur. On day 1, 2, 3, 4 and 5 (respectively −0.9%, −1.52%, −0.41%, −1.14%, 0.21%) there is observed the depreciation of AR prices, however, they do not tend to be statistically significant. Among the given ones, the highest depreciation is observed on day 4 after the split, with the level of 1.14%. As it was mentioned before, it is not statistically significant. The second stage of the research is CAR analysis presented in Figure 4 and Table 2.

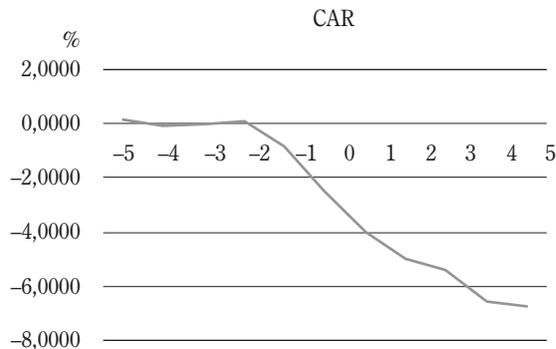Table 2.   Cumulated rates of return in various event windows

Presents the value of CAR in different event windows

Window	CAR	p-value
0+1	–0,03145	0,7388
–1+1	–0,04043	0,497699
0+5	–0,05931	0,16086
–2+2	–0,04946	0,156852
–5+5	–0,06762	0,132069

Source: own preparation.

Figure 4.   Cumulated rate of returns in the event window

Presents cumulated abnormal rates of return (CAR) in the window 5 days before
and after the split

Source: own preparation.

Figure 4 presents that cumulated abnormal rates of return of the companies' prices from the day before the split tend to depreciate continually. There is no correction and return to the previous price, which fits the theory of the information effectiveness presented by Fama (1969). The companies Index depreciated on average for 6.76%. The highest individual declines occur between –1 and 1 (-3.15% which gives on average 1.58% daily). After that the depreciation of prices decreases, which is presented in the windows of days between 0 and 5 and -2 and 2 (the decline of the average daily depreciation). Statistical significance did not occur in windows presented in this research.

Basing on the information resulting from the statistical significance it can be concluded that market prices of given companies are statistically different from the prices given by the market model. It shows that the correlation between the split and market prices' behavior occurs and it is not a coincidence.

6. Summary

The hypothesis formulated in this research is being rejected. The differences between market prices and prices observed during days 0 and 1 are statistically significant, so the split has an influence on formation of stock prices.

In this research, the day of the split was analyzed, in which abnormal declines of prices were observed. The biggest one – being statistically significant –fall on day zero and one, but beginning from the day before the split, however with the further, declining depreciation up till day 5 (with agreed event window between -5 and 5). This market reaction may show that investors are not prepared how to act during sudden (not resulting however from the general market situation) depreciation of stock prices. Also, the stock split, which depreciates the value of an individual stock, makes the smaller change of stock prices result in the bigger percentage change of stock prices.

The split announcement usually causes the increase in prices as investors interpret it as the information about a good financial condition of the company and further possibilities of the development, which is inconsistent with the information effectiveness theory. What is more, the split announcement is frequently connected with a lot of other information. The part of the literature focuses on the split announcement day, on the next stage of this research it will analysis of the split announcement day.

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