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BACHELOR IN BUSINESS ADMINISTRATION

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Stock Splits

Analysis of market reactions in the Spanish stock exchange

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1. Introduction

In the last three decades, there has been significant evidence that the stock splits operations have increased in the Spanish stock exchange market. This type of operation is a decision that the company makes where the nominal value of the stocks is proportionally reduced to an increase in the number of shares outstanding, leaving the share capital amount unchanged. This means that the par value of the shares is reduced by the same proportion of the increase in the number of shares. As an example, if someone has a share worth $100 and the company decides to perform a stock split of a 1:2 ratio, the shareholder would have now 2 shares instead of 1, both worth $50 and leaving the shareholders with no tangible benefits, and no alterations in the company´s cash flows.

With these characteristics, in perfect market conditions, this proportional fall in the stock price and increase in the number of shares would leave the market capitalization of the firm unchanged (which is independent of the number of securities represented in the capital of the firm), and theoretically, there would be no operating or financial consequence for the structure of the firm, leaving this event to a purely cosmetic change (Xiaoqi *et al*, 2011).

However, empirical evidence of these events contradicts such theoretical point of view. Several studies carried out on stock splits support the existence of significant abnormal returns in the announcement and the execution dates, as well as on its respective surrounding days, and a notable behavior in various liquidity measures of the securities (Fama *et al*, 1969, Grinblatt *et al, 1984*). Firms, therefore, face several incentives from which they can benefit when splitting the stock

The objective of this paper will be to understand the concept of stock splits, what factors motivate the managers to perform this kind of operation, and research the different hypotheses formulated from other studies for the market reactions that have been observed. Those main hypotheses that have been formulated regarding the market reaction will be contrasted with empirical evidence for the case of the Spanish stock market, as most of the research made about this topic has mainly been focused on the US framework.

The paper will be structured as follows: firstly, it will be focused on giving some theoretical background about the stock split phenomenon and some of the studies already

carried out. It will continue with the sections regarding the data gathering and methodology used to contrast the respective framework with our results for the period and market studied, and finish with the general conclusions found in the research.

2. Conceptual framework

2.1 History of the stock splits.

Reviewing this type of operation in a historical context, stock splits are not considered a very modern financial operation. Although the first official split in Spain occurred in 1997, they already had a certain tradition in the US financial markets with the first split occurring in April 1915 (Ángel, 1917). They became a common phenomenon after the First World War, during the period of the "Roaring Twenties" (Ruiz Molina, 2007), until nowadays, where they continue to happen commonly in the global market.

For the case of Spain, the first splitting took place back in 1996 and was soon followed by many of these types of operations to the point that the next couple of years were referred to as the time of "Moda de Los Splits", which translated refers to splits´ trend. The majority of the splits carried out in Spain are concentrated between 1997 and 1998, a period that coincided with a greater popularization of the stock market among the small savers, the replacement of the peseta with the euro, and large increases in the stock prices (Ruiz Molina, 2007).

Stock splits have not been especially numerous in recent years, however, it has now returned to the center of the stage as many large companies have been opting for this formula, such as Amazon, Google, Apple, and Tesla. At this point, several analyses of investment banking experts and other firms are already suggesting that more stock splits of Wall Street listed companies could be easily in the pipeline (Chamizo, 2022). This scenario and together with the great influence of the US market on the rest of the world could impact the future increase of potential stock splits for the Spanish market.

2.2 Management view on stock splits

The movement of stock returns given a stock split event has been a subject of interest for financial economists and academics over the years. According to Calzada and Gomez Jacinto (1997), this is an operation that only has a psychological effect (what yesterday was expensive, today it is cheaper). Theoretically, a stock split leaves the market capitalization of a firm unchanged, and it does not contribute to any changes in the operating or financial structure. Shareholders receive additional stocks, but their proportional ownership of the company remains the same (PJ and Rao, 2001). Some authors defend that the stock split operations do not have significant effects on the market and that it is a purely cosmetic transaction (Calzada and Gomez Jacinto, 1997; Merino and Ferrán, 1997), although they agree that there must be a rational explanation for some managers to still be executing this operation given the transaction costs incurred in the process.

Companies follow different objectives when deciding to carry out a split on their shares. It is important to highlight that the motivations for the split decision have not been explained by a single theory. However, the great number of these corporate actions that have already taken place in several stock exchange markets is already evidence that there are several incentives that managers take into account, considering that it is an operation that involves several costs which could sum up to high amounts of money for a firm. These refer to the direct/administrative costs, the additional per-share fees in maintenance and listing in some stock exchanges, as well as the per-share taxes collected by the states of incorporation (Pérez *et al,* 2012). As part of the theoretical background, several motives have been proposed behind these management decisions.

Backer and Gallaguer (1980) in their study, surveyed 100 CFOs from the New York Stock Exchange-listed firms giving some conclusions on some of the main motives behind these operations. For instance, managers agreed that it can make the share prices more attractive for smaller investors by reducing their nominal value and becoming more affordable. This is a point of interest for those firms that have achieved a historical maximum and have become inaccessible for small investors. A stock split manages to overcome the psychological barrier of all-time high prices and gives the investors the impression that the stock has become more affordable and that they can achieve a more diversified portfolio. From the firm's point of view, a bigger number of small investors as shareholders provides a bigger prestige and confidence as the company is backed by a large volume of small shareholders who keep their shares as a long-term investment. This

large and stable shareholder base shields the company against speculative market movements that could be caused by the exit of a shareholder with a significant stake in the company´s capital. Moreover, the split leaves the stock price with more room for appreciation as it moves away from historical highs. This leaves the firm with a higher margin to increase its share price and thus improve its profitability.

On the other hand, some research studies (Lakonishok and Lev, 1987; Lamoureux and Poon, 1987), show that as a result of the price decrease, and with a larger pool of small investors there is a higher trading volume (understood as the number of securities traded during a specific period) and, as a result, an improvement in the level of liquidity for the security.

Empirical studies have demonstrated that the theoretical basis is not a conclusive explanation and that these operations are associated with significant market reactions upon announcement and execution dates. During the years of research about stock splits, various studies have found that the event of a stock split produces abnormal returns and changes in liquidity. Several hypotheses have been formulated throughout the studies conducted to explain why a stock split can have a significant reaction in the market.

2.3 Empirical analysis of market reaction: Signaling theory

One of the most accepted theories is the so-called signaling hypothesis, proposed by several authors such as Fama, Fisher, Jensen, and Roll (1969) or Grinblatt, Masulis, and Titman (1984). The explanation of this hypothesis relies on the idea that the market value of a firm is determined based on the estimations that the investors establish, taking into account the public data available, the expected returns, and the perceived risk (Ruiz Molina, 2011). Therefore, this signaling theory postulates that stock splits can act as positive value-relevant signals so that through them investors will infer the positive expectations of managers about the company (Xiaoqi et al, 2011). The signaling explanation is consistent with expected increases in earnings and/or dividends. If managers of a firm believed that the share price of their stock would decrease in the future, they would not be willing to split the stock due to the increased indirect costs that would involve when trading lower-priced stock and because of their reluctance to see the share price fall below their perceived optimal range (Lyroudi and Dasilas, 2006). The study of

Grinblatt et al. (1984), supports this argument. If managers possess pessimistic information about the company´s future growth, it is unlikely that they decide to increase the number of shares, even if the stock price is perceived to be too high.

Managers know more about the value of the firm than investors, and according to this theory the respective financial decisions (splits in our case), are used to reduce the information asymmetry with investors about the performance expectations (previously known at a private level). The decision, therefore, gives signals to investors that the company has confidence that the split is justified and not mindless speculation. Greater interest is attracted by these positive signals and thus new investors enter the company, leading to positive abnormal returns (Brennan & Copeland, 1988).

Within this signaling theory, two possible views can be distinguished based on the hypothesis explained in the signaling process (Ruiz Molina, 2001):

- Dividend theory: market interprets the split decisions as announcements of increases in future dividends.
- Earnings theory: investors interpret splits as signals sent by management to convey information regarding positive expectations for future earnings of the company, and thus, a higher market value of the firm. This theory is supported by the fact that splits are normally preceded by a period of stock price increases.

2.4 Empirical analysis of market reaction: Liquidity theory

The findings of Backer and Gallaguer (1980) in their survey to financial managers of listed companies on their reasons for making such decisions, gave rise to another of the most accepted theories of the stock split effects, in this case regarding the liquidity. According to the liquidity hypothesis, stock splits are directly related to price levels. As more companies go public and the stock market becomes more mature, there is a bigger number of players who enter to deposit their investments. As the increase of the number of participants in the stock market increases along with the demand, the prices of these securities begin to rise as well. Companies that execute a split in their capital usually have the common characteristic that the price of their shares has experienced very strong growth (Gómez, 1999). The objective of the split, in consequence, is to bring the share price to a lower level, to what should be considered its normal trading range. A lower

price of a security as a result of a stock split will make the stock more affordable for small investors and, in consequence, will increase the marketability and liquidity of the security with the larger pool of investors (Lyroudi and Dasilas, 2006).

According to the theory displayed by McGough (1993), for every security, there is an optimal price range so that it should be neither too high nor too low. Stocks that manage to keep their price in their optimal range concerning the rest of the stocks in the same industry have good marketability in the economy and enjoy a lower percentage of intermediation costs and appear to be more liquid (Ruiz Molina, 2007). If the price of the stock is too high, it will discourage the small investors, while if a price is too low, it will damage the company´s confidence with respect to their direct competitors as it would be sending wrong signals to the market.

2.5 Empirical analysis of market reaction: Corporate entrenchment theory

The study of Backer and Gallaguer (1980) also suggested the existence of the theory of corporate entrenchment, which states that managers could feel incentivized to undertake this transaction to change the ownership structure of the company´s capital by increasing the number of shareholders, in order to make it have a more heterogeneous composition to have more effective control of the company and entrench their positions within the firm (Torrejón Reyes, 2015). According to this theory, it could be inferred that those companies with a higher concentration in their capital ownership would have more probability to fraction their stock. Studies made on stock split events differ in their conclusions regarding if the number of different shareholders after the transaction truly increases (Ruiz Molina, 2007).

2.6 Cases of stock splits in large companies

As part of the conceptual framework, some cases are brought of important firms that performed a stock split transaction and analyze what were the causes and consequences of this decision.

Apple, Inc has been one of the most active companies in splitting its stocks with five closed operations since it went public. If they had never split their stock, it is

estimated that a share would have been worth $1,800 approximately in 2021. For the split that took place in April 2014, the stock was trading at $524.75 when a 7 for 1 split was announced. Investors at that time inferred that it was a signal of the company´s belief that the price would soon achieve the barrier of $700. Four months later, Apple managed to trade its shares at $100, a case influenced by a clear signaling effect (Smith, 2019).

Samsung, another giant in the mobile and electronics industry, announced in 2018 a stock split of 50:1 as a step to enhance the shareholders' value. The reason behind this was the numerous requests that the company received because of the high value of its securities, which was an issue for potential investors that were willing to buy stocks. The split was therefore executed with the objective to improve the liquidity and marketability of Samsung´s stock and boost the corporate value in the long term. The number of investors two years after the split event grew more than 5 times. The example of Samsung, therefore, can be reflected in the liquidity and corporate enhancement theories.

Regarding the most recent months, Amazon approved a 20 for 1 stock split on March 9, 2022. The decision has been made to increase the number of shares in circulation and reduce their price. The announcement led to a 6% rise in the share price and has continued to grow in the following days. With this example, we can see an example of abnormal stock returns proposed by several authors when a stock split occurred.

3. Empirical analysis

The development of an empirical analysis of the stock split phenomenon was firstly made by Fama, Fisher, Jensen, and Roll (1969) and has been executed by many other studies throughout the years. Their conclusions indicated that there is an existence of abnormal behavior in the rates of return of the stocks on the dates close to the announcement of a split and its realization, testing the return and liquidity behavior of a total of 940 splits that took place between January 1927 and December 1959. In the case of Spain, there have been several studies dedicated to testing the validity of the above theories, and the different effects that the stock splits have had on the market. For instance, Menendez and Gómez Astón (2002) analyzed a sample of stock splits from the 1990s decade until the end of 1998, concluding that there is a presence of positive abnormal returns around the announcement and the execution date of the split. Gómez

Sala (1999), on another hand, carried out a study from 1994 through 1997 and found evidence, as in the previous case, that splits produced positive abnormal returns but only on the ex-date and not on the previous days or the days following it.

For the purpose of the analysis, considering the theoretical base already proposed, the research will be focused on a different time frame than the ones researched for the Spanish stock market splits and will test the different hypotheses that have been proposed in the literature made about this type of transaction. The methodology used will be based on the event study theory. It states that the impact of a specific event on a company can be analyzed by viewing the effect on the stock prices, which is a mirror image of the available information and the expectations about the future (Hayes, 2022). In simple terms, the analysis will be based on testing whether there is or is not a statistical relationship between a stock split event and a company´s share price changes. On one hand, the effects that the announcement and the execution of a split can have on the returns of the stock will be studied, considering the prices on the surrounding days before and after the event dates, and see to what degree the signaling effect takes place. On the other hand, I will analyze the effect of a stock split in terms of liquidity in the market after the execution date considering the volume levels of the sample data selected. With this analysis, I will be able to test the most accepted explanations that have been raised from the stock splits literature of previous studies and contrast my results with the theoretical explanations of both hypotheses.

The time frame selected for my analysis implies a different one from most of the research made about the split phenomenon, as well as the fact that the market studied is the Spanish one and not the US, for which most of the other empirical work has been carried out. The Spanish stock market has several characteristics that distinguish it from the US stock markets which means that the results gathered could lead to the effects and hypothesis described above not being observable for this case or having a different impact on the variables focused.

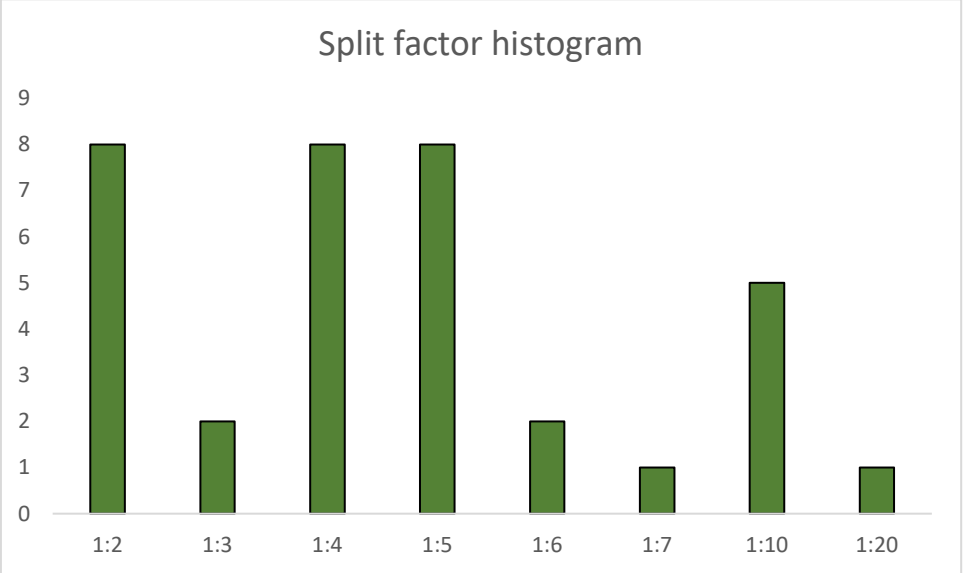
3.1 Data

The split information has been downloaded from a screening made with S&P Capital IQ (the research arm of S&P Global), one of the world´s largest platforms providers of

financial data, ratings, research, and market indices. For the period specified, the screening yielded a total of 61 stock splits that occurred between January 2003 and December 2018. From this dataset, I have excluded those companies that were private as they were not listed in the Spanish stock exchange market, leaving the set with 35 stock splits, which have some of the following characteristics.

The following graph shows the distribution of their split factors, being 1:2, 1:4, and 1:5 being the most common options.

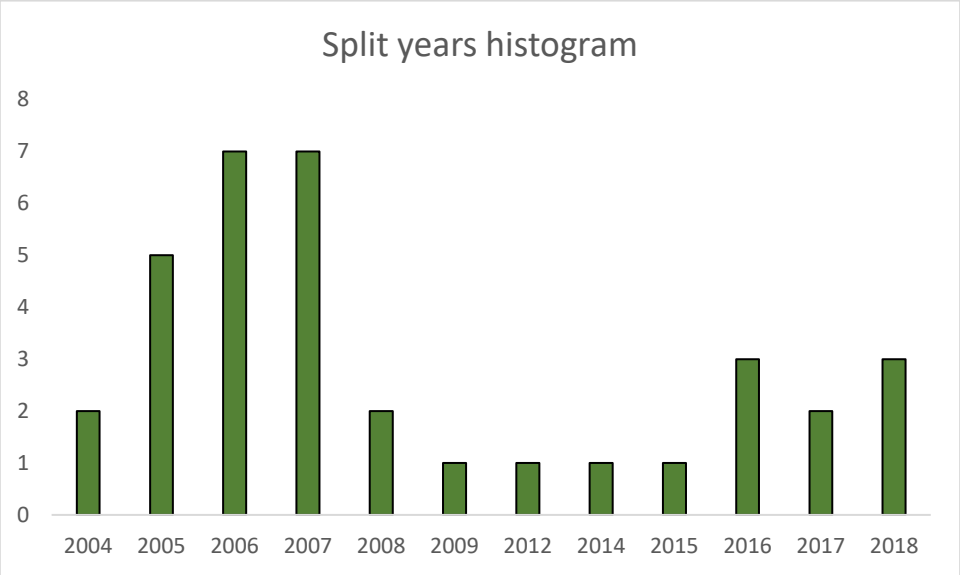
Figure 1: Distribution of the split factors of the dataset



Source: Own elaboration based on the data obtained from S&P Capital IQ

Regarding the split dates of the data, considering the execution dates of the splits, we find that over the years, the Spanish stock market has seen a reduction in this type of activity. As we can see in Table 2 below, most of the stock splits of our sample occurred before the financial crisis of 2008, particularly during the years 2006 and 2007.

Figure 2: Number of splits through the years



Source: Own elaboration based on the data obtained from S&P Capital IQ

Over the remaining data, a second filtering has been applied. To be able to perform the analysis, it has been necessary to have available information on 180 daily stock prices observations before the announcement date and 5 days after the execution date. The companies that did not comply with these requirements have been removed. Furthermore, I have also taken into account that at the time that the split was made for each of the cases, the firm was already public. Those companies that performed the split being private (although they become public in the future), were also taken out of the data set. Summing both requirements the total number of companies removed have been 8, leaving the sample with 27 stock splits, which are shown in table 3, below.

Table 1: Stock Split Dataset

Company Name	Split Date	Split factor
Acerinox, S.A. (BME:ACX)	26/07/2004	1:4
Atresmedia, S.A. (BME:A3M)	27/04/2005	1:4
Deoleo, S.A. (BME:OLE)	23/05/2005	1:4
Cementos Molins, S.A. (BDM:CMO)	18/07/2005	1:10
Elecnor, S.A. (BME:ENO)	25/07/2005	1:5
Tubos Reunidos, S.A. (BME:TRG)	14/11/2005	1:3
Prim, S.A. (BME:PRM)	20/02/2006	1:2
CIE Automotive, S.A. (BME:CIE)	22/05/2006	1:5
Duro Felguera, S.A. (BME:MDF)	20/06/2006	1:6
Grupo Catalana Occidente, S.A. (BME:GCO)	10/07/2006	1:5
Airtificial Intelligence Structures, S.A. (BME:AI)	22/09/2006	1:2
Mapfre, S.A. (BME:MAP)	30/10/2006	1:5
Faes Farma, S.A. (BME:FAE)	29/01/2007	1:2
ENCE Energía y Celulosa, S.A. (BME:ENC)	26/04/2007	1:5
Banco de Sabadell, S.A. (BME:SAB)	07/05/2007	1:4
Urbar Ingenieros, S.A. (BDM:UIN)	20/07/2007	1:2
Bankinter, S.A. (BME:BKT)	23/07/2007	1:5
Tubos Reunidos, S.A. (BME:TRG)	08/10/2007	1:4
Elecnor, S.A. (BME:ENO)	15/09/2008	1:2
Prosegur Compañía de Seguridad, S.A. (BME:PSG)	06/07/2012	1:10
Industria de Diseño Textil, S.A. (BME:ITX)	28/07/2014	1:5
Grifols, S.A. (BME:GRF)	04/01/2016	1:2
Red Eléctrica Corporación, S.A. (BME:REE)	11/07/2016	1:4
Construcciones y Auxiliar de Ferrocarriles, S.A. (BME:CAF)	30/11/2016	1:10
Iberdrola, S.A. (BME:IBE)	08/10/2017	1:4
Borges Agricultural & Industrial Nuts, S.A. (BME:BAIN)	18/12/2017	1:7
Nueva Expresión Textil, S.A. (BME:NXT)	03/08/2018	1:4

Source: Own elaboration based on data obtained from S&P Capital IQ

Once the general screening information was obtained, the information details of the daily returns for each stock were searched and downloaded from Refinitiv, a global software provider of financial market data. The daily returns for the time frame specified have been calculated with the share prices differences surrounding the respective dates of announcement and execution.

Furthermore, the general stock market index data to calculate the abnormal returns has been collected from the historical series of daily returns of the "Índice General de la Bolsa de Madrid" (IGBM), which has been considered a proxy of the market portfolio returns. The IGBM is the General Index of the Madrid Stock Exchange, the main and most important stock market in Spain.

3.2 Methodology

3.2.1 Signaling theory: Event study

As mentioned before, the methodology of the paper will be focused on quantifying the impact that the announcement and the execution of a split have on the yields of the securities studied, that is, if there are any abnormal returns as a consequence of each of the events. The abnormal returns of each security are estimated using the methodology of event studies by Strong (1992) to examine the announcement effect of the split, an approach that aims to unveil the effect of a firm-specific event on the stock price. The event study methodology will allow us to test the market efficiency hypothesis (Fama, 1970), which states that the market as a whole should react immediately to changes in the information, that is, the market should identify absorb and reflect the new information instantly as soon as it becomes available, allowing for the possibility of abnormal behavior during the period called the event window.

The abnormal returns will be quantified as the difference between the actual return of a security and its expected return:

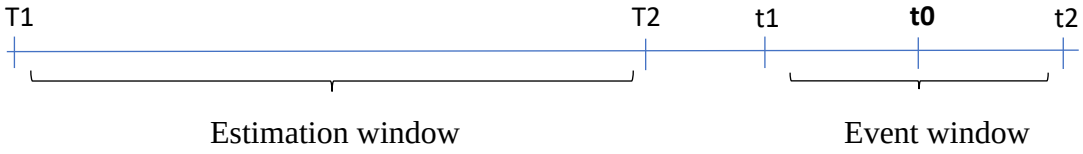
$$AR_{it} = R_{it} - E(R_{it}) \qquad t \in EW$$

where AR_{it} is the abnormal return of security (i) for a specific date (t); R_{it} is the observed return for the company i at time t, conditional on the event (announcement or execution); and $E(R_{it})$ is the expected return (not the actual) of the company with respect to the market index. The difference will give us the abnormal returns and we will be able to compare the actual stock returns with the normal or expected ones. EW refers to the event window, which will be the time period of the days surrounding the event dates.

To estimate E(Rij) in the present study, I will use the market model. According to the definition provided by Nasdaq, the market model is used to determine the return of a security based on the return on the market portfolio and the responsiveness extent that the security towards it. This assumes the existence of a stable linear relationship between the expected return of any security (R_{it}) and the expected return of the market portfolio. The general formula for the calculation of $E(R_{it})$ is:

$$E(R_{it}) = \alpha_i + \beta_i R_{Mt} + u$$

where α_i is the constant term, which is the return from the security i that is not related to the market´s return and depends on conditions that are unique to the firm; β_i refers to the degree of sensitivity and variability of the return of the security with respect to the average return of the market portfolio in which it is traded. It is used as a measure for the systematic risk of a security compared to the market; R_{Mt} refers to the return of the market portfolio at time t, and u_i is an error term measuring the extent to which the returns are not explained by the regression equation. From the model, I will obtain the α and β for each one of the firms from the selected data. To do so, it will be necessary to run a "single index model" regression analysis of the firm´s returns onto the market returns during the period specified and estimate both unknown parameters by the ordinary least square methods (OLS), which minimizes the sum of the squared distances between the observations and the predictions of the linear approximation. The data analysis excel add-in will be the tool to calculate the regression between each of the stock returns during the studied period and the respective ones for the market during the same dates. The estimation will be performed over an *estimation period* (T1 and T2), preceding the event period of the announcement and execution (t1 and t2).



Source: Own elaboration

Considering t0 as the event date for both announcement and execution, the estimation window will be between -180 and -6 days before the announcement date, while the event window will be within the range of -5 and +5 days for both the announcement and execution. The following time intervals will be used to calculate the abnormal returns around the event dates: (1) *-5 to -1 days*, (2) *-5 to 0 days*, (3) *-5 to +5 days*, (4) *0 to +1 days, and* (5) *0 to +5 days.*

Once we have estimated α and β for each case, we apply it to the data during the event period and get the respective $E(R_{it})$ to subtract it from the actual return. Based on the market model, if the event does not cause any changes regarding the observed return the expected value of the AR_{it} should be 0. The mean of the abnormal returns of each of

the companies for every t in the event window will be calculated using the cross-sectional average method:

$$AAR_t = \frac{1}{N} \sum_{i=1}^{N} AR_{it}$$

and the performance over every time interval specified will be summed up over the days as follows for which we will have the cumulative average abnormal returns, and a clear effect of the stock splits over the event periods:

$$CAAR = \sum_{+t}^{-t} AAR_t$$

As for the actual (or observed) stock and market returns, they have been calculated based on the closing price of each of the stocks for the specified period of the study in the following way:

$$R_{it} = \frac{P_t}{P_{t-1}} - 1$$

where P_t is the closing price on day t and P_{t-1} is the price the day before.

3.2.2 Testing the statistical significance

Once the results are obtained, it will be important to claim that they have not been obtained as a result of chance but rather can be attributed to a specific cause, using statistical tests such as hypothesis t-testing. It is an essential step to be able to draw any conclusions and assume economic relevance from the calculated abnormal results. This type of test will be used to determine if the results (abnormal returns in this case) are significantly different from 0 at a specified level of significance. Thus, the null and alternative hypotheses I will conduct will be:

$$H0: E(AAR_t) = 0$$

$$H1: E(AAR_t) \neq 0$$

where E(AAR) is the expected average abnormal returns at time t.

Strong (1992), suggests that in order to check this null hypothesis, the following equation should be used to obtain the t-statistic point:

$$t = \frac{AAR_t}{S(AAR_e)}$$

where AAR_t is the average abnormal returns at time t (equation below), and $S(AAR_e)$ is the standard deviation of the average abnormal returns for the estimation period (-180, -6).

$$AAR_t = \frac{1}{N} \sum_{i=1}^{Nt} AR_{i,t}$$

As σ is unknown, an estimator will be constructed for the entire sample from the following formula:

$$S(AAR_e) = \frac{\sqrt{\sum_{-180}^{-6}(AR_e - AAR_e)}}{N}$$

The absolute value of the t-statistic equation will be compared to the critical value corresponding to the N-1 degrees of freedom and the significance level chosen. The null hypothesis will be rejected if the t-statistic is higher than the critical value.

3.2.3 Liquidity theory: Changes in volume

In the previous section, I have explained that an important reason for companies to perform stock splits was to reduce the share price in order to attract more small investors. As part of the empirical analysis, I will also test if this decision offers advantages in terms of liquidity for the company. According to the online resource Investor.gov, a stock´s liquidity is defined as how easily or quickly it can be bought or sold in the market. Stocks with low liquidity are more difficult to sell than those with a higher one.

For the purpose of the paper, I will test whether the implementation of a stock split produces an increase in the stock liquidity, which will be understood as the number of shares traded during the day. The sample data considered will be the same as in the previous section, and to test the effect that the splitting will have, will be analyzed by

applying a statistical method based on the excess value of this variable during the event period time interval (5 days before and after the execution date). This excess value will be calculated as the difference between the average volume at time t and the average volume for the estimation period (-180, -6). The abnormal volume on a day t will therefore be the excess at that time in relation to the mean of the estimation period, as shown in the following equation:

$$AAV_t = V_t - V_e$$

where AV_t refers to the average abnormal volume at time t; V_t is the observed average volume of the sample at time t; and V_e to the average volume of the estimation period (-180, -6). Once the results are collected, a t statistic point will be constructed for every t in the event period to test the following null hypothesis,

$$H0: AAV_t = 0$$

which will be tested by calculating the t-statistic formula:

$$t = \frac{AAV_t}{sd(V_e)}$$

where the denominator is the standard deviation of the abnormal volume in the estimation period. As for the case in the signaling theory testing, the t-statistic will provide the level of significance at which the null hypothesis could be rejected.

3.3 Results

3.3.1 Abnormal returns

The following table shows the daily average abnormal returns for the overall sample, in the period comprising the 5 days before (t= -5) and after (t= +5) the announcement date, obtained by averaging the abnormal returns calculated as prediction errors of the market model.

Table 2: Results of abnormal returns around the announcement date

Average Abnormal Returns Announcement Date s=0,00348			
Days	Abnormal returns (%)	t-statistic	Significance
-5	-0,16%	-0,47	
-4	0,76%	2,17	**
-3	0,52%	1,50	
-2	-0,14%	-0,39	
-1	0,60%	1,72	*
0	0,82%	2,34	**
1	0,74%	2,13	**
2	0,07%	0,21	
3	-0,46%	-1,31	
4	0,08%	0,22	
5	-0,64%	-1,83	

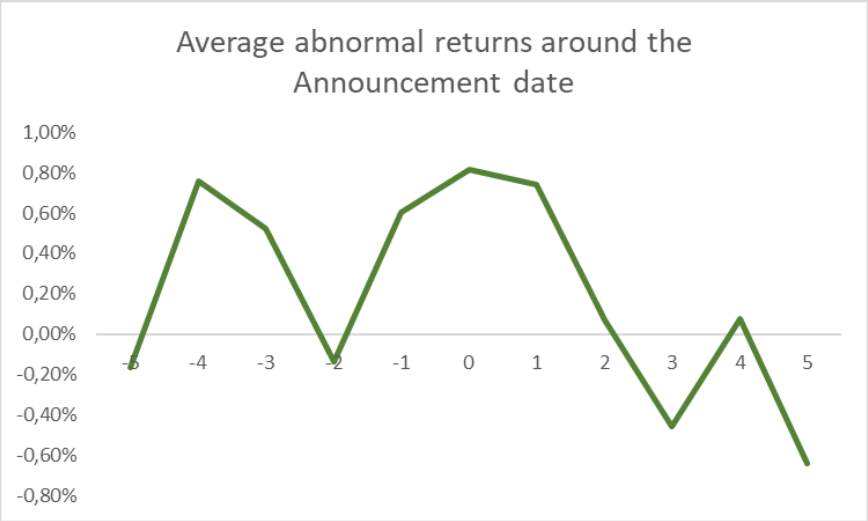
Source: Own elaboration.

Notes: *significant at 0.1 level; **significant at 0.05 level; *** significant at 0.01 level.

As a result, when studying the effect of the announcement of the split on the profitability, we generally observe positive abnormal returns on most of the days of the event period. The results surrounding the event date (-1 to +1) give a positive result and are statistically significant. On the following days, the abnormal returns tend to fall, reaching negative values on some of the days (+3 and +5), although we do not find statistical significance on those days.

It is therefore clear that positive abnormal returns are observed on the days surrounding the stock split announcement and prove to be significant at the 10% level the day before, and 5% on the event day and the day after, comparing our t-statistic with the critical values in the t-student table. In the following graph, we can visually see the positive and significant results around the announcement date and how that tendency does not stabilize in the next days, moving from positive to negative results.

Figure 3: Average abnormal returns around the announcement date



Source: Own elaboration

Following the same methodology, the behavior of the returns around the days of the execution date has been studied. Although this event does not involve sending new information to the market, it is interesting to check what is the reaction to the split event. The table below shows the result for the abnormal returns around the execution date:

Table 3: Results of abnormal returns around the execution date

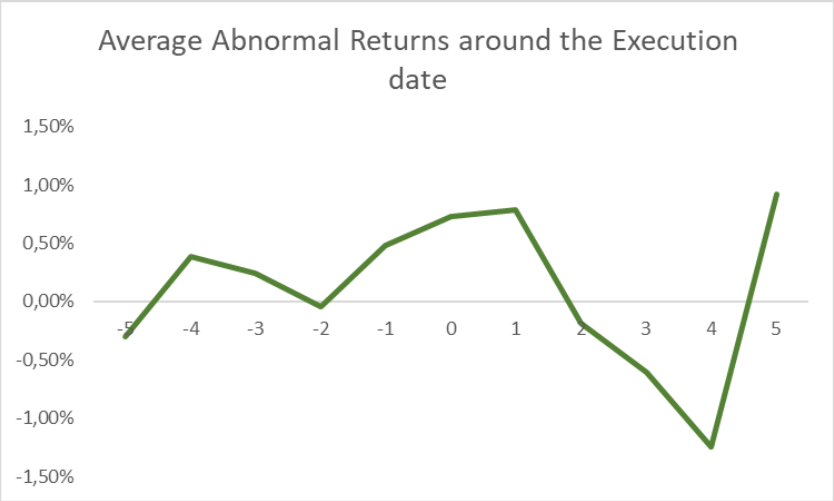
Average Abnormal Returns Execution Date s= 0,00348			
Days	Abnormal returns (%)	t-statistic	Significance
-5	-0,30%	-0,86	
-4	0,39%	1,10	
-3	0,24%	0,70	
-2	-0,04%	-0,13	
-1	0,48%	1,38	
0	0,73%	2,10	**
1	0,78%	2,25	**
2	-0,19%	-0,55	
3	-0,60%	-1,73	
4	-1,25%	-3,59	***
5	0,92%	2,64	**

Source: Own elaboration.

Notes: *significant at 0.1 level; **significant at 0.05 level; *** significant at 0.01 level.

As was the case for the announcement date, we find statistically significant abnormal returns for the event day, the day after, and day +5 at a significance level of 5%, as well as negative abnormal return 4 days after the execution. In the following graph, we observe that the execution event had only a temporary positive effect on the following day of the event that vanishes through the next three days with negative abnormal returns

Figure 4: Average abnormal returns around the execution date



Source: Own elaboration from the data obtained

The returns of both events are then accumulated for the different sub-periods around the announcement and the execution date for the intervals (-5, -1), (-5, 0), (-5, +5), (0, +1), and (0, +5), and are presented below.

Table 4: Results of cumulative average abnormal returns

Cumulative average abnormal returns				
Period	CAR Announcement	Significance	CAR Execution	Significance
(-5, -1)	1,58%	**	0,77%	
(-5, 0)	2,40%	***	1,50%	**
(-5, +5)	2,19%	***	1,16%	
(0, +1)	1,56%	**	1,52%	**
(0, +5)	0,61%		0,39%	

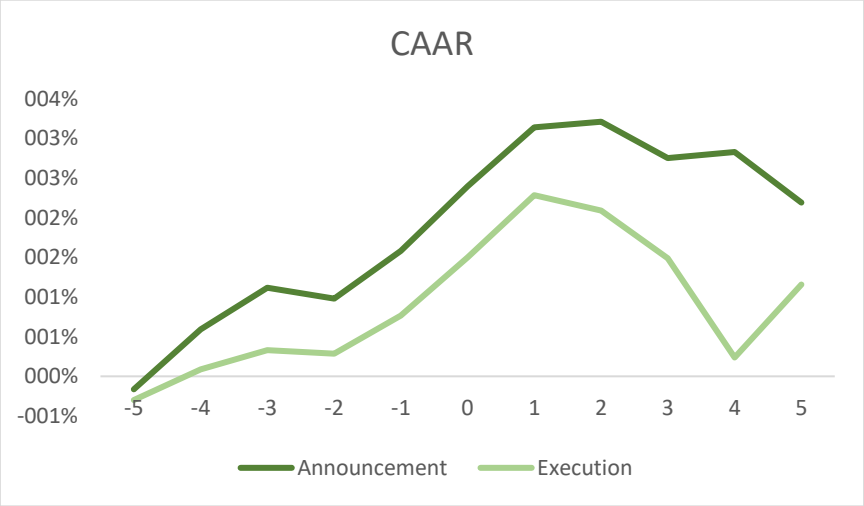
Source: Own elaboration.

Notes: *significant at 0.1 level; **significant at 0.05 level; *** significant at 0.01 level.

For the case of the announcement date effect, all of the calculated cumulative average abnormal returns are positive and statistically significant except for the (0, +5) period. We, therefore, infer that positive abnormal returns are observed and accumulated on the day prior. On the other hand, the effect on the execution date also gives positive accumulated abnormal returns, although there is only statistical significance for the periods (-5,0) and (0, +1).

The following graph shows a representation of the cumulative average abnormal returns for both events during the entire event period (-5, +5).

Figure 5: Cumulative average abnormal returns on the announcement and event date



Source: Own elaboration. Data from the methodology results.

We observe that in both cases the abnormal returns start to increase in the days prior to the event and in the following days, which coincide in being the time frames with more statistical significance. It is visible that the announcement has a bigger impact on the returns than the execution event. However, this increase in abnormal returns seems to dissipate as days go by, both lines tend to start a decrease a few days after the event days.

3.3.2 Liquidity

The results regarding the contrast of the liquidity hypothesis are shown in the following table:

Table 5: Results of average abnormal volume

t	Abnormal volume	t-statistic	Significance
-5	-899.347	-0,72	
-4	-1.050.487	-0,84	
-3	-1.847.884	-1,47	
-2	-1.229.206	-0,98	
-1	-1.120.431	-0,89	
0	-1.870.844	-1,49	
1	148.931	0,12	
2	-919.796	-0,73	
3	-416.001	-0,33	
4	-1.054.643	-0,84	
5	-1.361.191	-1,08	

Source: Own elaboration

Notes: *significant at 0.1 level; **significant at 0.05 level; *** significant at 0.01 level.

We can observe negative abnormal volumes in the days surrounding the event date, except for the day before the split takes place. However, these results do not give us any statistical significance for any case, and the null hypothesis of the abnormal returns being zero cannot be rejected. Based on these results we cannot infer that the liquidity hypothesis takes place for the data selected.

4. Conclusions

A stock split is a decision by which a firm reduces the nominal value of its shares by increasing the number of securities without changing the amount of capital stock, and therefore in perfect market conditions, the share prices should fall in the same proportion to the split executed and the market value of the firm would stay at the same level.

Empirical evidence, however, has contradicted these affirmations with various studies made about the effect of these operations on the market. The objectives of the project were to understand the motivations behind a stock split and research the different hypotheses formulated within the market reaction in previous studies made. We find that most studies agree on the signaling and the liquidity effect being the most significant ones for the abnormal returns and abnormal liquidity found in the several results gathered around the event dates.

To test both effects, data on stock splits have been collected for the Spanish market between the years 2003 and 2018 obtained from an S&P Capital IQ screening and after filtering some of the results the methodology used to test the effect has been based on an event study.

For testing the signaling hypothesis, the focus has been set on the days surrounding the announcement and the execution dates of the stock splits. The results have shown generally positive abnormal returns for the 5 days before and after the events. For both cases, we find statistical significance in those positive abnormal returns for the event day (t0) and the day after, although the effect tends to disappear the following days with a decrease in the abnormal returns. In summary, we can conclude that our results show that a signaling effect takes place during both events but may not be sustainable in the following days as we observe a significant fall in the abnormal returns, although without statistical significance. On the other hand, when looking at the cumulative abnormal returns for the different periods specified, we find positive returns with statistical significance for some of them. The cumulative returns have a significant increase on the immediate days before and after the events but begin to decrease a couple of days after. We can therefore conclude that the signaling effect takes place for the sample selected and that a stock split has a positive effect on the returns during the days surrounding the announcement and the execution, but it is not sustainable, and the abnormal returns tend to decrease after a few days. Comparing both dates, we see that it is the announcement the one that has a higher effect on the market.

Regarding the liquidity hypothesis, the average volume of the shares has been obtained for each of the sample selected and the results have not shown any statistical significance on abnormal volume average during the execution date. For this case, therefore, we cannot conclude that the liquidity hypothesis stands for this respective study.

Overall, the main finding that this study has provided, is that the stock splits can have significant market reactions that affect the returns of a split. The study is consistent with most of the other empirical research made about the stock split phenomenon.

5. References

Angel, J. J. (1997). *Tick Size, Share Prices, and Stock Splits*. The Journal of Finance, 52(2), 655–681. Available at: https://doi.org/10.2307/2329494

Baker, H. K., & Gallagher, P. L. (1980). *Management's View of Stock Splits*. Financial Management, 9(2), 73–77. Available at: https://doi.org/10.2307/3665171

Brennan, M. J., & Copeland, T. E. (1988). *Stock splits, stock prices, and transaction costs.* Journal of financial economics. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=717801

Calzada, B. & Gómez Jacinto, M. (1997). Splits: Algo más que un simple

desdoble. Bolsa de Madrid, 57, 17-19.

Chamizo, H. (2022). *De Amazon a Tesla: por qué la tendencia del 'split' de acciones en las grandes compañías irá a más.* Business Insider. Available at: https://www.businessinsider.es/cada-vez-empresas-apuestan-split-acciones-1027677

De Jong, F., & de Goeij, P. (2007). *Event studies methodology*. Lecture Notes. Available at: https://www.academia.edu/download/55108295/De_Jong_2007.pdf

Fama, E. F., Fisher, L., Jensen, M., & Roll, R. (1969). *The adjustment of stock prices to new information*. International economic review, 10(1).

Fama, E. F. (1970). *Efficient capital markets: A review of theory and empirical work.* The journal of Finance, 25(2), 383-417. Available at: https://www.jstor.org/stable/2325486

Gardiol Morinigo, G. I. (2017). *Fraccionamiento del nominal de acciones: una perspectiva de las finanzas del comportamiento*. Available at: http://repositorio.udesa.edu.ar/jspui/handle/10908/12146

Gómez, J. C. (1999). *Rentabilidad y liquidez alrededor de los splits*. Instituto Valenciano de Investigaciones Económicas. Available at: http://www.ivie.es/downloads/docs/wpasec/wpasec-1999-01.pdf

Grinblatt, M. S., Masulis, R. W., & Titman, S. (1984). *The valuation effects of stock splits and stock dividends*. Journal of financial economics, 13(4), 461-490. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=995759

Hayes, A (2022). *What is an event study?* Investopedia. Available at: https://www.investopedia.com/terms/e/eventstudy.asp#:~:text=An%20event%20study%20is%20an,react%20to%20a%20given%20event

Investor.gov (2021). *Liquidity (or marketability).* Available at: https://www.investor.gov/introduction-investing/investing-basics/glossary/liquidity-or-marketability#:~:text=A%20stock's%20liquidity%20generally%20refers,shares%20when%20you%20want%20to.

Lakonishok, J., & Lev, B. (1987). *Stock splits and stock dividends: Why, who, and when*. The Journal of Finance. Available at: https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1540-6261.1987.tb03919.x

Lamoureux, C. G., & Poon, P. (1987). *The market reaction to stock splits. The journal of finance.* Available at: https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1540-6261.1987.tb04370.x

Li, X., Stork, P. A., & Zou, L. (2013). *An empirical note on US stock split announcements, 2000-2009*. International Journal of Economic Perspectives.

Lyroudi, K., Dasilas, A., & Varnas, A. (2006). *The valuation effects of stock splits in NASDAQ*. Managerial finance. Available at: https://doi.org/10.1108/03074350610657427

McGough, E. F. (1993). Anatomy of a stock split. Strategic Finance, 75(3), 58. Available at: https://www.proquest.com/docview/229777306?pq-origsite=gscholar&fromopenview=true

Menendez, S., & Anson, S. G. (2003). Stock splits: motivation and valuation effects in the Spanish market. Investigaciones Económicas, 27(3), 459-490. Available at: https://www.fundacionsepi.es/investigacion/revistas/paperArchive/Sep2003/v27i3a2.pdf

Merino, J. y Ferrán, E. (1997): Los splits: Una moda que gusta al pequeño accionista. Bolsa de Madrid, nº 55:38.

Nasdaq (2022). *Market model.* Available at: https://www.nasdaq.com/glossary/m/market-model

Palmer, A (2022). *Amazon announces 20-for-1 stock split, $10 billion buyback.* CNBC. Available at: https://www.cnbc.com/2022/03/09/amazon-announces-20-for-1-stock-split-10-billion-buyback.html

Perez, F., Shkilko, A., & Tang, T. (2011). Signaling Via Stock Splits: Evidence from Short Interest. Unpublished Working Paper, Wilfrid Laurier University. Available at: https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.295.3668&rep=rep1&type=pdf

PJ, J. L., & Rao, S. N. (2001). Market Reaction to Stock Splits-An Empirical Study. The ICFAI Journal of Applied Finance. Available at: https://www.researchgate.net/profile/Pj-Lukose/publication/278968489_Market_Reaction_to_Stock_Splits-An_Empirical_Study/links/5588ea8408aeb716bcd01619/Market-Reaction-to-Stock-Splits-An-Empirical-Study.pdf

Refinitiv Financial Solutions (2022). Available at: https://www.refinitiv.com/

Ruiz Molina, M. E. R. (2001). *Splits en la bolsa española:¿ una simple moda?*. Revista de Treball, Economia i Societat, (21), 15-28. Available at: https://dialnet.unirioja.es/servlet/articulo?codigo=2264402

Ruiz Molina, M. E. R. (2007). *El desdoblamiento de acciones en el mercado español: factores determinantes y efectos* (Doctoral dissertation, Universitat de València). Available at: https://www.funcas.es/wp-content/uploads/Migracion/Publicaciones/PDF/1424.pdf

S&P Capital IQ (2022). https://www.capitaliq.com/

Samsung Newsroom (2018). *Samsung Electronics Announces Stock Split and Shareholder Return*. Available at: https://news.samsung.com/global/samsung-electronics-announces-stock-split-and-shareholder-return

Smith, G. (2019). *Stock Splits: A Reevaluation*. The Journal of Investing, 28(4), 21-29. Available at: http://economics-files.pomona.edu/GarySmith/papers/StockSplits.pdf

Torrejón Reyes, A. L. (2016). *Efectos y repercusiones de los splits en la capitalización bursátil y en la liquidez de acciones para la bolsa española*. Available at: https://riull.ull.es/xmlui/bitstream/handle/915/1570/Efectos%20y%20repercusiones%20de%20los%20splits%20en%20la%20capitalizacion%20bursatil%20y%20en%20la%20liquidez%20de%20acciones%20para%20la%20bolsa%20espanola.pdf?sequence=1