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**«Impact of the COVID crisis on abnormal return M&A both on the part of  
acquiring companies and on the part of target companies in comparison with the non-  
crisis period»**

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**IMPACT OF THE COVID CRISIS ON ABNORMAL RETURN M&A BOTH  
ON THE PART OF ACQUIRING COMPANIES AND ON THE PART OF TARGET  
COMPANIES IN COMPARISON WITH THE NON-CRISIS PERIOD**

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## **Abstract**

During crises such as the current COVID-19 crisis, the number of mergers and acquisitions decreases, but the most profitable deals are made during the crisis. This study aims to determine whether an abnormal return rise of a company's stock occurs during a crisis. In this study, 28,402 M&A transactions were initially selected from the period from 2018 to the end of 2020. The event research method and regression analysis were used as methodologies. The results of this study showed that during crisis periods, in contrast to the non-crisis period, there is a significant increase in abnormal return both on the part of the target company and on the part of the acquiring company. Also, as a result of the regression analysis, it was found that, in addition to the crisis, the abnormal return is rather strongly influenced by the method of payment with which the buyer company will buy out the target company.

## 1. Introduction

At the beginning of 2020, panic began around the world in connection with the recognition of the news of the COVID-19 virus leaving China. The news has spurred many governments to start introducing widespread restrictive measures. This led to the fact that part enterprises were cannot work, and therefore these enterprises began to adjust their costs by reducing the number of employees (Mazur & Dang & Vega, 2020). All this has led to a significant increase in unemployment in many countries. In addition, this situation gave a signal to many investors about the deteriorating situation in the market. All of this led to a stock market crash. In just a month from February to March, the Dow Jones Industrial Average (DJIA) market fell 28%. At the same time, due to the specifics of the crisis, not all sectors were affected by this crisis, some, such as the health care and information technology sectors, had, on the contrary, an upward trend. On the other hand, the entertainment and hospitality industries have been hit quite hard (Mazur & Dang & Vega, 2020).

Also, as in other economic processes, the new crisis that began has quite a strong impact on the M&A market. M&A itself is one of the ways companies can increase shareholder value or expand their business. Through M&A, companies can both grow in their industry and enter new industries for themselves. In such crisis periods, companies, due to the uncertainty in the market, begin to postpone or cancel their M&A deals in order to wait out unstable times (Harroch, 2020). So, for example, the American company Xerox Holdings Corp refused to take over HP Inc (Nuttall, 2020) due to the uncertainties associated with market shocks. In addition, at the end of 2020, according to statistics taken from Bloomberg, the number of transactions decreased from 21,592 to 19,407, at the same time, the amount of these transactions itself also fell from 3,870 billion in 2019 to 3,101 billion in 2020 (Blomberg 2021 personal data analysis).

Despite all this, periods of such crises can be extremely beneficial for companies that have a large amount of free cash and are actively purchasing. This conclusion is supported by some studies that show that M&A deals concluded during periods of crisis tend to create more value for buyers than those who are concluded during non-crisis periods. (Degen & Keienburg & Kengelbach & Sievers & Gell & Bader & Nielsen, 2019). Since in times of crisis a company often loses some of its value, this gives an opportunity for some more stable acquiring companies to buy target companies at a lower cost. This, in turn, may affect the

return of companies. If company returns are unusually high or unusually low compared to other periods, this is called abnormal returns.

Research on M&A transactions has become quite popular over the past few decades. This is due to the fact that during this time there was an increase in the number of M&A transactions. Therefore, it is not surprising that there are quite a few studies on this topic. Even in spite of the global financial crisis, due to which the number of M&A transactions has decreased, research on the topic of M&A remains popular. In this paper, the main focus in the selection of literature was paid to studies that used the event study method. However, the results in these studies were different. Some of the results turned out to be opposite to each other, as, for example, some studies show that when M&A is announced, target companies receive abnormal returns (Bruner, 2004; Adnan & Hossain, 2016; Campa & Hernando, 2004; Ma & Pagán & Chu, 2009 ). And other studies show that companies do not have significant abnormal returns (Beltratti & Paladino, 2013; Motis, 2007). However, there is little research to date that has covered the impact of the current crisis on abnormal M&A returns in the current crisis. However, there is quite a bit of M&A research on the themes of the 2008 crisis. In this research, as an example of a crisis period, we have taken works that are devoted to abnormal returns during the global financial crisis. (Linssen, 2017; Rao-Nicholson & Salaber, 2014; Colenbrander, 2018; Amewu, 2014). But just like in studies not devoted to the crisis, the results of the studies were different. In this regard, in order to understand how much the current crisis affects the mood of investors, we will consider the following research questions:

"Has the current crisis affected the abnormal return of acquiring companies and target companies?"

"What other variables besides the crisis can affect the abnormal return of the company?"

In this regard, this study is important for several reasons. First, this study can complement the existing literature on M&A in times of crisis. At the moment, there is already quite a lot of literature on this topic, however, in many of these studies, the results were varied. And my research can be another look at how the crisis affected the M&A market. In this regard, it may be useful for future research on M&A.

Second, this research examines the impact of the COVID-19 crisis on the M&A market. In this research, the impact on M&A is not considered in the context of one specific country, but

in the whole world. Since the M&A market is part of the global financial market, this study may be useful for future research on how COVID-19 has affected the world as a whole.

## **2. Literature review**

The literature review in this paper is divided into 3 subchapters. At the beginning of this research, papers were read that introduce the motives of M&A. After that, the method by which the research will be carried out was determined, in connection with which the results of the research related to the event study method were read. Further studies were read that roughly correspond to the topic of this research.

### **2.1. Motives for M&A**

First of all, when research is about M&A, it will be quite useful to generally familiarize yourself with the reasons why companies go to M&A. According to studies such as Gupta (2012), mergers and acquisitions (M&A) are strategic concepts pertaining to the corporate sector. In general, M&A is the process of selling, buying, and combining one or more companies to achieve future growth. Absorption in this concept implies the purchase of one asset of the companies by another or the purchase of the entire company as a whole. A merger is a process of merging two companies into one.

Due to the complexity of M&A, they often do not have one specific motive, as evidenced by research by Nguyen, Yung & Sun (2012) who observed that about 80% of mergers out of their sample of 3,250 deals had multiple motives for the M&A. And so it's hard to imagine one specific motivation for the merger. However, there are also several popular motivations for M&A such as increased market power, diversification, and synergy. Synergy is the effect that two companies benefit from a merger more than if they did their business separately.

According to a survey conducted by Mukherjee, Kiymaz, and Baker (2004), their study found that the main motivation for M&A is to achieve synergy. The same conclusion is made by Goergen and Renneboog (2004) according to their research results, the main motivation for M&A is the synergy effect, which implies that synergy creates wealth for target shareholders. Another motivation for companies may be to gain market power, but according to a study by Fraunhoffer, Freytag & Schiereck (2013), such motivation has more potential in oligopolistic markets such as Germany, while in markets such as the United States there is less potential to increase market power. However, studies by Mukherjee, Kiymaz, and Baker (2004) suggest that diversification business is one of the motivations for M&A, especially during economic downturns.

## **2.2. Event Study**

Since this research will use the event study method, one cannot begin to research this topic without reading the literature about it. The concept is fairly well described in Binder (1998), describing how to use hypothetical tests and how to model abnormal returns. Since the topic of M&A is quite popular, there are quite a few studies on abnormal returns and all of them show different results.

Research by Adnan and Hossain (2016) showed that when an upcoming M&A is announced, share prices rise for both the acquirer company and the target company. Bruner (2004) used about 130 research results from 1971 to 2001, overall results showed that target companies almost always receive significant positive market returns, while the situation with acquirer companies is not so clear. Studies by Ma, Pagán, and Chu (2009) have shown that information about the upcoming M&A is considered good news for shareholders of acquirer companies, but not good news for shareholders of target companies because the shares of the target companies are growing due to the purchase of a controlling stake in acquirer companies. Wong and Cheung (2009) matched very different results, which showed that news of the M&A announcement had a positive effect on the shareholders of the acquirer companies, while the news of M&A was unfavorable for the target companies.

Also, according to a study by Mateev (2015), the acquirer company receives a positive abnormal return if the acquisition was made using shares, rather than using cash to buy the target company. Exactly the same result was obtained in the studies of Sehgal, Banerjee, and Deisting (2012) in their study that it was shown that acquiring by shares creates value while acquiring for cash in the short term leads to a decrease in value. In studies by Bouwman, Fuller, Nain (2009), it was found that buying in non-crisis periods of time brings profit in the short term, however, after these returns begin to fall.

## **2.3. Returns on M&A Announcements During the Crisis**

At the same time, in order to compare the obtained research results with other studies, several works on this topic were read. However, there are not many studies that address the topic of M&A announcements during the COVID-19 crisis. In this regard, works were taken, which are mainly devoted to the financial crisis of 2008.

In the work of Amewu (2014), the data were divided into two periods of pre-crisis (1999-2007) and crisis (2007-2009), as a result of this study, they were not statistically significant,

and therefore the author concluded that changes in stock prices during the crisis period and non-crisis is not significant. In another work conducted by Rao-Nicholson and Salaber (2014), the reaction of 2,245 transactions that took place from 2004 to 2012 was studied, the results showed that M&A transactions bring higher abnormal returns in the post-crisis period than in the pre-crisis period. According to a study by Linssen (2017), target companies get high abnormal returns during the crisis while the acquirer company, on average, earns lower returns during the crisis. The results of the Colenbrander study (2018) showed that the financial crisis had a significant negative impact on the profitability of mergers and acquisitions.

### **3. Research Methodology**

#### **3.1. Data collection**

In this study, data were taken from various sources. Initial data on all completed transactions from 2018 to 2020 were taken from the Bloomberg terminal. Along with the names of the companies of the participants and the date of the announcement, some financial indicators were taken. Further, this data was divided into 2 datasets, 1 dataset contained data on companies for the entire period of 2018 and 2019, 2 datasets contained data from the beginning of the crisis, that is, from February 2020 until the end of 2020. In total, the original dataset consisted of 94,272 rows and 33 columns. Each column represented the selected variables.

Further, to analyze this data, the programming language R and several libraries to it were used. A complete list of both libraries and parts of the code is available in Appendix 1. Due to the fact that not all companies in the dataset are public companies, tracking the value of their shares is difficult and therefore non-public companies were removed from the dataset. After that, the remaining companies had unrecognized tickers containing a large number of numbers, since according to these tickers it is rather difficult to get ahead of the companies, they were removed from the data set. Also, using the dplyr library, a new Industry column was created from the original AcquirerSIC and TargetSIC columns, and the CrossBorder column was created from the Acquirer\_Country and Target\_Country columns.

Further, in order to calculate the abnormal returns, you need to find the return of companies for a certain period before the event. In my case, this is 200 days before the merger announcement. To get these returns, you need to download the stock prices of each company, this can be done using some functions in R, but for this you need the company tickers. However, this may cause problems, since as a result of the merger of companies, the company may cease to exist and their tickers may pass to other companies. To avoid this problem, in this study, web scraping was used to verify that the ticker in the dataset matches the company in the dataset. In this regard, a custom function was written, which can be found in Appendix 2. After these cleanings, the amount of data reduced, the remaining amount can be found in Table 1. Then, using the BatchGetSymbols library, the stock prices of all companies were downloaded, after which they were converted into return. Since this study used data on the company's stock returns, the problem of the different currencies in which the stock price data was taken was spared. These data were further used in event research.

**Table 1: Number of observation after cleaning**

	Non Crisis Acquirer	Crisis Acquirer	Non Crisis Target	Crisis Target
<b>Number of deals</b>	11 282	5 259	1 014	438

Source: Author calculations

### 3.2. Descriptive statistics

As mentioned above, the data was cleared specifically in order to solve problems that may arise in the future. To understand the data, the columns in the dataset will be briefly described below, the reasons for choosing certain columns will be described in the section on regression. The `Announce_Date` column displays the date of the M&A announcement. `Acquirer_Name` and `Target_Name` display the full names of the companies. `Announced_Total_Value` is the amount for which the M&A was announced. `AcquirerSIC` and `TargetSIC` reflect the industries in which companies operate. `Acquirer_Ticker` and `Target_Ticker` are the tickers of the companies involved in the transaction; they do not include intermediaries, i.e. companies are former owners of target companies. `Acquirer_Country` and `Target_Country` are the countries where the companies are headquartered. `Acquirer_TotalAssets` reflects the size of the buyer's companies. `Acquirer_FinancialLeverage` reflects the debt of the buyer's companies. `PaymentType` indicates on what basis the upcoming M&A trail will come. `Acquirer_SecurityType` and `Target_SecurityType` indicate whether companies are private or public. `Target_WACC` displays the WACC of the target search. `Target_ROA` display return on assets. `Target_ROE` display return on equity. `Target_Current_Ratio` show the liquidity of companies.

**Table 2: Descriptive statistics**

	Min	Median	Mean	Max	Class	Number of NA
<code>Acquirer_Name</code>	—	—	—	—	Character	—
<code>Target_Name</code>	—	—	—	—	Character	—
<code>Acquirer_Ticker</code>	—	—	—	—	Character	—
<code>Target_Ticker</code>	—	—	—	—	Character	—
<code>Announced_Total_Value</code>	0.0	24.0	322.3	132 295.1	Numerical	54 757
<code>AcquirerSIC</code>	—	—	—	—	Character	—
<code>TargetSIC</code>	—	—	—	—	Character	—
<code>Acquirer_Country</code>	—	—	—	—	Character	—
<code>Target_Country</code>	—	—	—	—	Character	—
<code>Acquirer_TotalAssets</code>	0.0	920	27 953	4 323 960	Numerical	48 989
<code>Acquirer_Leverage</code>	-59 148.10	8.33	583.64	78 112.70	Numerical	53 059
<code>PaymentType</code>	—	—	—	—	Character	—
<code>Acquirer_SecurityType</code>	—	—	—	—	Character	—
<code>Target_SecurityType</code>	—	—	—	—	Character	—

Target_WACC	-76.57	9.03	8.66	550.66	Numerical	85 299
Target_ROA	-6.96	1.56	0.61	47 045.40	Numerical	86 120
Target_ROE	-3.97	5.94	16.02	130 644.00	Numerical	87 341
Target_Current_Ratio	-5.71	1.44	4.14	4 367.46	Numerical	85 479
Announce_Date	2018-01-01	2019-06-24	2019-06-27	2020-12-31	Date	—

Source: Author calculations

### 3.3. Event study

In this work, one of the research methods was the event study method. The purpose of this method is usually to determine how an event affected the price of the assets of companies. This method is one of the most frequently used methods in works related to M&A. In studies related to M&A, the day of M&A announcement or the day of completion of the transaction is usually chosen as an event. This method was chosen because it can be applied to study how announcements of mergers and agreements affect stock prices during a crisis compared to not crisis period. However, this method also has its drawbacks, such as the limitations of the model on which abnormal returns are based. Due to the fact that a one-dimensional model is used to calculate it, other explanatory variables that affect the abnormal return of companies cannot be included. Such as, for example, the impact of cross-border transactions or mergers between different industries. And therefore, in addition to the method of investigating events in this study, regression analysis will be used. In order to determine the influence of other variables on the cumulative abnormal return.

In order to carry out the events study, we need to perform the following steps. First, we need to decide on the event window, that is, the period during which we examine the event. The event window will include the day the event occurred, a few days before the event, and several days after the event. This will help us to include in our research not only the market reaction before the announcement of the event but also after the announcement. In addition to the event window, you also need to decide on the study window. The exploration window is any number of days that precede the event window. The need for a study window is due to the fact that we will further build our theoretical profitability as if the event had not happened. Typically, event research uses a three-day event window. In this research, several event windows have been selected that range from 20 days before the announcement and 20 days after the announcement. The research window was selected 200 days before the M&A announcement.

The next step is to identify abnormal returns. Abnormal return is the difference between our actual return that was in the event window and another return. Another return can be the average return on stocks of companies for the period, or the return on the market on a corresponding day, or the expected return. In turn, the expected return is the theoretical return

on the stock as if the event had not happened. Usually, to calculate it, a risk-adjusted return model is used, which has a tracking form.

$$E(R_{i,t}) = \alpha_i + \beta_i * R_{m,t}$$

- where R (m, t) is the market return at a given moment. Alpha is the slope of the model and beta is the firm's market sensitivity

$$AR_{i,t} = R_{i,t} - E(R_{i,t})$$

- where R(i, t) is the profitability of the selected company at a particular moment.

Further, after the abnormal return, it is necessary to calculate the cumulative abnormal return, which is the sum of all abnormal returns for the period of the event window. CAR can be used to see how, as the day of events approaches, the return rises, falls, or remains to maintain. The CAR calculation can be represented by the following formula

$$CAR(t_1, t_2) = \sum_{t=t_1}^{t_2} AR_{i,t}$$

After that, the average cumulative abnormal return can be calculated. In this study, CAAR will be calculated both for the crisis period and for the non-crisis period in order to determine how strongly the crisis affects the profitability of companies on average. CAAR calculation can be represented by the following formula

$$CAAR = \frac{1}{N} \sum_{t=t_1}^{t_2} CAR$$

After all these calculations, several tests need to be carried out to determine how significant our results are. In order to determine how much our CAARs differ from 0, the Cross-Sectional Test was used. The following formula was used to calculate the t-test:

$$S_{CAAR}^2 = \frac{1}{N-1} \sum_{i=1}^N (CAR_i - CAAR)^2$$

$$t_{CAAR} = \sqrt{N} \frac{CAAR}{S_{CAAR}}$$

This test basically only checks to see if our CAAR values are random. In this regard, this test does not help to determine whether the values in the pre-crisis and crisis periods really differ

from each other. The Welch test will also be used to resolve this issue. This test is used to test the hypothesis that two groups have equal mean values.

$$S_{CAAR_i} = \frac{S_i}{\sqrt{N_i}}$$

$$t_{CAAR} = \frac{CAAR_1 - CAAR_2}{\sqrt{S_{CAAR_1}^2 + S_{CAAR_2}^2}}$$

### 3.4. Regression analysis methodology

Once the CAR values have been obtained, you can begin to build a simple regression model to determine which variables most strongly affect the abnormal return. These variables will be added gradually to the model as independent variables. Ultimately, this model for acquirer companies will have the following form:

$$\begin{aligned} CAR(\text{for Acquire}) &= \beta_0 + \beta_1 \text{Crisis} + \beta_2 \text{LOG (Acquirer Total Assets)} \\ &+ \beta_3 \text{Leverage of Acquirer} + \beta_4 \text{Industry} + \beta_5 \text{LOG (SIZE of deal)} \\ &+ \beta_6 \text{Cross Border} + \beta_7 \text{Cash Payment Type} + \varepsilon \end{aligned}$$

For target firms, the model will be as follows form:

$$\begin{aligned} CAR(\text{for Target}) &= \beta_0 + \beta_1 \text{Crisis} + \beta_2 \text{Industry} + \beta_3 \text{LOG (SIZE of deal)} + \beta_4 \text{Cross border} \\ &+ \beta_5 \text{Cash Payment Type} + \beta_6 \text{Target ROA} + \beta_7 \text{Target ROE} \\ &+ \beta_8 \text{Target Current Ratio} + \beta_9 \text{Target WACC} + \varepsilon \end{aligned}$$

The crisis variable divides our data into pre-crisis period 0 and crisis period 1. It was added because it is our main variable for analysis of the study. Variable Industry and CrossBorder were added because they are often used in other studies as a variable for regression.

(Colenbrander, 2018). The Acquirer\_ROE was added because researchers such as Beltratti and Paladino (2013) found it to have a pretty strong effect on CAR. PaymentType was taken because Loughran and Vijh (1997) found that payment method was an important factor in their study of stock returns. Announced\_Total\_Value was taken because Linssen's research (2017) found a significant influence of the transaction amount on profitability.

Acquirer\_FinancialLeverage was taken because it was assumed that the company could raise

funds to acquire the target company by issuing bonds. What investors might not like. Target\_Altman\_ZScore, Target\_WACC, Target\_Retained\_Earnings, Target\_Current\_Ratio, Target\_ROE, and Target\_ROA were taken because many investors, seeing the announcement about the acquisitions, can watch various financial indicators of the target company to understand whether this acquisition is profitable for them as a shareholder of the companies

## 4. Results

### 4.1. Event study

The results of the event stage can be found in the table below. It displays how significantly the average CAR value differs from zero for non-crisis and crisis periods. With windows CAR (-5, + 5), CAR (-10, + 10), CAR (-20, + 20).

**Table 3. Results of an event study for acquirer companies in before crisis and crisis periods.**

#### Panel A: Result for Acquirer Companies

Period	Event window	CAAR	T-test	Number of deals
Before crisis	(-1;1)	0.9301 %	11.893***	10 368
Crisis	(-1;1)	2.2171 %	13.154***	4 885
Before crisis	(-3;3)	0.8745 %	8.589***	9 908
Crisis	(-3;3)	2.6430 %	11.872***	4 668
Before crisis	(-5;5)	0.8195 %	6.718***	9 511
Crisis	(-5;5)	2.6619 %	10.228***	4 445
Before crisis	(-10;10)	0.4658 %	2.683***	8 610
Crisis	(-10;10)	2.6567 %	7.672***	4 054
Before crisis	(-20;20)	-0.2811 %	-0.920	7 243
Crisis	(-20;20)	3.7540 %	7.339***	3 374

Source: Authors' calculations

Notes: \*, \*\* and \*\*\* Denote P-values smaller than 10, 5 and 1 per cent, respectively

#### Panel B: Result of Welch test

Period	Event window	CAAR	T-test	Number of deals
Crisis & Non-Crisis	(-1;1)	1.3423 %	-6.926***	15 253
Crisis & Non-Crisis	(-3;3)	1.4409 %	-7.224***	14 576
Crisis & Non-Crisis	(-5;5)	1.4063 %	-6.410***	13 956

Crisis & Non-Crisis	(-10;10)	1.1671 %	-5.656***	12 664
Crisis & Non-Crisis	(-20;20)	1.0011 %	-6.773***	10 617

Source: Authors' calculations

Notes: \*, \*\* and \*\*\* Denote P-values smaller than 10, 5 and 1 per cent, respectively

Panel A in Table 3 shows whether the CAAR value for acquirer companies differs significantly from zero during non-crisis and crisis periods. As you can see, almost all values are statistically significant, which means that they are different from zero. As you can see, there is a tendency for acquirer companies to decrease their CAAR in non-crisis periods. This trend is consistent with the results of research by Rani, Yadav, Jain (2015), Chari, Ouimet, and Tesar (2004) in which, as the event window grew, CAAR began to gradually decrease. However, their research does not cover the crisis period. This result is also inconsistent with the results of such researchers as Wong and Cheung (2009), Ma, Pagán, and Chu (2009), in which the results showed an increase in CAAR with an increase in the event window.

On the other hand, we can observe that during crisis periods, CAAR has the opposite tendency, that CAAR grows with the growth of the event window. This can generally mean that acquirer companies get to benefit from buying target companies in times of crisis in the long run. But the results obtained during the crisis period do not agree with the results of the research by Linssen (2017), Colenbrander (2018). In their works, the results of the research showed that with the growth of the event window during the crisis period, CAAR decreased.

Panel B, in turn, shows whether the values between the CAARs of the acquirer companies in the crisis period really differ from the values in the non-crisis period. As we can see from the results in panel B, all values are really different from each other, from this we can conclude that CAAR in non-crisis times significantly differs from CAAR in crisis time. There is not a lot of literature that really checks out that acquirer companies the meanings in times of crisis differ from those in times of non-crisis, however, in one work by Colenbrander (2018), this issue has been tested. But in contrast to my results in Colenbrander (2018), it was concluded that CAAR during a crisis is much lower than in non-crisis times.

As a result of all this, we can conclude that acquirer companies in non-crisis times receive a small positive CAAR around the day of the announcement, however, gradually this CAAR tends to decrease. At the same time, acquirer companies in times of crisis receive a significant CAAR around the day of the announcement, and this CAAR tends to grow in the long term.

**Table 4. Results of an event study for target companies in before crisis and crisis periods.**

**Panel A: Result for Target Companies**

Period	Event window	CAAR	T-test	Number of deals
Before crisis	(-1;1)	3.6596 %	8.111***	902
Crisis	(-1;1)	8.9975 %	9.778***	393
Before crisis	(-3;3)	3.7172 %	7.639***	865
Crisis	(-3;3)	10.715 %	9.611***	368
Before crisis	(-5;5)	3.4279 %	6.590***	826
Crisis	(-5;5)	11.434 %	8.708***	350
Before crisis	(-10;10)	3.6954 %	5.588***	743
Crisis	(-10;10)	12.539 %	6.998***	305
Before crisis	(-20;20)	2.2788 %	2.296**	635
Crisis	(-20;20)	13.514 %	5.842***	249

Source: Author calculations

Notes: \*, \*\* and \*\*\* Denote P-values smaller than 10, 5 and 1 per cent, respectively

**Panel B: Result of Welch test**

Period	Event window	CAAR	T-test	Number of deals
Crisis & Non-Crisis	(-1;1)	5.2795 %	-5.208 ***	1 295
Crisis & Non-Crisis	(-3;3)	5.8059 %	-5.752 ***	1 233
Crisis & Non-Crisis	(-5;5)	5.8107 %	-5.669 ***	1 176
Crisis & Non-Crisis	(-10;10)	6.2692 %	-4.630***	1 048
Crisis & Non-Crisis	(-20;20)	5.4436 %	-4.463***	884

Source: Author calculations

Notes: \*, \*\* and \*\*\* Denote P-values smaller than 10, 5 and 1 per cent, respectively

Panel A in Table 3 shows whether the CAAR value for target companies differs significantly from zero during non-crisis and crisis periods. As you can see, all values are statistically significant, which means they are different from zero. In panel A, you can see those target

companies in non-crisis periods receive significant CAAR on the day of the announcement of the deal, at the same time, as with acquirer companies, here you can observe a downward trend in CAAR indicators with an increase in the event window. This decline can also be seen in the results of other researchers like Chari, Ouimet and Tesar (2004). At the same time, this result is opposite to the results of the work of such researchers as Shah and Arora (2014), Linssen (2017), Pantagiotaki (2015), whose works showed an increase in CAAR for target companies with an increase in the number of days in event windows.

On the other hand, according to panel A, you can see that target companies in crisis periods receive significant CAAR growth with an increase in the event window. These results are consistent with the results of research by Linssen (2017), which showed that target companies receive significant growth during periods of crisis. This may be due to the fact that when a deal is announced, investors begin to buy back shares of target companies in order to sell them in the consequences, or this may be due to the fact that investors expect that the purchase of this company will have a good effect on it in the long term.

Panel B, in turn, shows whether the values between the CAARs of the target companies in the crisis period significantly differ from the values in the non-crisis period. As you can see, all values are statistically significant from this, it can be concluded that the values between the crisis period and the non-crisis periods are indeed very different from each other.

From all this, the following conclusion can be drawn. Target companies in non-crisis times receive a positive CAAR during the announcement of the deal, however, as in the case of acquirer companies, the CAAR is gradually decreasing. At the same time, in contrast to the non-crisis period, in the crisis period, target companies receive almost three times higher CAAR indicators and, in contrast to the non-crisis period, these indicators grow with the growth of the event window.

On the whole, the results of Table 3 and Table 4 answer the first question of the study “Has the current crisis affected the abnormal return of the acquirer companies and target companies?”. The crisis has significantly increased the CAARs for target companies and acquirer companies. In this regard, we can conclude that the current crisis has quite strongly affected the returns of both target companies and buyers' companies.

## 4.2. Regression results

The regression models in this work were built in three iterations. In the first, only the variable crisis acts as an independent variable, which has only 2 values, 0 if this is not a crisis period and 1 if this is a crisis period. In the second iteration, the variables Acquirer Total Assets and Leverage of Acquirer are added. The values of the Acquirer Total Assets variable were given in millions of units, therefore, for convenience, this variable has been logarithmized. In the third iteration, the following variables are added Industry, Cross-border, Cash Payment Type, Size of deal. The Size of deal was also logarithmized since the original data was given in millions of units. Industry, Cross-border and Cash Payment Type are variables with two values 0 and 1.

**Table 5: Regression results for acquirer companies CAR(-1;1) CAR(-3;3)**

	CAR(-1;1)	CAR(-1;1)	CAR(-1;1)	CAR(-3;3)	CAR(-3;3)	CAR(-3;3)
CRISIS	0.012**	0.011**	0.013**	0.014**	0.013*	0.014**
LOG (ACQUIRER TOTAL ASSETS)		-0.004***	-0.003**		-0.003**	-0.004**
LEVERAGE OF ACQUIRER		0.001	0.001		-0.0002	-0.0003
INDUSTRY			-0.003			-0.002
LOG (SIZE OF DEAL)			-0.001			0.001
CROSS-BORDER			0.002			0.007
CASH PAYMENT TYPE			0.019***			0.024***
CONSTANT	0.002	0.031***	0.021**	0.001	0.028**	0.013
OBSERVATIONS	1 128	1 128	1 128	1 114	1 114	1 114

Source: Author calculations

Notes: \*, \*\* and \*\*\* Denote P-values smaller than 10, 5 and 1 per cent, respectively

As you can see from Table 5, CAR (-1; 1) has only a few variables that are significant. In all 3 iterations, the Crisis variable is significant, which in turn gives us the following conclusion: when acquiring companies buy target companies during a crisis, their CAR is about 0.013 (1.3%) higher than in a non-crisis period. At the same time, we can also observe that the size of companies negatively affects CAR companies in the event window from (-1.1). This means that an increase in Log (Acquirer Total Assets) by 1 unit will decrease the CARs of

companies by -0.001 (0.1%). The Cash Payment Type variable is also statistically significant. This means that if the company was bought out using cash, its CAR would be 0.019 (1.9%) higher than if the buyback took place using shares or in other ways. In turn, with CAR (-3; 3), the results correspond to approximately the same as with CAR (-5; 5) or slightly higher.

**Table 6: Regression results for acquirer companies CAR(-5;5) CAR(-10;10)**

	CAR(-5;5)	CAR(-5;5)	CAR(-5;5)	CAR(-10;10)	CAR(-10;10)	CAR(-10;10)
CRISIS	0.018**	0.017**	0.018**	0.017	0.017	0.017
LOG (ACQUIRER TOTAL ASSETS)		-0.002	-0.004*		-0.004*	-0.006*
LEVERAGE OF ACQUIRER		-0.001	-0.001		-0.002	-0.002
INDUSTRY			0.0002			-0.001
LOG (SIZE OF DEAL)			0.002			0.002
CROSS-BORDER			0.010			0.014
CASH PAYMENT TYPE			0.029***			0.029**
CONSTANT	-0.001	0.020	0.001	-0.001	0.042*	0.020
OBSERVATIONS	1 090	1 090	1 090	1 058	1 058	1 058

Source: Author calculations

Notes: \*, \*\* and \*\*\* Denote P-values smaller than 10, 5 and 1 per cent, respectively

As you can see from Table 5, CAR (-5; 5) also has several significant variables. The crisis still remains significant for the window (-5; 5), but its significance has slightly dropped, but the value itself has increased. In general, this means that for the event window (-5; 5) in a crisis, CAR is 0.018 (1.8%) higher than in a non-crisis period. At the same time, we can observe that the size of the firm in the second iteration became insignificant, but in the third it became significant again. Overall, the value of firm size has not changed much with the change in the event window. Unlike other variables, the statistically significant variable Cash Payment Type did not fall, but the value increased slightly than in the previous event windows. We can also observe that some changes have occurred in the CAR (-10; 10) events window. So, the crisis variable has ceased to be statistically significant. The firm's statistical significance remained the same, but the value of this variable dropped to -0.006 (-0.6%). The

statistical value of Cash Payment Type dropped slightly, but the value remained at the same level.

**Table 7: Regression results for acquirer companies CAR(-20;20)**

	CAR(-20;20)	CAR(-20;20)	CAR(-20;20)
CRISIS	0.037*	0.038*	0.041**
LOG (ACQUIRER TOTAL ASSETS)		-0.0004	-0.001
LEVERAGE OF ACQUIRER		-0.003	0.0004
INDUSTRY			0.022
LOG (SIZE OF DEAL)			-0.002
CROSS-BORDER			0.015
CASH PAYMENT TYPE			0.043**
CONSTANT	-0.011	-0.001	-0.033
OBSERVATIONS	989	989	989

Source: Author calculations

Notes: \*, \*\* and \*\*\* Denote P-values smaller than 10, 5 and 1 per cent, respectively

As can be seen in Table 5 CAR (-20; 20), there are only 2 statistically significant variables left. In contrast to the previous window of events, in this one the crisis became significant again and its values increased quite strongly compared to the window (-1; 1). In general, this means that companies acquire acquirers during periods of crises by 0.041 (4.1%) more CAR than in non-crisis periods. Likewise, the variable of firm size has ceased to be statistically significant. In turn, the variable Cash Payment Type is still statistically significant. At the same time, its value increased to 0.043 (4.3%).

The results of tables 5, 6 and 7 confirm and reject the conclusions of some other researchers. In this study, the Crisis variable remains positive across all event windows. This result is inconsistent with the results obtained by Colenbrander (2018), Beltratti and Paladino (2013). In their work, the crisis had a negative impact on CAR. I associate the growth and the positive value of the crisis variable with the fact that during crisis periods I can give companies with sufficient liquidity the opportunity to buy companies that have fallen in price due to the crisis. The Acquirer Total Assets variable had a negative value in all event

windows, but at some point this variable ceased to be significant. The negative values of firm size on CAR are also observed in Waal (2013), however, in other works, as in Colenbrander (2018), they are statically insignificant. Variables Leverage of Acquirer, Industry, SIZE of deal, Cross-border were statistically insignificant in all event windows. This result is slightly inconsistent with the result of the study in Waal (2013), Colenbrander (2018). In their works, it was found that the SIZE of deal is statically significant. The Cash Payment Type variable had a positive effect on CAR in all event windows and remained statistically significant. The statistical significance of this variable was observed in Beltratti and Paladino (2013), but was absent in Colenbrander (2018). And in contrast to my results, Beltratti and Paladino (2013) found that the cash payment method negatively affects CAR. The positive effects of cash not on CARs but on the firm as a whole can be seen in Linn and Switzer (2001). In their research, it was found that the financial performance of companies is significantly higher in cases where the digging is acquired by cash.

**Table 8: Regression results for target companies CAR(-1;1) CAR(-3;3)**

	CAR(-1;1)	CAR(-1;1)	CAR(-1;1)	CAR(-3;3)	CAR(-3;3)	CAR(-3;3)
CRISIS	0.108***	0.105***	0.104***	0.112***	0.107***	0.116***
INDUSTRY		0.022	0.020		0.037	0.028
LOG (SIZE OF DEAL)		0.004	0.005		0.004	0.002
CROSS-BORDER		-0.032	-0.033		-0.051**	-0.056**
CASH PAYMENT TYPE		0.075***	0.075***		0.089***	0.076***
TARGET ROA			0.0003			-0.0001
TARGET ROE			-0.0001			0.00002
TARGET CURRENT RATIO			0.004			0.011***
TARGET WACC			0.003			-0.003
CONSTANT	0.035***	-0.014	-0.050	0.047***	0.014	0.015
OBSERVATIONS	206	206	206	202	202	202

Source: Author calculations

Notes: \*, \*\* and \*\*\* Denote P-values smaller than 10, 5 and 1 per cent, respectively

Table 8 shows that with CAR (-1; 1), only two values are statistically significant. As you can see, the variable crisis has a positive effect on CAR. In accordance with this, we can say that target companies have a CAR that is higher by 0.105 (10.5%) during crises than in a non-crisis period. Also, the Cash Payment Type variable is statistically significant. The value of Cash Payment Type means that companies when using cash for purchase receive a growth for target companies CAR of 0.075 (7.5%) than when using other types of payments. With a wider range of the event window, the number of statistically significant variables increased to four. Variables Crisis and Cash Payment Type remained statistically significant and their values increased slightly compared to the previous event window. In this event window, Cross-border has become statically significant; in general, its value can be interpreted as follows: if a transaction is carried out between companies from one country, the CAR of the target company is lower by -0.056 (-5.6%). The Target Current Ratio variable also became statistically significant, the results of this variable can be interpreted as follows: an increase in short-term liquidity of target companies by 1% leads to an increase in CAR by 0.011 (1.1%).

**Table 9: Regression results for target companies CAR(-5;5) CAR(-10;10)**

	CAR(-5;5)	CAR(-5;5)	CAR(-5;5)	CAR(-10;10)	CAR(-10;10)	CAR(-10;10)
CRISIS	0.144***	0.135***	0.144***	0.177***	0.165***	0.167***
INDUSTRY		0.021	0.012		0.035	0.028
LOG (SIZE OF DEAL)		0.005	0.007		0.00001	0.007
CROSS-BORDER		-0.046*	-0.050*		-0.024	-0.014
CASH PAYMENT TYPE		0.110***	0.101***		0.124***	0.142***
TARGET ROA			-0.0002			-0.003**
TARGET ROE			0.0001			0.001**
TARGET CURRENT RATIO			0.011***			0.003
TARGET WACC			0.001			0.009
CONSTANT	0.034**	-0.033	-0.072	0.019	-0.034	-0.176*
OBSERVATIONS	198	198	198	172	172	172

Source: Author calculations

Notes: \*, \*\* and \*\*\* Denote P-values smaller than 10, 5 and 1 per cent, respectively

As you can see in Table 9 CAR (-5; 5), the number of statistically significant variables remained the same as in the previous event window. At the same time, the indicators of the Crisis variable increased to 0.144 (14.4%). The same growth is observed in the variable Cash Payment Type, whose values increased to 0.101 (10.1%). The Target Current Ratio and Cross-border values remained at approximately the same levels. In the event window CAR (-10; 10), Target ROA and Target ROE became statistically significant, but Cross-border and Target Current Ratio became statistically insignificant. The Target ROA tells us that a 1% increase in the target company's ROA decreases CAR by -0.003 (-0.3%). The Target ROA tells us that a 1% increase in the target company's ROA increases CAR by 0.001 (0.1%).

**Table 10: Regression results for target companies CAR(-20;20)**

	CAR(-20;20)	CAR(-20;20)	CAR(-20;20)
CRISIS	0.174***	0.157***	0.153***
INDUSTRY		0.101**	0.098**
LOG (SIZE OF DEAL)		0.001	0.007
CROSS-BORDER		-0.066	-0.048
CASH PAYMENT TYPE		0.112***	0.144***
TARGET ROA			-0.003**
TARGET ROE			0.001**
TARGET CURRENT RATIO			-0.006
TARGET WACC			0.008
CONSTANT	0.004	-0.043	-0.164
OBSERVATIONS	155	155	155

Source: Author calculations

Notes: \*, \*\* and \*\*\* Denote P-values smaller than 10, 5 and 1 per cent, respectively

The results of Table 10 show that at CAR (-20; 20) the Industry variable becomes statistically significant. Since the Industry variable has become significant, its value reflects that if the participants in the merger are companies from the same industry, then this news will affect the CAR by the target firm by an increase of 0.098 (9.8%). Target ROA, Target ROE, Cash Payment Type remained at the same level. At the same time, it can be seen that the value of

the Crisis variable began to decrease, which may mean that over time, the impact of the crisis on the growth of CAR decreases.

The results of Tables 8, 9 and 10 show that different indicators of the variables affect different event windows. However, in all these variables, the influence of Crisis and Cash Payment Type at all stages remains significant. The same strong influence can be observed in the work of Linssen (2017), in which the variable Crisis, CashDummy, and Ln (DV) had a strong influence on CAR. In the work of Linssen (2017), it can be seen that the variables Crisis and CashDummy have a positive effect on CAR with an event window (-5; 5). The influence of other variables Target ROA, Target ROE, Target Current Ratio were not observed in all event windows. The positive impact of Target ROE is seen in Beltratti and Paladino (2013), who find that companies with higher ROE have higher CARs. The effect of Target Current Ratio consistent with the findings of Massa and Xu (2013). Their results show that the purchase of a more liquid target firm has a positive effect on the liquidity of the acquiring companies. The results of the study by Alexandridis, Fuller, Terhaar, Travlos (2011) can partially confirm the negative ROA, this may be due in general to the expectations of investors that the acquisition of the target company will negatively affect its financial performance in the consequences. The impact of industrial diversification and cross-border on stock prices is confirmed in the studies of Moeller and Schlingemann (2005), according to their result, the growth of cross-border and industrial diversification negatively affects the prices of companies' shares. In this study, the Industry variable showed that if the target and the company are the buyer from the same industry, then this has a positive effect on CAR. However, in this study, cross-border negatively affects CAR if the companies involved in the transaction are from the same country.

## 5. Conclusion

This study initially asked itself two research questions. The first of which was: "Has the current crisis affected the abnormal return of acquiring companies and target companies?" The answer to this question was obtained as a result of the study.

As a result of the research, calculations were made that showed whether the crisis really affects the abnormal income of the companies involved in the transaction. According to the results from Tables 1 and 2, we can conclude that acquirer companies in non-crisis periods generally have a positive return from the news about the announcement, however, this return gradually decreases and at a certain moment may become negative. In the event of a crisis period of companies, acquirers receive a significant increase in return, which grows over time. In the case of target companies, they usually receive a higher return from the merger than acquiring companies in non-crisis periods, so according to the result, target companies in the event window (-1; 1) receive a return equal to 3.6596%, however, as in the case of acquiring companies, this return gradually decreases. At the same time, during crisis periods, target companies receive higher returns, which, in my opinion, is strange, since during times of crises, target companies usually experience a decrease in their value, but the results do not confirm my guess. Also, the first research question is confirmed by the results of regressions, according to which the variable crisis is statistically significant and their values in all models are positive. The second research question was formulated as follows: "What other variables besides the crisis can affect the abnormal return of the company?" To answer this question, several regression models were made, which mainly differed in the number of days in the event window, and were also divided into target companies and acquiring companies. In general, according to the results obtained, we can say that, in addition to the crisis, the abnormal return of acquirer companies is greatly influenced by whether the purchase of companies will be carried out at the expense of cash. The other chosen variables do not particularly affect the return of the acquirer companies. On the other hand, several selected variables affect the return of target companies. Just as in the situation with the acquirer company, the return is strongly influenced by the purchase with the help of cash. At the same time, some of its financial indicators, such as ROA, ROE, and Current Ratio, also affect the return of target companies. Another positive effect on return is the news that the companies participating in the transaction operate in the same industries, but the news that the companies participating in the transaction from different countries negatively affect the return.

In general, at the end of this study, we can say that to date, more than one study has been written devoted to the theme of the impact of the crisis on the return of participating companies. However, due to the fact that many of these studies come to different conclusions, my research can be an addition to the existing literature and can be useful for people who will conduct research on M&A.

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## Annexes:

### Appendix 1: Libraries used in the calculation

```
library(readxl)
library(dplyr)
library(tidyr)
library(quantmod)
library(stringi)
library(stringr)
library(rebus)
library(BatchGetSymbols)
library(zoo)
library(xts)
library(writexl)
library(eventstudies)
library(stargazer)
```

## Appendix 2: The line of code responsible for web scraping

```
for (i in 1:length(unique(MaNonCrisisAcquirer$Acquirer_Name))) {
  Sys.sleep(1)
  words <- str_replace_all(unique(MaNonCrisisAcquirer$Acquirer_Name)[i], " ", "+")
  words <- str_remove(words, pattern = "&")
  url = paste0('https://www.google.com/search?q=', words, "+yahoo+finance")
  UrlGet <- url %>%
    read_html() %>%
    html_nodes(xpath = "//div/div/div/a") %>%
    html_attr('href')
  vowels2 <- char_class("A-Za-z.0-9")
  pattern2 <- "finance.yahoo.com/quote/" %R% zero_or_more(vowels2)
  extracted <- str_extract(UrlGet, pattern2)
  detected <- str_detect(UrlGet, pattern2)
  newUrl <- extracted[detected][1]
  urlForNonCrisisAcquirer[i] <- newUrl
  CrisisNonAcquirer_Name[i] <- (unique(MaNonCrisisAcquirer$Acquirer_Name))[i]
  print(i)
  print(newUrl)
}
```

Appendix 3: The line of code responsible for downloading share price

```
MA_SharePrcieNonCrisisAcquirer <- BatchGetSymbols(tickers = tickers,  
                                                    first.date = as.Date("2017-03-08"),  
                                                    last.date = as.Date("2020-02-28"),  
                                                    freq.data = "daily")
```

```
SP500NonCrisis <- BatchGetSymbols(tickers = "^GSPC",  
                                   first.date = as.Date("2017-03-08"),  
                                   last.date = as.Date("2020-02-28"),  
                                   freq.data = "daily")
```

#### Appendix 4: The line of code responsible for eventstudy

```
EventStudyNonCrisisAcquirer <- eventstudy(firm.returns = MA_ZooNonCrisisAcquirer, event.list = SelectedComp  
    event.window = 22,  
    type = "marketModel",  
    to.remap = TRUE,  
    remap = "cumsum",  
    inference = TRUE,  
    inference.strategy = "bootstrap",  
    model.args = list(market.returns = SP500ZooNonCrisis$ret.closing.prices))
```

## Appendix 5: The line of code responsible for data conversion

```
MANonCrisisAcquirerReg <- MANonCrisisAcquirer %>%  
  mutate(CrossBorder = as.numeric(MANonCrisisAcquirer$Acquirer_Country == MANonCrisisAcquirer$Target_Country),  
         Industry = as.numeric(MANonCrisisAcquirer$TargetSIC == MANonCrisisAcquirer$AcquirerSIC),  
         Acquirer_SecurityType = as.numeric(MANonCrisisAcquirer$Acquirer_SecurityType == "Common Stock"),  
         CashPaymentType = as.numeric(MANonCrisisAcquirer$PaymentType == "Cash"),  
         Announced_Total_Value = as.numeric(Announced_Total_Value),  
         Acquirer_TotalAssets = as.numeric(Acquirer_TotalAssets),  
         Acquirer_FinancialLeverage = as.numeric(Acquirer_FinancialLeverage),  
         Announce_Date = as.Date(Announce_Date),  
         Crisis = 0) %>%
```