

# THE EFFECT OF COMPANY ANNOUNCEMENTS OF MERGER AND ACQUISITION PROCESSES ON THEIR PRICE IN THE US STOCK MARKET



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# ABSTRACT

This study aims to analyze the impact of a merger or acquisition announcement on the price of US listed shares. The study is based on 44 US companies that were involved in a merger or acquisition process between 2012 and 2019. For this study, daily returns and other variables around the announcement day have been examined. Specifically, the analyses focus on the differences between the pre- and post-announcement days in relation to the transaction volume, gross returns, returns in excess of the market portfolio, and abnormal returns of each stock derived from implementing the CAPM. This study yields positive and statistically significant results on post-merger or acquisition announcement stock returns, generating abnormally high returns up to 1 year after the announcement.

## **Key words**

Profitability, CAPM, abnormal return, transaction volume.

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# 1. INTRODUCTION

A merger is a process by which two or more firms merge into one and can take two forms: By incorporation or absorption, a process by which one or more companies contribute all their assets and liabilities to a different one; and by creation or pure merger, which consists of two or more companies joining together to create a new one (Iglesias, 2003).

Many companies resort to mergers and acquisitions as a way of business growth. Authors such as Santeiro (2014), Socolich (2007) and Zozaya (2007) have studied the reasons for using this process, and these reasons can be operational synergies, financial synergies, market power, efficiency gains, tax benefits, use of surplus funds, and other reasons to try to increase business. There are also companies that engage in mergers or acquisitions in response to competitors.

This paper will study the effect of mergers and acquisitions on share prices. Many are the works that have delved into this topic, there are some that have studied them via their abnormal returns, others have done it through a study of their annual accounts, because of the many ways to study this phenomenon (Kyriazopoulos et al., 2019).

In this paper we will opt for two ways of concluding the study. Initially, we will study the shares before and after the announcement of a merger or acquisition process, and in this way we will reach conclusions about the evolution of the shares; and subsequently, we will study the abnormal profitability that these shares can generate. This methodology was first used by Fama et al. (1969).

The process followed and the conclusions reached will be explained in detail throughout this paper, although there are many studies that have focused on this method to obtain clear conclusions. In the case of the study carried out by Limmack (1991), shares obtain an abnormal return of 31% between the announcement of the merger and the end of the merger; in the study carried out by Asquith (1983), it has been concluded that the shares obtain a positive abnormal return after the announcement for both the companies that merge and those that fail to merge. In the case of Jensen and Ruback (1983), who conducted the study on the US market, they concluded that merger processes generate profits, especially for the shareholders of the selling companies, and that the shareholders of acquiring companies do not gain but do not lose either. In the case of this paper, it shares similarities with the work of Asquith (1983) in that positive

abnormal returns are achieved but it has not been studied whether the merger or the acquisition takes place, only the effect on the announcement. Throughout the paper we will explain in detail the process to be followed and the conclusions reached, although there are many papers that have focused on this method to obtain clear conclusions. In the case of the study carried out by Limmack (1991), shares obtain an abnormal return of 31% between the announcement of the merger and the end of the merger; in the study carried out by Asquith (1983), it has been concluded that shares obtain a positive abnormal return after the announcement for both merging and non-merging companies. In the case of Jensen and Ruback (1983), who conducted the study on the US market, they concluded that merger processes generate profits, especially for the shareholders of the selling companies, and that the shareholders of acquiring companies do not gain but do not lose either. In the case of this paper, it shares similarities with the work of Asquith (1983) in that positive abnormal returns are achieved but it has not been studied whether the merger or the acquisition takes place, only the effect on the announcement.

The CAPM (Capital Asset Pricing Model), which was developed by William Sharpe (1964), winner of the Nobel Prize in Economics in 1990, among others, and is based on various formulations of Harry Markowitz on diversification, has been used for the analysis of abnormal returns. This model is mainly used to measure the expected return of a financial asset as a function of its systematic risk. Jan Mossin (1965), Treynor (1961), and Lintner (1965) were also involved in the development of this model. This model has been widely used for practitioners and academics, and is considered as one of the key models to estimate expected stock returns. It is worth to note that the utility of this model is not restricted to the analysis of stock returns since other economists have extended the use and applications of the CAPM on other fields. For instance, the zero-beta CAPM model which sets systematic risk equal to zero Black (1972), or the APT model (Arbitrage Pricing Model), developed by Roll (1980), or also, the Consumption CAPM model, which is based on valuing consumption-based assets, which was developed by Rubinstein (1976), later by Lucas (1978), and finally by Breeden (1979).

The process of studying shares before and after the official announcement of a merger or acquisition is not based on any specific study, but simply on an aggregate analysis of the data obtained and the conclusions drawn from it.

The paper is structured as follows: Section 2 looks at the background work on which the paper builds. Section 3 describes the data needed to carry out the study and the methodology to be followed. Finally, Section 4 presents the results obtained in this study.

## 2. LITERATURE REVIEW

This section will mention the studies and their conclusions on the subject studied in this paper, which have served as a model for the study. In this review we will not look at identical studies to this one (same market, same time frame, same study process), but rather studies that investigated the effect of mergers and acquisitions, regardless of the market studied, since the intention always has been to learn about the topic under study.

Ma et al. (2009) investigated the abnormal returns of bidding firms around the announcement day for ten emerging Asian markets. The three authors concluded that stock markets expected positive abnormal returns in different timing intervals.

On the other hand, Yilmaz and Tanyeri (2016) studied a sample of mergers and acquisitions in 47 countries and found that the average cumulative abnormal return 3 days after the announcement was 6.9% for target firms and 1.4% for bidders. According to the authors, they concluded that the announcement of a merger or acquisition generated value especially in transactions where control rights were sold.

On the other hand, Fatemi, Fooladi and Garehkoolchian (2017), evaluated the short-term effects of mergers and acquisitions in Japan between January 2000 and December 2014. In this paper, the authors concluded that shareholders of acquiring firms did not experience significant wealth effects while shareholders of acquired firms did experience significant gains.

Another study on domestic equities within BRICS<sup>1</sup> countries considering both the acquiring and acquired company found that the return on the announcement was positive and significant, averaging 1.45%.

Other papers instead conducted a different study, based on abnormal returns in the days prior to the announcement. The study by Ma et al. (2009) found significant positive abnormal returns in the days prior to the announcement of an acquisition but took insider information into account. In this case, it was concluded that in the days before the official announcement there was a possible leakage of proprietary information. In other works, such as Firth (1979), it was

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<sup>1</sup> Brazil, Rusia, India, China and Southafrica

established that companies that are targets of a merger obtain abnormal returns of 33% during the year prior to the announcement, data that were later corroborated in another study by Firth (1980) on 486 target companies, which obtained an abnormal return of 37% in the 6 months prior to the announcement of the merger. Franks and Harris (1989), in a study of UK companies, found that shareholders of sell-side companies had positive abnormal returns from four months prior to the announcement to one month after the announcement. On the other hand, a study of acquiring companies found that acquiring companies had a positive abnormal return of 5% from 40 months before the announcement, which declined to almost zero in the 40 months after the announcement. Dodd (1980), on the other hand, studied the abnormal profitability of the companies involved in the aforementioned process before and after the announcement, dividing them into those in which the process materialised and those in which it did not. Both companies increased their share prices significantly in the days prior to the announcement, but only those in which the process materialised showed positive abnormal returns.

Other papers have studied this merger or acquisition process by focusing on the size of the firm, such as the work of Malatesta (1983), which establishes that if the acquiring firms are very large relative to the target firms, the abnormal returns obtained in percentage terms are usually very small but similar in absolute terms.

On the other hand, there are studies that have focused on the study of post-announcement returns, this is the case of Singh (1971), Meeks (1977) and Kumar (1984), which established that profitability decreases after the merger is completed in Singh's case, and one year later in Meeks' and Kumar's studies.

Finally, studies reveal that it is difficult to know whether the gains revealed in studies such as those mentioned above may be due to market inefficiencies, caused for example by an overvaluation in the price of securities (Healy et al., 1992).



# 3. METHODOLOGY AND DATA

## 3.1 DATA

For this paper we have used the data of 44 US companies involved in a merger or acquisition process (hereafter M&A) in a period between 2011 and 2019. The date chosen as the starting day is the date on which the companies made an official announcement that they were going to start a M&A process.

Accordingly, table 1 shows the companies chosen for this study, the date of the announcement of the process, the ticker of the company and the company with which the M&A process was carried out. The necessary information on the companies involved in this process was obtained through the internet, and subsequently, the date was obtained by comparing news items from various economic newspapers such as Business Day of the New York Times, Business of the Washington Post or Money of US Today, and thus finding the necessary date. This process was carried out on a company-by-company basis so that the date was the actual date we wanted to study.

**TABLE 1: COMPANIES STUDIED**

<b>Target company</b>	<b>Date of announcement</b>	<b>Ticker</b>	<b>Company involved in the M&amp;A process</b>
DUPONT	14/12/2015	DD	DOW CHEMICAL
PFIZER	23/11/2015	PFE	ALLERGAN
ALLERGAN	23/11/2015	AGN	PFIZER
MEREDITH	26/11/2017	MDP	TIME INC.
CVS	04/12/2017	CVS	AETNA
AETNA	04/12/2017	AET	CVS
JOHNSON CONTROLS	25/01/2016	JCI	TYCO
ANHEUSER-BUSCH INVEB	11/11/2015	BUD	SAB MILLER PLC
AT&T	12/06/2018	T	TIME WARNER
BRISTOL MYERS	02/01/2019	BMY	CELEGENE
T-MOBILE	30/04/2018	TMUS	SPRINT

WALMART	11/05/2018	WMT	FLIPKART
WALT DISNEY	14/12/2018	DIS	21st CENTURY
ACCENTURE	22/10/2018	ACN	DAZ SYSTEM
ALITHYA	26/11/2018	ALYA	MANAGED WEB SERVICES
ATOSSA GENETICS	22/07/2018	ATOS	SYNTEL
NEWMONT MINING CORP	14/01/2019	NEM	GOLDCORP
DANAHER	25/02/2019	DHR	GE BIOPHARMA
FISERV	16/01/2019	FISV	FIRST DATA CORP
FIRST DATA CORP	16/01/2019	FDC	FISERV
BB&T	07/02/2019	TFC	SUN TRUST BAN
SUN TURST BANKS	07/02/2019	STI	BB&T
KRAFT	25/03/2015	KHC	HEINZ
ALLERGAN	17/11/2014	AGN	ACTAVIS
EMC CORPORATION	12/10/2015	EMC	DELL
MONSANTO	14/09/2016	MON	BAYER
CIGNA	08/03/2018	CI	EXPRESS SCRIPTS
EXPRESS SCRIPTS	08/03/2018	ESRX	CIGNA
MEDTRONIC	15/06/2014	MDT	COVIDIEN
COVIDIEN	15/06/2014	COV	MEDTRONIC
COMCAST CORP	22/09/2018	CMCSA	SKY PLC
BERKSHIRE HATHAWAY	10/08/2015	BRK-B	PRECISION CASTPORTS
PRECISION CASTPORTS	10/08/2015	PCP	BERKSHIRE HATHAWAY
HARRIS CORPORATION	14/10/2018	LHX	L3 TECHNOLOGIES
L3 TECHNOLOGIES	14/10/2018	LLL	HARRIS CORPORATION
IBM	28/10/2018	IBM	RED HAT
RED HAT	28/10/2018	RHT	IBM
T-MOBILE	03/10/2012	TMUS	METRO PCS
REYNOLDS AMERICAN	15/07/2014	RAI	LORILLARD TOBACO
ABBOTT LABORATORIES	28/04/2016	ABT	ST JUDE MEDICAL
ST. JUDE MEDICAL	28/04/2016	STJ	ABBOTT LABORATORIES
MARATHON PETROLEUM	30/04/2018	MPC	ANDEAVOR
ANDEAVOR	30/04/2018	ANDX	MARATHON PETROLEUM
KINDER MORGAN	17/10/2011	KMI	EL PASO CORPORATION

Source: Own elaboration.

Once the companies had been chosen, the data on the listed price of these companies from 1 January 2002 to 31 December 2020 were studied, if possible, as some of these companies ended their business activity or changed their company name due to the process in which they have been involved. Data on the volume of transactions of these companies have also been obtained to subsequently carry out analyses with these data and thus study their evolution.

These data have been downloaded from two different databases, the database of *Yahoo Finance*, and the database of *Investing*. Data has also been obtained from the database of *Kenneth R. French*<sup>2</sup>. These daily prices are adjusted for splits but not for dividends. To ensure the consistency of the analysis, these data are used and, although this is a limitation of the work, the course of the work has been followed.

On the other hand, the daily trading volume data of the aforementioned companies have been needed to perform certain analyses throughout the paper.

Finally, data have been collected for the benchmark index, which is an index of firms belonging to the NYSE, AMEX, and NASDAQ, which have a CRSP code of 10 or 11.

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<sup>2</sup> For more information about the database visit:

Yahoo Finance: <https://finance.yahoo.com/>

Investing: <https://www.investing.com/>

Kenneth and French:

<http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/index.html>

## 2.3 METHODOLOGY

Once the reference day was established, i.e., the day on which the announcement of the process was made official, the daily returns were studied from the first day from which the records were downloaded until one day before the announcement and 60 days before the announcement. Daily returns were also studied from 3 years before the announcement to 60 days before, as well as daily returns between 60 days before the announcement and 60 days after, 30 days before and 30 days after, 10 days before and 10 days after, 5 days before and 5 days after, 3 days before and 3 days after, one day before and one day after. In order to obtain better results, we also studied the profitability between 60 days before the announcement and one year after, one year before and one year after, the daily profitability obtained between the day of the announcement and one year after, and finally the daily profitability obtained between the day after the announcement and one year after.

$$\text{Accumulated return} = \frac{(\text{Final price} - \text{Initial price})}{\text{Initial price}}$$

This is the formula that has been used throughout to calculate the cumulative return for the analyses where it has been necessary.

### 3.2.1 VOLUME OF TRANSACTIONS

When faced with the unexpected announcement of a piece of news that contains relevant information for decision making, the market reacts by reflecting the effects on the price of the companies' shares, and may adjust it upwards or downwards, depending on expectations (García, 2009). For this to occur, there must be movement in the market, and that is why the volume of transactions on the day and on the days close to the official announcement will be studied.

To study whether there is any type of effect at the time of the announcement of a merger and/or takeover, the daily volume of the day of the announcement and that of a subsequent day will be studied, obtaining the average, (in case the announcement was made while the market was closed) and compared with the average volume of previous days, in this case we will use the average of 3 days prior, 5 days prior and 10 days prior to the announcement of the M&A. Subsequently, these averages will be contrasted by means of a statistical significance analysis to see if the differences obtained between the volume of the aforementioned days are statistically significant.

This analysis is due to the fact that investors can respond by selling their positions or entering these companies, depending on how they see the future of that company, that is, if they believe that the process in which they have been involved is positive and the shares can bring them profits or on the contrary, if it is negative and they can lose some profitability, which will be studied in this paper later on. But to study whether there is a positive or negative effect on the price of listed shares after an announcement, a priori unexpected, there has to be movement, if there is no exchange of shares, it means that the announcement does not cause any type of effect on the share price.

To perform this test, the volume data of the companies mentioned in the "Data" section were obtained and the key days were taken, i.e., the day of the announcement of the M&A one day later, and ten days before, thus obtaining the data necessary to perform the t-test and obtain statistically significant results.

### 3.2.2 DIFFERENCES IN YIELDS

To observe the effect that this type of announcement may have had on the share price, several models can be used, and in this paper we start by studying the differences in returns at different points in time. We have studied the returns between the day before and after the day of the announcement, the 3 days before and after the day of the announcement, 5 days, 10 days, 30 days, 60 days, and finally, one year.

To carry out this analysis, the share price of all the days from 1 year before to 1 year after was obtained, taking as day 0 the day of the official announcement of the M&A process, the daily profitability was obtained, and from there the study was carried out.

Once all the necessary data had been obtained, it was divided into several parts, as many parts as the time periods mentioned above, i.e., 7 parts. This has been done with the intention of facilitating the study to be carried out.

The subsequent process carried out was as follows: First, the average of all daily returns from  $-t$  to  $+t$  has been obtained, then the average from  $-t$  to  $-1$ , and finally the average of the returns from  $0$  to  $+t$ . This has been done to obtain the average of the daily share price returns and to obtain the differences between the days before the announcement and the days after.

Once the average of the aforementioned time periods has been obtained, a t-statistic has been performed to see if the data are statistically significant.

### 3.2.3 DIFFERENCE IN YIELDS COMPARED TO THE MARKET

This section analyses the differences in returns between the shares studied in this study and the benchmark market used. This study was carried out for the time periods of 252 days after the announcement date, 60 days before and 60 days after, 30 days before and after, 10 days before and 10 days after, 5 days before and 5 days after, 3 days before and after and finally one day before and one day after.

To carry out this analysis, the daily return of the reference market in the aforementioned time periods was obtained, as well as the daily return of the shares in the same time period. This return was calculated using the daily price data of the asset and the benchmark index. Once these data have been obtained, the average daily return of the reference market in the time frame marked, i.e., one day before the announcement, two days before the announcement, 3 days before the announcement, etc., has been obtained, and in turn the average daily return of the shares in the same time frame has been obtained.

Once the average has been calculated, a statistical significance test has been performed to see if the difference between these data is statistically significant.

## 2.2.4 ABNORMAL RETURNS

In this section we applied the event study methodology, which consists of an estimation of the abnormal returns before and after a particular event for subsequent comparison (Brown and Warner, 1980; Fama, 1991; Firth, 1978).

The CAPM model has been used to conduct the study and to obtain the abnormal returns of the shares of the companies covered in this study.

The CAPM model is used to calculate the expected profitability of a share, to subsequently obtain the abnormal profitability of these shares.

For the development of this model, the return of the risk-free asset (such as government bonds) and the market return are needed.

$$E(R_i) = R_f + (\beta_i * (E(R_m) - R_f))$$

Where:

- $E(R_i)$ : Expected return on a given asset
- $R_f$ : Risk-free asset return
- $\beta_i$ : Beta of a financial asset
- $E(R_m)$ : Expected return of the market in which it is listed

The beta referred to is the measure of the sensitivity of the asset under study to its benchmark, i.e. the relative change in the asset's return over the market.

Once the expected return has been obtained, it is compared with the actual return that the asset has obtained at a given time and thus the abnormal return of that asset at that given time is obtained.

$$\text{Abnormal return} = \text{Achieved return} - \text{Expected return}$$

In this work two directions have been taken with respect to this section, the first one, in which the beta is obtained considering the returns from 3 years before the announcement to 60 days before; and the second one, in which the beta is calculated considering the returns from the first day for which data are available (01/01/2002) to 60 days before the announcement. At all times, the study ends with the 60 days prior to the announcement to avoid the data being directly influenced by possible rumors about the process in which they will be involved.

The beta is calculated as the slope of the asset return minus the risk-free asset return and the market return minus the risk-free asset return:

$$\text{Beta} = \frac{\sigma(R_f, R_m)}{\sigma^2(R_m)}$$

Thus, using the above-mentioned formula, the Beta has been obtained for the 3 years back 60-day returns, and for all historical data at 60 days back.

To obtain this Beta we needed the daily return of the companies' shares, which was already available from the study on the difference in returns. The risk-free asset return for the same days was needed, which was obtained from the Kenneth R. French database, and the daily market return was also needed.

Regarding the expected market return, it has been obtained through the market factor which includes the NYSE, Nasdaq, and AMEX markets that have a CRSP code of 10 or 11 at the beginning of the month studied. This has been done to use the same market return on all assets, since as seen in the data section, there are companies listed on the Nasdaq, and others listed on the NYSE.

In turn, in order to calculate this expected market return, different time horizons have also been used, which are as follows: The expected market return calculated with the 60 days before the announcement, with one year before the announcement, with three years before the announcement, and finally, the return of the day on which the expected return of the share is calculated has been used, i.e. the expected market return is the return that has finally occurred.



Therefore, we are going to obtain 4 different results, the expected return of the share will depend on the expected return of the market that has been chosen.

## 4. RESULTS

### 4.1 DESCRIPTIVE ANALYSIS

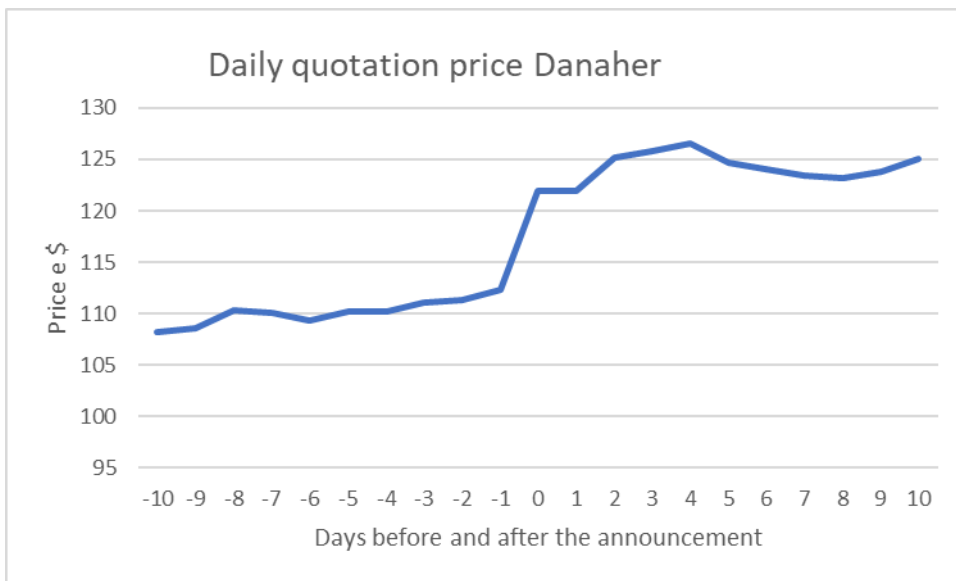
For this descriptive analysis, two companies out of the 44 studied have been chosen to analyze the share price data on the day of the announcement and the days before and after, one of which was involved in a takeover process, and another company involved in a merger process. In the following, the data obtained from the company and the conclusions that can be drawn from these data will be developed.

For this, we will discuss the company DANAHER, which is dedicated to the design, manufacture and marketing of professional, medical, industrial, and commercial products and services. DANAHER announced on 25 February 2019 that it was commencing an acquisition process by which it acquired GE BIOPHARMA, which was a supplier of instruments, products, and software for the development of biopharmaceuticals.

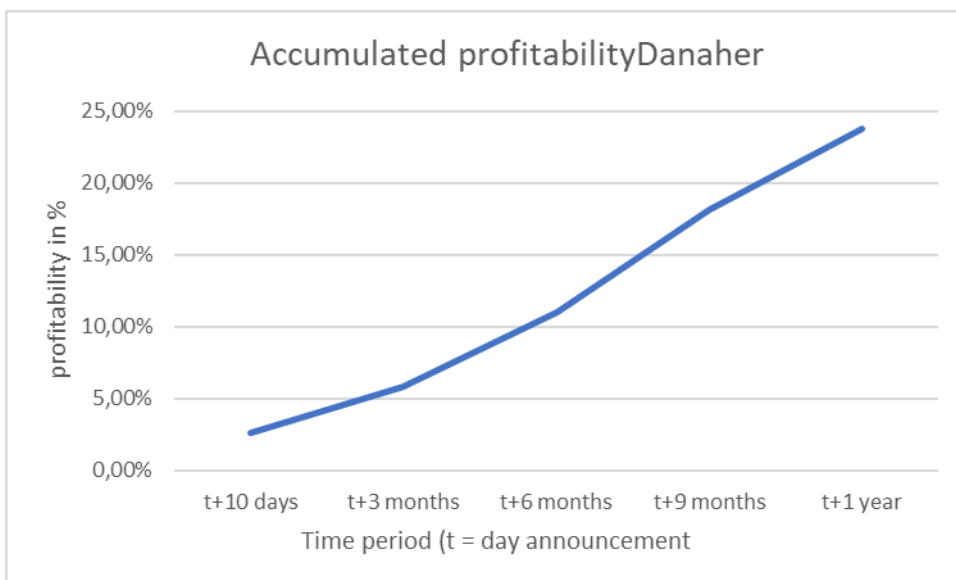
As can be seen in graph 1, 10 days before the announcement, Danaher was trading at a unit price of \$108.17 per share, which was the lowest record low from 10 days before to 10 days after, thus observing an increase in the share price. From 10 days before to the day before the merger announcement, the shares appreciated by 3.87%, while on the day of the announcement, the shares appreciated by 8.53%. Ten days after the announcement, the shares were \$125.08, giving a cumulative return between the 10 days before the announcement and the 10 days after the announcement of 15.63%.

Extending the time horizon and making use of graph 2, there is a clear upward trend, with the share price increasing by 23.73% from the day of the announcement to one year later.

**FIGURE 1: Daily quoted price between 10 days before and 10 days after Danaher**



**FIGURE 2: Cumulative performance between announcement day and one year later Danaher**

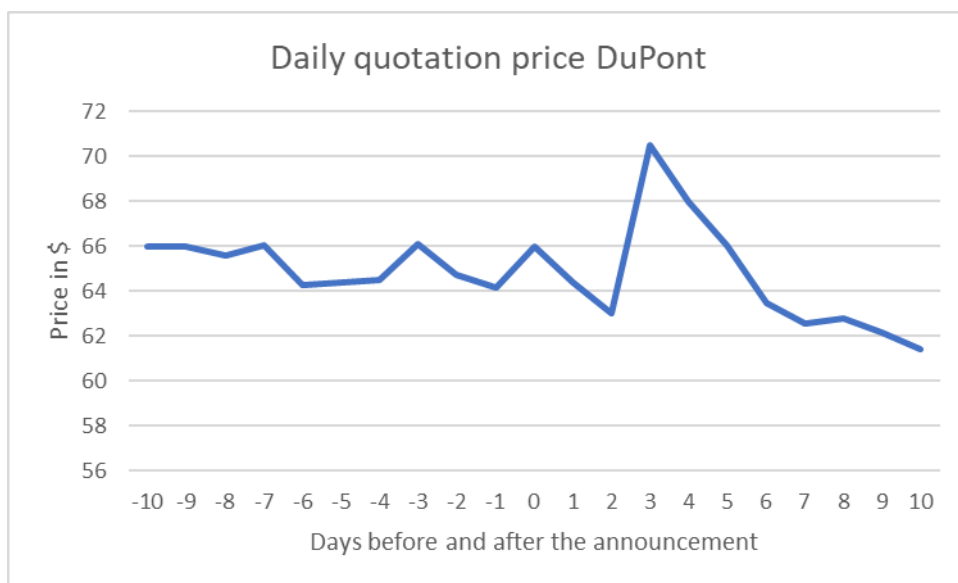


On the other hand, we will describe the data obtained from the company DUPONT, which merged with THE DOW CHEMICAL COMPANY, making the announcement on 14 December 2015.

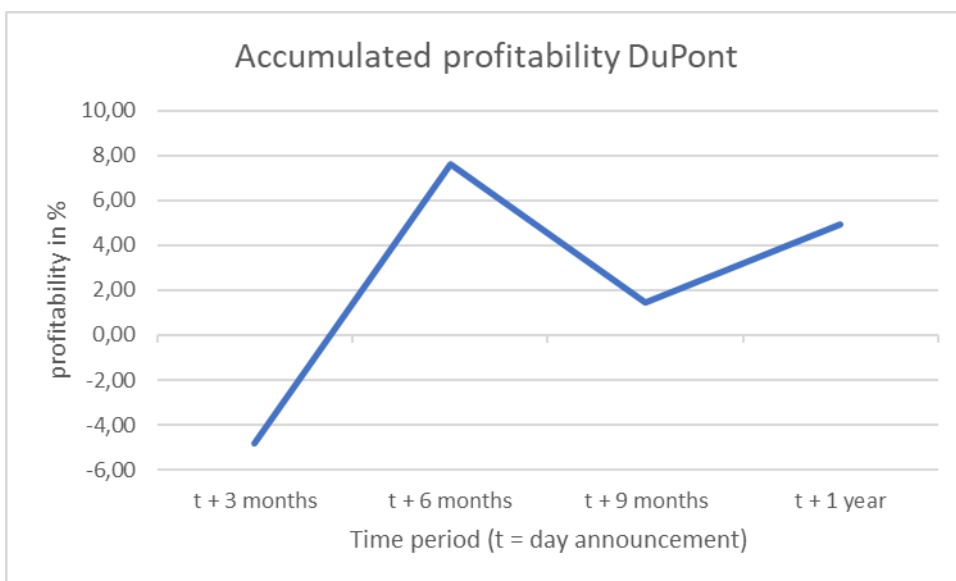
Unlike the case of Danaher, this merged company obtained a negative cumulative return between the day of the announcement and the 10 days after it, being this cumulative return of -6.89%, despite revaluing by 2.79% on the day of the announcement of the merger.

Despite this decline in share price between the days closest to the announcement, 6 months after the announcement the company was already making a positive cumulative return relative to the day of the announcement (3 months after the announcement the cumulative return was -4.82%). This upward trend that started 6 months after the announcement extended into the year following the day of the announcement, with a cumulative return of 3.88% after 9 months, and a cumulative return of 9% after one year.

**FIGURE 3: Daily quoted price between 10 days before and 10 days after DuPont**



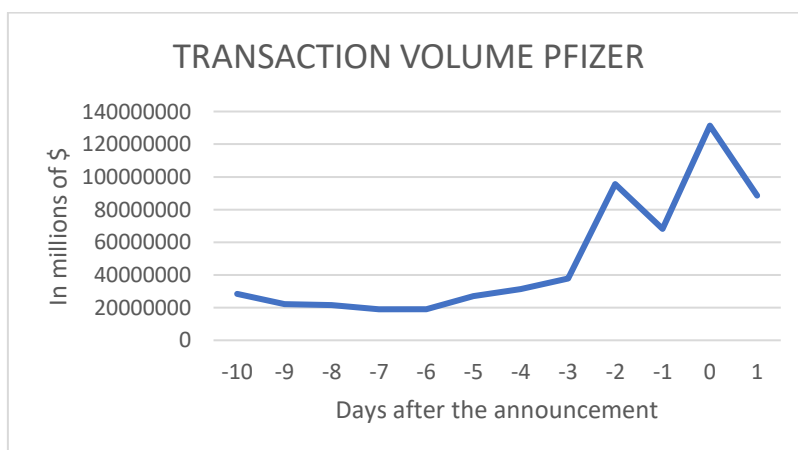
**FIGURE 4: Cumulative performance between day of announcement and one year later DuPont**



Therefore, in relation to this company, the announcement of the merger made investors decide to sell in the very short term, but it gradually revalued again, restoring investors' confidence in this process and in this company so that the unit price of the shares increased by 9% a year after the actual announcement.

## 4.2 TRANSACTION VOLUME

**FIGURE 5: Pfizer transaction volume**



As can be seen in the graph on the volume of Pfizer shares on the day of the official announcement of its merger with Allergan, a clear rise in volume can be observed, being constant between the 10 days prior to the announcement and the 4 days before and increasing its volume 3 days before the official announcement, which may be due to investor and press rumors.

Regarding the volume, as established in the methodology, a t-statistic has been performed on the differences between the volume in the different time periods.

The following table shows the results of the average volume obtained.

**TABLE 2: AVERAGE VOLUMENS**

<b>Results</b>	<b>Differences between temporalities</b>	<b>T-stat with respect to +1</b>
Average volume average of the previous three days	7,322,840 *	(-3.95)
Average volume average of the previous five days	6,487,647 *	(-4.20)
Average volume of the previous ten days	5,915,653 *	(-4.37)
Average volume of the day of announcement and the following day	27,212,233	

**This table refers to the average transaction volume of the set of companies studied. The asterisk in the "t-stat with respect to +1" refers to the fact that it is statistically significant.**

As the data reflect, the differences between the trading volume of the different days studied are very different and statistically significant. This implies that the day of an official announcement causes a sell or buy effect in the market, which is yet to be determined.

This analysis also yields a very important result, which is that the announcement is unexpected, because if this were not the case and economic agents knew what was going to happen, they would anticipate the announcement, but as has been shown, stock market movements occur after the official announcement by the company.

### 4.3 DIFFERENCE IN YIELDS

In this section we will explain the results obtained through the analysis explained in section 2.2.2 on the difference in stock returns.

Here is the example of the company "Meredith" and its study of the average of the 5 days before the announcement and the 5 days after the announcement..

**TABLE 3: DAILY RETURNS FOR THE DAY STUDIED**

Day studied	Daily share performance
17/11/2017	0.016
20/11/2017	0.005
21/11/2017	-0.009
22/11/2017	-0.008
24/11/2017	0.014
27/11/2017	0.107
28/11/2017	-0.004
29/11/2017	0.017
30/11/2017	-0.004
01/12/2017	-0.004

This table shows the daily performance of the Meredith company. Returns are to the third decimal place.

Once the data have been obtained, the aforementioned averages have been calculated, in this case, the averages would be as follows:

- Average return on equity of -5 a +5: **1.3%**

- Average return on equity of -5 a -1: **0.35%**
- Average return on equity of 0 a +5: **2.25%**

The difference between the daily profitability of the share from -5 to -1 and from 0 to +5 is 1.9%.

In turn, this process has been done with the remaining 43 companies, obtaining the average of these to subsequently compare by means of a t-statistic, both the significance of the daily profitability from -t to +t, and of the two periods into which they have been divided, as well as that of the differences of these periods.

Once the process has been completed with all the aforementioned companies and in all the aforementioned time periods, the results obtained are as follows:

In table 3 we can observe the average daily return of the shares in the time periods marked on the left-hand side. And in turn, the t-statistic analysis to see if these data are statistically significant.

As can be seen, all the data are statistically significant except for the 60 days before the announcement to 60 days after the announcement, at a confidence level greater than or equal to 95%.

The data we extract from this analysis is that between 1 day before the announcement and 1 day after, the shares, on average, appreciate by 6.46%; between 3 days before and 3 days after, by 5.03%; in the 5-day time frame, by a total of 4.54%; between 10 days before the announcement and 10 days after, by 5.25%; between 30 days before and after, by 4.4%; and finally, between 1 year before the announcement and 1 year after, by 4.4%. 54%; between 10 days before the announcement and 10 days after, 5.25%; between 30 days before and after, 4.4%; and finally, between 1 year before the announcement and 1 year after, the share price is revalued by an average of 30.41%.

Thus, it is observed that between 1 day before the announcement and 1 day after there is an increase in the price of the shares, this increase is higher than the profitability obtained in the other time periods.



**TABLE 4: AVERAGE DAILY RETURNS BETWEEN -T to +T**

Temporariness	Average daily return	T-stat
-1; +1	0.022 *	(2.44)
-3; +3	0.007 *	(2.24)
-5; +5	0.004 *	(2.06)
-10; +10	0.003 *	(2.25)
-30; +30	0.0007 *	(1.82)
-60; +60	0.0003	(1.05)
-252; +252	0.0006 *	(3.82)

This table shows the average daily returns for the set of stocks used in this work. The numbers in parentheses refer to the t-stat. The asterisk in the parentheses refers to statistically significant. Returns are approximated to three decimal places unless the first three are equal to 0. The t-stat is approximated to two decimal places.

Regarding the average daily return of the shares between the time periods marked before the announcement and the day before the announcement, as shown in table 4, the data are statistically significant for the annual time.

Regarding the annual time horizon, as can be seen in the table above, from one year before the announcement to the day before the announcement, the shares appreciate by an average of 0.033% per day, i.e., 8.38% annualised.

**TABLE 5: AVERAGE DAILY RETURNS BETWEEN -T AND -1**

Temporariness	Average daily return	T-stat
-1; -1	0.007	(1.48)
-3; -1	0.003	(1.33)
-5; -1	0.002	(1.17)
-10; -1	0.002	(1.14)
-30; -1	0.0007	(1.23)
-60; -1	0.0002	(0.47)
-252; -1	0.0003 *	(2.62)

This table shows the average daily returns for the set of stocks used in this work. The numbers in parentheses refer to the t-stat. The asterisk in the parentheses refers to statistically significant. Returns are approximated to three decimal places unless the first three are equal to 0. The t-stat is approximated to two decimal places.

Next, we will present the results of the average daily return between the day of the announcement and the period marked.

As can be seen in table 5, in this case the data obtained for the returns from 0 to +1, from 0 to +3, from 0 to +10, and from 0 to +252 are statistically significant.

**TABLE 6: AVERAGE DAILY RETURNS BETWEEN 0 AND +T**

Temporariness	Average daily return	T-stat
0; +1	0.036 *	(2.02)
0; +3	0.012 *	(1.74)
0; +5	0.007	(1.63)
0; +10	0.004 *	(1.76)
0; +30	0.0008	(1.01)
0; +60	0.0004	(0.83)
0; +252	0.001 *	(3.61)

This table shows the average daily returns for the set of stocks used in this work. The numbers in parentheses refer to the t-stat. The asterisk in the parentheses refers to statistically significant. Returns are approximated to three decimal places unless the first three are equal to 0. The t-stat is approximated to two decimal places.

As can be seen in this table about the average returns after the announcement, it is obtained that one day after the announcement the share is revalued by 3.65%; three days after the announcement, the share is revalued by 3.54%; ten days later, by 3.82%; and finally, one year after the official announcement, the share is revalued by an average of 24.18%.

With the data in the last three tables, a study can be carried out on the differences in the moments from -t to -1, and from 0 to +t. This analysis has been carried out, but it is only statistically significant for the one-year period. For this time horizon, the difference between -252 to -1 and 0 to +252 is an average daily return of 0.06%, i.e., an annual return 15.77% higher in the year after the announcement than in the year before the announcement.

In order to observe whether the increase in the profitability of the shares is marked by the evolution of the market, the following study has been carried out in which the profitability of these shares is compared with the profitability of the reference index during the same days, in order to find out whether this increase in profitability is due to the process in which the company

is involved or, on the contrary, to the economic situation of the market. However, the announcements are not made at the same time, so they may be conditioned by market developments in different time periods.

## 4.4 DIFFERENCE IN YIELDS COMPARED TO THE MARKET

Table 9 below presents the results obtained in this section, which reflects the difference between the average stock return and the average market return.

A limitation of this study is that the return calculated for these stocks is not adjusted for the systematic degree of these stocks, since as will be seen in the following section on the CAPM, the systematic degree of the stock will be considered.

**TABLE 7: DIFFERENCES BETWEEN EQUITIES AND MARKETS**

Time frame studied	Difference in the average	T-stat
1 day before	0.005 *	(6.27)
1 day after	0.016 *	(1.89)
3 days before	0,002	(1.10)
3 days after	0.005	(1.08)
5 days before	0.0009	(0.61)
5 days after	0.003	(1.02)
10 days before	0.0007	(0.61)
10 days after	0,002	(0.98)
30 days before	0.0006	(0.91)
30 days after	-0.0003	(-0.28)
60 days before	0.0002	(0.42)
60 days after	-0.0003	(-0.61)
252 days after	0.0003	(0.62)

This table shows the differences between the average stock return and the average benchmark return. The numbers in parentheses refer to the t-stat. The asterisk in the parentheses refers to statistically significant. Returns are to four decimal places. The t-stat is approximated to two decimal places.

As can be seen in the table, as the seasonality becomes larger the difference between the average daily stock return and the average daily market return becomes smaller and smaller. In the case of one day earlier, this difference is 0.52% higher for stocks than for the market, while in the case of 252 days later this difference is 0.03% higher for stocks. This leads to the conclusion that in the days close to the announcement, stocks tend to behave differently from the market due to the unexpected announcement in the case of the days after, and possible rumours in the case of the days before.

On the other hand, in all the time frames studied the average daily stock return is higher than the average daily market return, this is true for all time frames except for 30 days after the announcement (-0.03%) and 60 days after the announcement (-0.03%), but back to one year after the announcement this difference becomes positive again and so stocks outperform the market.

Although the differences are positive in most of the time frames, these data are not statistically significant, only for the time frame of one day before and one day after, while for the other time frames this is not the case in any case. Therefore, statistically speaking, it can only be said that the day before and the day after the announcement, the share will outperform the market. Specifically, 0.52% more the day before the announcement, and 1.57% more the day after the announcement.

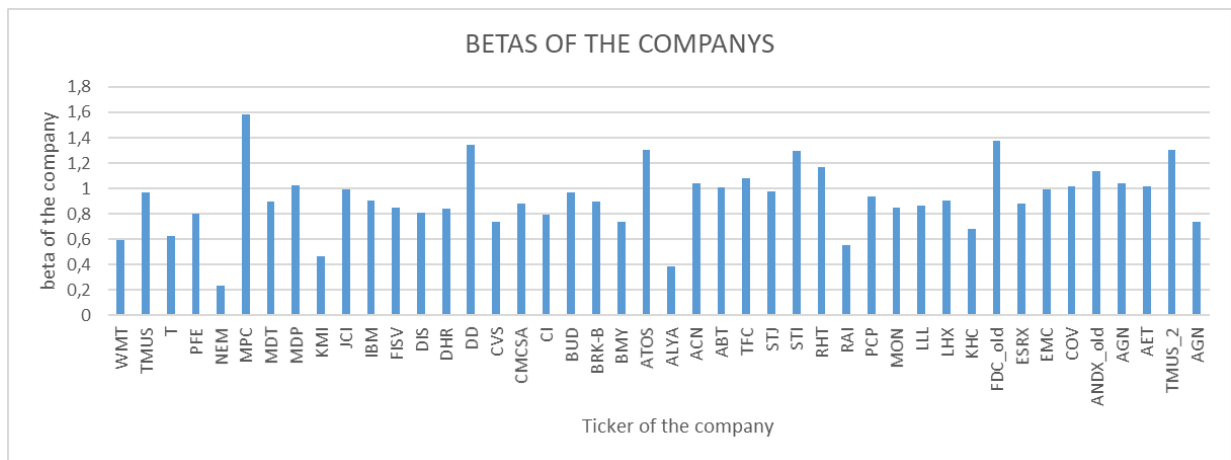
## 4.5 ABNORMAL RETURNS

Once results have been obtained on the differences in returns on the shares studied and the differences between these and the market, the CAPM analysis has been carried out, in which the previous studies are also involved.

Initially, the Beta has been calculated for all the companies on which the study has been carried out. As mentioned in the methodology, this beta was calculated using data from the three years prior to the announcement and the 60 days prior to the announcement.

As can be seen in graph 5, the betas are between 0.5 and 1.4; except for three companies, NEM, MPC and ALYA, whose betas are 0.2, 1.6 and 0.4 respectively.

**FIGURE 6: Betas of the companies surveyed**



Subsequently, once the beta, the risk-free asset return and the average market return had been calculated, the expected return was calculated. As mentioned in the methodology, different data on the average market return have been used, of which we will comment on two. The first assumption is whether the expected market return is the one that occurs and in the second assumption the average market return of the 60 days prior to the announcement has been obtained to calculate the unknown  $R_m$ , explained in the methodology section. The other two assumptions discussed in the methodology are not used because, despite yielding similar positive results, they are not significant using the t-statistic.

In the first assumption, in which the market is exactly what the investor expects, the data shown in the following table are obtained:

**TABLE 8: ABNORMAL RETURNS IF WHAT IS EXPECTED OCCURS**

Temporalities	Abnormal mean return and t-stat	Abnormal returns before announcement and t-stat	Abnormal returns after the announcement and t-stat
-1; +1	0.012 * (1.95)	0.006 (1.43)	0.015 (1.60)
-3; +3	0.006 * (2.15)	0.003 (1.44)	0.008 (1.67)
-5; +5	0.004 * (2.15)	0.001 (1.14)	0.006 * (1.77)
-10; +10	0.002 * (1.78)	0.0009 (0.88)	0.003 (1.38)
-30; +30	0.0004 (1.14)	0.0005 (1.17)	0.0003 (0.46)
-60; +60	0.00008 (0.32)	0.0001 (0.33)	0.00004 (0.09)
-60; +252	0.0004 * (2.10)	0.0001 (0.33)	0.0005 * (1.92)

This table refers to the average abnormal return obtained by the stock if what the investor expects to happen is what actually happens. The numbers in parentheses refer to the t-stat. The asterisk in the parentheses refers to statistically significant. Returns are approximated to three decimal places unless the first three are equal to 0. The t-stat is approximated to two decimal places.

As can be seen in table 7, the average daily abnormal return under the above assumption is statistically significant for time horizons -1 to +1, -3 to +3, -5 to +5, -10 to +10 and -60 to +252. These shares have obtained an abnormal revaluation of 3.66%, 4.17%, 4.37% and 12.28% respectively. Thus, with these data it can be established that following a M&A announcement at the above-mentioned time periods there are positive abnormal returns. The average normal

post-announcement share return is only statistically significant at two time points, from -5 to +5 and from -60 to +252, being 3.08% and 12.77% respectively. Thus, following an unexpected official announcement, the abnormal returns between the day of the announcement and the 5 days thereafter, and the day of the announcement and the year thereafter are positive assuming the market moves as the investor expects.

The results of the next assumption, the assumption in which the average expected market return is given by the average market return in the 60 days prior to the official announcement, are detailed below. The data are shown in the table below:

**TABLE 9: ABNORMAL RETURNS CALCULATING THE MARKET RETURN**

Temporalities	Abnormal mean return and t-stat	Abnormal returns before announcement and t-stat	Abnormal return after announcement and t-stat
-1; +1	0.012 * (1.96)	0.006 (1.46)	0.015 (1.60)
-3; +3	0.006 * (2.18)	0.002 (1.26)	0.009 * (1.70)
-5; +5	0.004 * (2.22)	0.001 (1.07) *	0.007 * (1.81)
-10; +10	0.002 * (1.70)	0.001 (1.04)	0.003 (1.31)
-30; +30	0.0004 (1.22)	0.0006 (1.08)	0.0004 (0.48)
-60; +60	0.0002 (0.65)	0.0001 (0.28)	0.0002 (0.51)
-60; +252	0.0004 * (2.28)	0.0001 (0.28)	0.0006 * (2.10)

This table refers to the average abnormal return obtained by the shares if the market return is calculated according to the process explained above. The numbers in parentheses refer to the t-stat. The asterisk in the parentheses refers to statistically significant. Returns are approximated to three decimal places unless the first three are equal to 0. The t-stat is approximated to two decimal places.

As can be seen in the table, the statistical significance of the average daily returns in the different time horizons is the same, but the data changes when using this assumption. Regarding the -1 to +1 seasonality, the shares have an abnormal return of 3.74%, in the -3 to +3 seasonality, 4.28%, in -5 to +5, 4.61%, in the seasonality that occurs from 10 days before the announcement to 10 days after the announcement, the abnormal return reaches 3.94%, and finally, from 60 days before the announcement until the year after, the shares obtain an abnormal return of 13.53%.

With respect to the average abnormal return obtained after the announcement, it is observed that only in three time periods there is statistical significance, and that is in the time period from the day of the announcement to three days after, in which there is an abnormal return of 2.66%; in the 5 days after the announcement, where an abnormal return of 3.27% is obtained, and finally the time period from the day of the announcement to the following year, where there is an average abnormal return of 14.20%.



## 5. CONCLUSION

As we have seen throughout this paper, when carrying out the analysis of differences in returns, the study of abnormal returns and differences in returns with respect to the market, to assess the impact of M&A on share prices, companies obtain positive returns after the announcement of M&A. In some cases, positive returns are also observed in the days preceding the announcement. For most of these analyses, there is also statistical significance that corroborates this data.

Therefore, in the US market, for companies listed on the NYSE or Nasdaq, after a M&A announcement, there are sufficient arguments to say that the share price will increase.

On the other hand, it has been observed that on the day of the announcement of a M&A in the companies involved there is an increase in share trading.

This work has had several limitations, such as the number of companies chosen, or the model chosen to analyse certain data. This is the case of the CAPM model in which other factors that can condition the expected return assigned to a share, such as the size factor, have not been considered.

This work is a starting point for future work on the profitability achieved by shares, such as differentiating between acquiring companies, those acquired and those merged by equals, listed on other markets or belonging to certain sectors.

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