Study of the Effect on the Introduction of a Lockdown (COVID-19 Pandemic) on Abnormal Return Rate

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In general, everyone has an individual approach to investing their capital. In the case of the capital market, two extreme approaches can be observed, for some investors the key is the security of investments while for others it is maximization of profits. There are also many investors who follow their own beliefs when making decisions – the emotional factor. Such behavior is explained by a relatively new field, namely behavioral finance. Its inseparable elements are exchange rate fluctuations. The amplitude of occurring fluctuations increases in case of unexpected random events. One such event was COVID-19 and the announcements of lockdowns in individual countries. The following report investigated the impact of COVID-19 on the capital market, and more specifically, it has been tested in terms of generating abnormal rates of return. The hypothesis of the study was that an announcement of a lockdown resulting in an economic closure generates statistically significant abnormal rates of return in relation to national benchmarks. The study was conducted on the basis of daily closing rates for joint stock companies from six European countries: Bulgaria, the Czech Republic, Poland, Slovakia, Ukraine, and Hungary. The data range covered the period from 1st January 2020 to 30th April 2020. The results of the event study proved that a few companies in the analysis showed sensitivity of their rates of return in relation to COVID-19.

Badanie wpływu wprowadzenia lockdownu podczas pandemii COVID-19 na abnormalne stopy zwrotu

Na rynku kapitałowym każdy cechuje się indywidulanym podejściem do inwestowania swojego kapitału. Można zaobserwować dwie skrajne postawy: dla jednych inwestorów kluczowe będzie bezpieczeństwo dokonywanych inwestycji, dla innych z kolei – maksymalizacja osiąganych zysków. Jest również wielu inwestorów, którzy podczas podejmowania decyzji kierują się własnymi przekonaniami, czyli tzw. czynnikiem emocjonalnym. Takie zachowania tłumaczy stosunkowo nowa dziedzina, jaką są finanse behawioralne. Jej nieodłącznym elementem są wahania kursów. Amplituda występujących wahań wzrasta w przypadku pojawienia się nieoczekiwanych zdarzeń losowych. Jednym z takich wydarzeń było ogłoszenie lockdownów związanych z pandemią COVID-19 w poszczególnych krajach. Wpływ takich działań został zbadany pod kątem generowania abnormalnych stóp zwrotu. Postawiona hipoteza głosiła, że fakt ogłoszenia lockdownu i zamknięcia gospodarek w poszczególnych krajach generował

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istotne statystycznie ponadprzeciętne stopy zwrotu w odniesieniu do krajowych benchmarków. Badanie zostało przeprowadzone na podstawie dziennych kursów zamknięcia spółek akcyjnych z sześciu krajów europejskich. Zakres danych obejmował okres od 1 stycznia 2020 r. do 30 kwietnia 2020 roku. Wyniki event study dowiodły, że mała liczba analizowanych spółek wykazała się wrażliwością osiąganych stóp zwrotu na takie zdarzenia.

1. Introduction

Investors want to achieve the highest possible rates of return with the lowest possible risk. Most of investors have access to the same financial knowledge and each of them should be guided by rational behavior, optimize usability, and strive to maximize their benefits. However, this behavior cannot be observed in everyone. Investors are characterized by the fact that each of them is different, which entails various behaviors. This happens because there is an emotional factor involved in the decision-making process. A relatively new field that connects emotions (the psychological view of the investor with the world of finance) to the financial decisions made is behavioral finance. Additionally, life brings a lot of unexpected events, one such circumstance was the COVID-19 pandemic. The pandemic has caused fear in many investors, which most likely increased unconventional behavior. Such behavior led to large fluctuations in the stock market. In order to verify whether particular fluctuations caused additional benefits, the following event study was conducted.

The aim of the study is to analyze the impact of COVID-19 lockdown announcements on selected companies present on stock markets, in individual European countries, on their achieved abnormal rates of return, and to see whether the fluctuations, if present, are statistically significant.

The thesis of the following report is that the day of announcement of the economy's closures occurring due to the first phase of the global COVID-19 pandemic generated above-average returns on the stock market in relation to the corresponding national benchmarks.

The research part of the article is composed of three chapters. The first one focuses on the theoretical side, referring to issues from the world of behavioral finance.

The following sections describe the sample along with the methodology, and lastly the conclusions are presented.

2. Literature Review

One of the most common errors that appear in the initial information selection stage is the accessibility heuristics. When making decisions, investors are guided by (similar) previous events as well as their consequences that reflect the past. It is said that to an investor a current event that can be linked to a past event has a higher probability of recurrence. As a result, decisions made by some investors are wrong. Barber and Odean (2008) proved that investors, while looking for financial opportunities, mainly focus on stocks which they heard about somewhere before. This error is mainly attributed to individual investors, less often to institutional investors. Due to this failure on stock markets, there are strong fluctuations in sectors in which there is a large number of individual investors. In the long run, fluctuations usually do not bring profit as the rates of return on stocks are not higher than the market rates. Achieving a profit in this case is possible when investing "for a short time". Fama and French (1992, 1998) showed that one of the factors explaining the change in the rates of return generate the value of shares. In the study, value represents the ratio of the company's market value to its book value. The price-to-profit ratio is used to obtain an additional abnormal rate of returns as compared to capitalization of the company's book value. However, the cited study was challenged by Lakonishok et al. (1994). Calishkan et al. (2008) proved that the distribution of rates of return on investment in value has a relatively greater skewness, kurtosis and a wider range between the minimum and maximum value. In the case of investors who are characterized by a strong

feeling of loss aversion and low propensity to asymmetric risk, the rates of return on this strategy are not attractive. They found that roughly eighty percent of prospective investors reported high Sharpe's ratios that are not sufficient to encourage investors to use this strategy. Over a period of three years, De Bondt and Thaler (1985) studied behavior of returns on NYSE shares. They concluded that portfolios that were characterized by earlier profits recorded worse rates of return, as compared to the benchmarks, than the portfolios that had previously sufferes losses.

In many publications, the PEAD (post-earnings announcement drift) effect is noticed. This phenomenon can be observed after a company presents its financial reports. Firms with more satisfactory reports will see higher abnormal rates of return within months of the announcement date. In a study by Ball Brown (1968), the effect was presented for the first time; additionally, an extensive summary was conducted by Bernard and Thomas (1989, 1990). Bernard and Thomas (1990) pointed out that PEAD patterns can be understood as an event with two components. The first is the positive autocorrelation between seasonal differences, it is the seasonal errors in the random march forecast, which is the difference between the actual returns and the forecasted returns. This correlation is the strongest in the adjacent quarters as well as positive in the first three quarters of the delay. The second component is the negative autocorrelation between seasonal differences that are four quarters apart.

After analyzing the anchoring process, Anderson (1996) proposed an interpretation based on the so-called the Information Integration Theory. According to the author, investors who fall into the anchoring process attach great importance to both the priority effect and the freshness effect. How a particular effect will affect a person will depend on importance that a specific person gives it. For example, if investor A gives high importance (validity) to the first information and believes that the given message is credible (value), they may be subject to an anchoring effect. The given situation can also be interpreted in a different way, if the weight is low and the credibility is low, the investor will not be anchored. Finally, there were many stud-ies conducted in this direction and none of them managed to confirm the thesis. In the results section of this paper, an opposite position to the anchoring effect can be found when anchoring can be triggered with the first piece of information known to be untrue.

Another financial behavioral effect is related to overconfidence. Unqualified people in specific areas tend to overestimate their skills and competences when making decisions. Highly qualified people do the opposite: they lower their assessment of their skills. The effect in question is the Dunning-Kruger effect. Kruger and Dunning (1999) hypothesized that in the case of an ability that everyone can acquire to a varying degree (some more, others less), the incompetent:
– do not notice their low level of overall abilities,
– are unable to properly assess the level of their abilities,
– are not able to properly assess the level of skills in others,
– recognize and accept their low level of ability only after appropriate training of a given skill.

One other effect, also related to overconfidence, is the effect of an inadequate calibration. Investors characterized with overconfidence can exhibit such behavior in their decision-making process. Regardless of the recommendations of others or lack of recommendations, an investor will still pick a company they have chosen. As a result, investors may end up concluding trade with a negative expected rate of return. Such behavior may lead to a situation of excessive revision of the investment portfolio and changes of up to 70% of investments in equities per year (Barber & Odean, 2001). In a study conducted by Huber (2007), the presence of a J-shaped curve of the rate of return of investors with different information was noticed. Investors with the greatest amount of information will have the highest rates of return. The worst performing ones are those with access to only partial information, their rates of return are the lowest on average. They overestimate their competences, exhibit overconfidence and believe that the information they have is truly reliable. This approach leads to taking on too much risk than any investor is able and should take.

During a close analysis of the S&P 500 and the FTSE 100, Hodges et al. (2008) proved that in terms of both, investors overpay for buying options that are significantly above the actual market price (black horses) from the time they start to be seen as a lucky hit or a lottery ticket. Due to the aforementioned, black horses have become a frequent instrument that serves as a security position by financial institutions, yet they recorded a negative average rate of return for the put option. As such, due to excessive demand, they became overvalued.

Odean (1998) showed that investors are inclined to take profits, but they are reluctant to close the positions on which they are recording losses. This could be explained by the following:
– investors create mental accounts and make decisions that make earlier decisions look better (Hens & Vleck, 2006; Barberis & Xiong, 2008),
– a loss is retained on paper version whereas profit can be monetized,
– investors consider the past and they not necessarily reflect on future of their decisions,
– investors justify their actions and they are not willing to consider the best future for their decisions.

French and Poterba (1991) proved that investors prefer to invest in securities from their own countries. The reason for such behavior is that they feel safe and generally have more knowledge about their surroundings than that of others. Additionally, such behavior can be associated with aversion to ambiguity. In the case of domestic investments, the probability of success is easier to estimate due to the earlier mentioned market familiarity, and overall decisions are easier to make. When you want to increase the probability of investment, obtaining data such as a company's name and its seat may contribute to this (Ackert et al., 2005). Grinblatt and Keloharju (2001) showed that investors are more likely to invest in companies whose CEOs come from the same cultural background as them and speak their mother tongue. Chan et al. (2005) proved that the phenomenon of investing in domestic assets is typical for both developed and developing countries.

It is important for an investor to consider the time period of decision. The same discount rates are used in financial theory. In practice, each investor discounts future in their own way, guided by the moment in which they have to make a decision. They would not choose to fight for future profit, whereas they would choose to do so if both the loss and the gain were in the future. Thaler (1981) and Benzion et al. (1989) drew attention to three basic properties of a discounting function:
– hyperbolic discounting is a phenomenon which appears when more possibilities are distant in time from the moment of making the assessment to the comparison and the rate required by the decision maker is lower. This translates to policymakers applying high interest rates in the short run;
– the use of different discount rates by the decision maker in elections that differ only in a nominal value of individual investments. Lower values are discounted with higher rates than large ones at the same time. This may be related to the type of investor;
– application of different discounted rates for gains and losses. Profits are discounted much more than losses. Investors require a higher premium for refraining from taking profits.

In a 2005 study by Fan and Xiao (2005), it was shown that, when comparing Asians, Europeans and Americans, Asians revealed the most tolerant approach to risk. Bontempo et al. (1997) proved that strong aversion to risk depends more on the level of loss perceived than on the actual probability of profits that can compensate for it. On the other hand, Weber and Hsee (1998) noticed distinctive differences in the approach to risk. The researchers proposed the following hypothesis: collectivist societies may benefit from financial support which directly and significantly translates into risk reduction. When an investment decision is made with an additional context, Asians have a high degree of uncertainty avoidance. They called the aforementioned the soft pillow hypothesis. Wright and Phillips (1980) proved that Asians, in comparison to Europeans, tend to make very radical judgments when assessing probability. Yates et al. (1996) proposed that the phenomenon of excessive self-confidence in the assessment of probability can be caused by the mechanisms of collectivist culture. In the presented culture, it is

important that each of the subjects fits into their group, hence, they are not used to counter-argument. The benchmark varies by culture. The research carried out by Wang and Fischbeck (2004) and Levinson and Peng (2006) shows that Chinese people are more susceptible to the context effect than other nationalities and are also influenced by the social context in the assessment of insurance products.

There are many factors that need to be taken into account when analyzing the behavior of investors in the financial world. One of them is rumor. Pound and Zeckhauser (1990) showed that circulating rumor in the financial market has a significant impact on the changes in the share prices. A study conducted among professional investors by Schindler (2007) showed that due to the fact that rumor is passed from one to another, the time of information spread is much faster than that of news. This also points to the fulfilling power of prophecy and importance of false information concerning changes in exchange rates. About 20% of respondents indicated that it did not matter if a rumor was true, the most important factor was whether the market believed it. In terms of its spread, the degree of credibility or "credulity" is very important. If the rumor is not credible or only partially credible, the likelihood of a person passing it to someone else is small. In fact, when one emerges, and an investor would like to pass it on, they first check credibility of the information (Kimmel & Keefer, 1991). If an investor hears a rumor from a trusted source, the chance that the recipient will be less skeptical about its credibility increases. Therefore, the receiver will be more willing to accept any evidence, regardless of its importance. Schachter et al. (1986) found that in a bear market, stock prices are more sensitive to emerging information and recommendations as compared to a more stable market. Overall, financial rumors have the greatest impact on price volatility causing one-way deviations from randomness (DiFonzo & Bordia, 1997). One of the most attractive rumors on the global retail market is information about potential acquisition targets. A study at Harvard's John F. Kennedy School of Government determined the impact of 42 seizure rumors. The results were published in The Wall Street Journal (WSJ) "Heard on the Street" between 1983 and 1985. Following an investment opportunity analysis which was based on an annual buy and hold strategy analysis, after an artificial rumor emerged, slight risk-adjusted excess returns were detected (Pound & Zeckhauser, 1990). The conclusion drawn was that the market effectively responds to rumors. In a similar study by Zivney et al. (1996), almost 900 rumors about acquisitions from 1985 to 1988 as well as information presented in the **WSJ column "Abreast"** were analyzed. The results obtained coincided with the conclusions of the **Harvard's John F. Kennedy School of Government** study which stated that rumors in fact influence the market by showing slight excess rates of return. The researchers also found that depending on which column the rumors were in, different effects were observed. For example, if there was a rumor in the column **"Abreast"**, it had a short-term effect. On the other hand, the **"Heard"** column rumors caused sharp stabilization of prices. Based on their research, the authors concluded that the best way to make a profit is to shortly sell the rumors appearing in the **"Abreast"** column for a period of about 100 days after the rumor. Researchers believe that in such a case, an investor could see a 20% annual excess of returns with around 70% of the transactions being profitable.

Klibanoff et al. (1998) showed that country-specific information presented on the New York Times's front page had an effect on the prices of funds in closed countries. The survey showed that only weeks after news came out, there were price changes associated with it. They also proved that investors stimulated by certain information make decisions faster. Tetlock (2007) analyzed the linguistic content of the mass media and found that media pessimism predicts downward pressure which causes its subsequent reversal. Tetlock et al. (2008) noted that some of the negative words in the media predicts profits and returns. The results presented suggest that qualitative news coverage contributes to the stock prices efficiency. Additionally, Frieder and Subrahmanyam (2005) found that investors are more willing to buy shares that are more recognizable.

Feng and Peress (2009) showed that stocks not discussed in the media have higher future returns compared to those with a high profile, even after taking into

account commonly accepted risk characteristics. Some of the larger differences in returns compared to media companies can be seen in the case of small company stocks with low analyst input, shares owned by individuals and stocks with high idiosyncratic volatility. Premiums ranged from 8 to 12% per annum after risk adjustments.

During the COVID-19 pandemic, all information regarding the progress of the virus spread (i.e., the number of deaths and the number of new infections) was reflected in share prices (Kacperska et al., 2021). This is also confirmed by the study conducted for the stock exchange indices of the countries most affected by the first wave of the pandemic. The study shows that the number of cases had a statistically significant impact on the rates of return on equity prices during the analysis period (01.2020–11.2020) (Chodnicka-Jaworska et al., 2020). Global stock markets responded positively as various phases of clinical trials for COVID-19 vaccines began. A positive response to the COVID-19 pandemic was more visible after the start of vaccine Phase III trials (Chan et al., 2022).

Dias (2020) analyzed the pandemic period between 24th and 28th February 2020 and concluded that the prices do not fully reflect the available information on the market and the price changes are not independent and evenly distributed. Yan et al. (2020) found that the onset of the pandemic had a significant negative impact on consumer inventories especially on the second day after the crisis. However, its negative impact did not last long as the consumer industry recovered quickly.

The results from Beckmann et al.'s (2022) study, focusing on exchange rates, suggested the presence of a cumulative surplus rate of return which was partly caused by the macroeconomic foundations for the globally most important currencies. Dutta (2020), however, showed that the virus had a negative impact on international oil markets, which was reflected in drastic negative declines in the energy market "after the pandemic". Demirgüç-Kunt et al. (2021) suggested that the negative impact of the COVID-19 shock on the banking industry was much more pronounced and lasting as compared with other industries, revealing the expectation that banks would absorb

at least some of the shock caused to the economies. Moreover, larger private banks and publicly owned banks experienced greater declines in equity returns, reflecting their bigger projected role in coping with the crisis.

The results of a study conducted in 2021 show that the characteristics of the real estate industry with medium risk and medium return are important even in the short term (Hyesook et al., 2021). There is a considerable variation between the types of real estate available on any given market. Local and state policy interventions helped mitigate GeoCOVID's negative impact on return (Ling et al., 2020). As determined by Kaynak et al. (2021), on the Turkish city level, the COVID-19 pandemic was predicted to have a negative impact on abnormal housing price returns.

However, the regional analysis mainly shows the positive effect of COVID-19. The industries most exposed to COVID-19, according to investors, are tourism, oil and gas, and the financial sector (Korzeb et al., 2021). US listed companies, according to Huang et al. (2021), were recognized as the best brands experiencing higher returns on equity, lower systematic risk, and lower idiosyncratic risk in the event of the COVID-19 crash than other companies. On the other hand, countries in Asia experienced more negative incorrect returns compared to Japan, Korea, Singapore, the US, Germany, Italy, and the UK (Liu, Manzoor, et al., 2020). For the Chinese market, different responses to the pandemic can be observed depending on the sector. The biggest losses were recorded in the sports, tourism, and transport sectors (Kandil Göker et al., 2020). While China has tried to control the worsening of the epidemic, any global crisis will inevitably have an impact on the global economy, China included (Li & Yan, 2022).

Pharmaceutical manufacturing, software, and IT services all had a positive CAR, while transport, accommodation and catering all reported negative CAR results throughout the pandemic (Liu, Wang, et al., 2020). Tang et al.'s (2021) **Wuhan-based** study found a link between COVID-19 and the disruption of logistics and supply chains, with a negative impact on Taiwanese companies that manufacture products in China and sell them around the world.

In Indonesia, there was no significant difference in the abnormal rates of return for telecommunications companies as all possible decreases were compensated for by increased demand for these services (Šumadi et al., 2021). Handayani et al.'s (2020) analysis shows that regulation POJK no. 11 2020 could not reverse the pessimism in the capital market that accompanied the pandemic in Indonesia. The results of Mujib et al.'s (2021) study show that the announcement of the first COVID-19 case in Indonesia had a negative impact on the Indonesian stock market, but it was not significant, as evidenced by the lack of abnormal returns before and after the announcement of the first COVID-19 case. Returns on equity in Indonesia were lower in the early part of the financial crisis caused by the pandemic. The trading volume, profitability and book values of companies positively influenced the rates of return on shares, and their market capitalization negatively affected the rates of return on shares during the period under review (Indrayono, 2021). According to Nurhayati (2020), as many as eight stocks are always negative in any method of measuring of the performance of the stock, which indicates that they performed the worst in the Indonesian market during the pandemic. The Indonesian stock exchange (IDX) sectors that were affected the most were finance, followed by trade, services and investment (Herwany et al., 2020).

According to a study by Nasir Khan, in Pakistan, the rate of returns shows a significant negative relationship in the post-event window. In contrast, for Taiwan, the results show that biotech stocks have positive abnormal returns on the day of the event compared to Kao's (2021) electronics stocks. The results of Ngoc's (2021) research showed a significant drop in the average profitability of companies on the Vietnamese Stock Exchange. The service sector was heavily influenced by COVID-19, while the medical sector (stock market) was less affected by the pandemic.

The following research purpose is proposed:

The analysis of the lockdown announcements impact, in selected European countries, on the achieved excess rates of return that are statistically significant, by joint-stock companies during the period of the event.

The event study was used in the study, which is a method of event analysis. The moment of lockdown announcements by the studied countries had an individual impact on specific investors; however, a general panic caused by the collapse of the market could be observed.

3. Data Description and Methodology

The study is focused around daily closing rates of selected companies from countries such as Bulgaria, the Czech Republic, Poland, Slovakia, Ukraine and Hungary. The data was downloaded from the Refinitiv Eikon platform. The period covered by the study is the first quarter of 2020 – the time when the first lockdowns caused by the COVID-19 pandemic were announced. In the initial analysis, only the companies that met audit criteria were selected i.e., in the period from 1st January 2020 to 30th April 2020, they recorded closing rates of at least 50%. Out of 1,290 companies, 585 companies met the above criteria. In order to stabilize the variance and improve characteristics of the distribution of the rates of return for the selected companies, they were logarithmized. The study was conducted on the event study method basis, namely event analysis.

Table 1 presents the number of companies before and after the classification from a given country and the benchmarks adopted for the research.

Table 1. Classification of Companies With Benchmarks

Countries	Companies selected for the study	Companies that meet the research criteria	Benchmark
Bulgaria	261	24	BSE SOFIX
Czech Republic	26	7	PX
Poland	760	515	WIG20
Slovakia	49	1	SAX
Ukraine	119	5	PFTS
Hungary	75	33	Budapest SE

Source: Own elaboration.

In addition, announcement dates of economic closures in specific countries were used for the study. The analysis concerns the first phase of the pandemic. The dates below are based on publicly available information. Table 2 presents the aforementioned closure dates according to the specific country.

Table 2. Lockdown Dates for Selected Countries

Countries	Lockdown date
Bulgaria	13.03.2020
Czech Republic	16.03.2020
Poland	13.03.2020
Slovakia	12.03.2020
Ukraine	17.03.2020
Hungary	11.03.2020

Source: Own elaboration.

The following research hypothesis was adopted in the presented study:

H0: Lockdown announcement and therefore economies closure, in specific countries, generated statistically significant abnormal rates of return in relation to the national benchmarks.

In order to verify the above-mentioned null hypothesis, the following study was conducted with the use of event analysis. For the purpose of this research, logarithmic rates of return were calculated based on the daily closing rates. In order to properly execute the event analysis model, one should follow a diagram consisting of several stages. The first is to determine the date of a specific market event. Based on this date, the event window should be set, as should be the pre-event window and post-event window. In the second step, a list of measures that determine the level of the additional and expected rate of return should be made. Then, the expected rate of return is estimated based on the selected model. The last step is to verify the previously made null hypothesis, interpret the obtained results and summarize.

It is usual for the event studies that the event and estimation windows do not to overlap (MacKinlay, 1997). Such a design "provides estimators for the parameters of the normal return model which are not influenced by the returns around the event" (ibid.). As such, the impact of both normal and abnormal returns on the event was captured. Additionally, if the event window was included in the estimation of the normal model, the parameters could have been affected, i.e., the event returns could have had a sizable influence on the normal return measure.

In the conducted research, the date of the lockdown announcement for a given country is assumed as the date of the incident (event window). In all cases, it is mid-March 2020. On the basis of the adopted event date, windows were created. An event window was defined using the method of one business day before and three business days after [−1, 0, 1, 2, 3]. The estimation windows were established 20 days before and 20 days after the event window.

In the next step, additional and expected rates of return were specified. This was done using the market model. On the basis of the equation presented below, the expected rate of return of i (a specific company) in period t was determined (Perepeczo, 2010):

$$E(R_{it}) = \alpha_i + \beta_i * RM_t,$$

where:
α_i – free term of the market model,
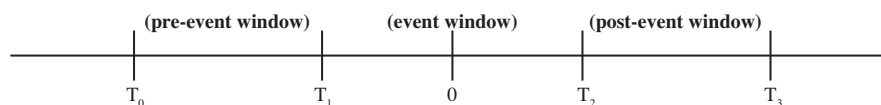β_i – risk factors for the *i*-th action,
RM_t – the rate of return on the market index in period *t*.

After determining the expected rate of return, an abnormal return should be established as the so-called additional rate of return. The additional rate of return is a difference between the actual and

Figure 1. Time Line for an Event Study

Source: MacKinlay (1997).

expected rate of return from company i in period t (Barber & Lyon, 2015):

$$AR_{it} = R_{it} - E(R_{it}),$$

where:
AR_{it} – additional (surplus) rate of return on stock i in period t,
R_{it} – actual rate of return on stock i in period t,
$E(R_{it})$ – expected rate of return on stock i in period t.

To estimate the impact of an event, cumulative abnormal return (CAR) is used, also called cumulative rate of return. It is the sum of excess daily rates of return from a previously defined event window (Barber & Lyon, 2015):

$$CAR_{it} = T\sum AR_{it}\ t = 1$$

where:
CAR_{it} – cumulative additional rate of return on stock i in event window T.

The following formula was used to determine the standard deviation of average upward returns (Brown & Warner, 1985):

$$\hat{\sigma}\overline{AR}_t = \sqrt{\frac{1}{T-1}\sum_{t=t_0}^{t_0+T-1}(\overline{AR}_t - \overline{AR})^2}$$

where:
t_0 – index of the oldest observation within the estimation window.

In the last phase, the Student's t-test was performed to verify the null hypothesis.

$$t_{stat} = \frac{\frac{1}{N}\sum_{i=1}^{N}AR_j}{\widehat{\sigma AR}}$$

4. Results

The tables below present the results of the Student's test for the selected companies concerning the proposed countries. If the absolute value of the Student's t-test is greater than 1.96, we are dealing with above-normal rates of return. Then the average rate of return differs statistically significantly from zero on the x level. For the purpose of clarity, the following color classification has been introduced:
- red – negative, abnormal rates of return [x < –1.96],
- yellow – no abnormal rates of return [–1.96 < x < 1.96],
- green – positive, abnormal rates of return [x > 1.96].

Please, see the table of selected Bulgarian companies' results (Table 3).

In the estimation window, the pre-event window, it can be observed that only one company has achieved negative abnormal rates of return out of twenty-four analyzed companies. In the event window, this number increased to six companies, which represents 25% of the companies analyzed in Bulgaria. Most of them recorded negative surplus rates of return (4 out of 6 companies), the remaining ones were positive. In the last estimation window, the

Table 3. Student's T-Test for Bulgaria

RIC	PRE-EVENT WINDOW TEST	EVENT WINDOW TEST	POST-EVENT WINDOW TEST	RIC	PRE-EVENT WINDOW TEST	EVENT WINDOW TEST	POST-EVENT WINDOW TEST
BGALB.BB	–0.4036195	–3.4456308	1.67960881	A4L.BB	–0.1965438	–2.3945864	0.14275186
MONB.BB	–1.3724048	–3.847874	0.07815957	SPH.BB	–0.7269906	1.08289365	–3.1440004
CCB.BB	–2.6858435	–1.8028969	1.18839513	ZHBG.BB	0.93048751	2.02064085	0.10658833
T57.BB	–1.0863599	–2.2464965	0.4233937	SPDY.BB	–1.4307286	1.17080871	–3.5886037
EAC.BB	0.34713091	–1.050751	2.00144613	MSH.BB	0.64108878	1.96560143	–1.7967539

Source: Own elaboration.

post-event window, the number of companies decreased to three. Only one of the three companies achieved abnormal positive rates of return. None of the analyzed companies achieved above-normal rates of return in all windows.

In the case of the Czech Republic (Table 4), both in the estimation window, the pre–event window as well as the past event window, none of the analyzed companies recorded above-normal rates of return. In the event window, the Komercni Banka AS and the Kofola CeskoSlovensko AS obtained negative abnormal rates of return, which accounts for 28.57% of the surveyed companies.

Table 5 presents the results of the Student's test for Slovakia. Tatry Mountain Resorts AS achieved negative above--normal rates of return in the event window as well as in the post-event estimation window.

Two companies achieved abnormal rates of return. The Agroton Public Ltd. achieved negative results in the estimation window, the pre-event window, while the KSG.WA a positive view in the event window (25%). The TMM Real Estate Development Public Ltd. (TR61q.F) posted an unchanged closing rate most of the time, which translated into zero returns. In the event window, the test value increased, but it did not exceed 1.96, which could indicate an achievement of an above-average rates of return (Table 6).

In the pre-event estimation window, it can be observed that three out of thirty-three analyzed companies achieve above-average rates of return. In the event window, the number of companies

Table 4. Student's T-Test for the Czech Republic

RIC	PRE-EVENT WINDOW TEST	EVENT WINDOW TEST	POST-EVENT WINDOW TEST	RIC	PRE-EVENT WINDOW TEST	EVENT WINDOW TEST	POST-EVENT WINDOW TEST
BKOM.PR	−1.2201056	−3.1658758	0.49262334	MONET.PR	−1.8772388	−2.0609484	−0.4965609

Source: Own elaboration.

Table 5. Student's T-Test for Slovakia

RIC	PRE-EVENT WINDOW TEST	EVENT WINDOW TEST	POST-EVENT WINDOW TEST
1TMR001E.BV	−0.80688	−3.17409	−4.8230866

Source: Own elaboration.

Table 6. Student's T-Test for Ukraine

RIC	PRE-EVENT WINDOW TEST	EVENT WINDOW TEST	POST-EVENT WINDOW TEST	RIC	PRE-EVENT WINDOW TEST	EVENT WINDOW TEST	POST-EVENT WINDOW TEST
AGTP.WA	−2.2468911	−1.10235	0.0489818	KSG.WA	−0.5580467	2.197645	0.41697516
TR61q.F	0	1.118034	0				

Source: Own elaboration.

Table 7. Student's T-Test for Hungary

RIC	PRE-EVENT WINDOW TEST	EVENT WINDOW TEST	POST-EVENT WINDOW TEST	RIC	PRE-EVENT WINDOW TEST	EVENT WINDOW TEST	POST-EVENT WINDOW TEST
AUTW.BU	–2.3164914	–1.9726367	–0.036248	NTSB.BU	–0.7787614	–1.7340839	1.99591992
BIFR.BU	–0.7137578	–2.1340652	–0.357577	OTT1.BU	–0.3703512	–1.1790852	2.03531788
CIGP.BU	–0.7508153	–7.9478102	1.95567003	PANP.BU	–0.7354248	–3.0393119	1.89830184
DELTA.BU	–0.931427	–2.169337	1.04602443	SETG.BU	–0.0280155	–2.6313502	1.27974246
FUTU.BU	–1.7681945	–2.2902094	1.77504952	WABE.BU	–2.0017366	–4.3897362	0.2620785
IGNY.BU	–0.2744512	–1.1711693	2.47052523	TAKA.BU	–0.9407231	–2.6516687	1.61787778
MTEL.BU	–2.2354937	–0.2400254	–0.5800755	RABA.BU	–0.4797996	–1.9843377	1.204906

Source: Own elaboration.

increased to ten, and in the next one, which is the post-event window, it returned to the level of three companies. Two companies, namely the AutoWallis Nyrt and the Waberer's International Nyrt, recorded abnormal rates of return in two windows: the pre-event and event windows. Only in the last estimation window can positive abnormal rates of return be observed.

The table concerning Poland is included in the attachment due to the large number of observations. Among the analyzed countries, Poland recorded the largest number of companies that showed a sufficient amount of information needed to perform an event study analysis. Of the seven hundred and sixty companies, five hundred and fifteen were left out (67.8%). In the case of the estimation window, the pre-event window, one hundred and forty-seven companies recorded above-average rates of return. In the event window, the number of companies dropped to fifty-four (10.48). The post-event window grew to fifty-five companies. The most positive abnormal rates of return were recorded in the pre-event window with 27 observations, later 23 companies in the post-event window and 8 companies in the event window.

Cumulative abnormal return (CAR) informs about the average rate of return achieved by companies from a given sector over the entire window. All analyzed sectors in Poland and the Czech Republic recorded negative rates of return in the first estimation window. Most of the analyzed sectors in these two countries recorded an increase in average cumulative returns between the event window and the other estimation window. In the case of Hungary (Table 7), there is a noticeable tendency for CAR to decline in the event window as compared to the pre-event window and to increase in the post-event window. Bulgaria has relatively many positive average returns across all windows compared to the rest of the world.

5. Conclusion

The aim of the study was to analyze the impact of lockdown announcements in individual countries on the achieved excess rates of return that are statistically significant as noted by joint-stock companies during the period of the event.

One thousand two hundred and ninety companies from fortunate countries (such as Bulgaria, the Czech Republic, Poland, Slovakia, Ukraine, and Hungary) were used for the study. The first step was to check whether the analyzed companies have a sufficient amount of data. After this stage, there were five hundred and eighty-five companies that were then subjected to the event study method.

The highest overall percentage that achieved an above-normal rate of return that of Slovakia, but it is not statistically significant as only one company was present

Table 8. Summary of Abnormal Return

Country	PRE-EVENT WINDOW		EVENT WINDOW		POST-EVENT WINDOW		The number of companies in the study
Bulgaria	1	4.17%	6	25.00%	3	12.50%	24
Czech Republic	0	0.00%	2	28.57%	0	0.00%	7
Poland	147	28.54%	54	10.49%	55	10.68%	515
Slovakia	0	0.00%	1	100.00%	1	100.00%	1
Ukraine	1	20.00%	1	20.00%	0	0.00%	5
Hungary	3	9.09%	10	30.30%	3	9.09%	33
Summary	152	25.98%	74	12.65%	62	10.60%	585

Source: Own elaboration.

in the study. Excluding Slovakia, Poland achieved the highest number of abnormal rates of return in the first estimation window. In the case of the event window, it was Hungary, while in the last estimation window, the post-event window, Bulgaria.

Apart from Poland, the tendency to achieve abnormal rates of return continued or increased in all countries. This may indicate that the lockdown was introduced too late or that the level of uncertainty prevailing among Poles earlier was higher.

When analyzing the trends of changes in the second estimation window outside Poland, a downward trend in achieving abnormal return can be noticed.

Due to the fact that a small number of analyzed companies achieved above-normal rates of return, the hypothesis assumed in the study (H_0: The fact of announcing the lockdown and closure of economies in individual countries generated statistically significant abnormal rates of return in relation to national benchmarks) should be rejected.

The presented study can be used as an informative start for the achievement of above-normal rates of return during a pandemic or possibly also other similar unexpected events. The announcement of the first lockdown was unfortunately not the only emotional information for the investors during the pandemic. There are many moments that could be investigated in order to verify whether they were generating abnormal rates of return. It has been shown

by Kacperska et al. (2021) that during the COVID-19 pandemic, all information on the progress of the virus, including the number of deaths and the number of new infections, was reflected in share prices.

In the presented research, it can be observed that the abnormal rates of return indeed occur in the pre-event window. This prompts for a more accurate and in-depth analysis of the events. One possible way to extend the research would be company examinations based on the lockdown intentions raised in the media rather than actual lockdown starting dates. Instead of daily rates of return, the time interval could be reduced, e.g., hourly data, which would translate into a better representation of investors' reactions.

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Attachment

Table 9. Student's T-Test for Poland

RIC POLAND	PRE-EVENT WINDOW TEST	EVENT WINDOW TEST	POST-EVENT WINDOW TEST	RIC POLAND	PRE-EVENT WINDOW TEST	EVENT WINDOW TEST	POST-EVENT WINDOW TEST
01C.WA	–3.1908973	0.90504813	–2.8719219	LAB.WA	–0.7362733	0.41663217	2.13037616
08N.WA	2.13672389	0.70253696	–0.1291475	LBW.WA	–1.9999723	0.49754091	0.95838825
1AT.WA	0.808159	–3.3345112	–0.0251346	LENP.WA	–2.2585818	–0.4547297	0.1610612
4FMP.WA	–0.2190596	–3.3613197	1.4003587	LPPP.WA	–1.9952143	–0.9409582	0.86828476
4MSP.WA	–2.9086543	–0.7323433	0.16437713	LPSP.WA	–4.2324339	–0.9622751	0.55066635
7FTP.WA	–3.1906071	–0.6453908	–1.5176881	LSIS.WA	–1.0919961	–2.1110633	0.30217881
ABEP.WA	–2.7362437	–0.2990525	1.95862302	LTSP.WA	–1.0730762	0.15124366	2.04954083
ACA.WA	–2.0195736	–0.5886753	0.50813682	LWBP.WA	–0.9583731	0.81309419	2.68028332
ACT.WA	0.11455259	–0.8187021	2.42197275	MDG.WA	1.23388622	0.42438094	–2.7258851
AGOP.WA	–2.8694257	0.76507144	–1.5091209	MDNP.WA	3.22493276	–0.1839403	–1.9469996
ALI.WA	–3.1759907	–3.2409322	–0.1020259	MGTP.WA	–2.2552792	–0.6356087	–0.2941329
ALRR.WA	–2.0129812	–0.9513497	0.08574567	MIR.WA	–3.3476176	0.36004703	–0.4746824
AMCP.WA	–1.5734063	–2.1184392	0.91657599	MLP.WA	–2.5441217	–0.2126348	0.84569836
APEP.WA	–2.4983113	–0.8239177	–0.0852061	MLSP.WA	–1.9710604	–0.4242171	–0.8507733
AQT.WA	–3.2676593	–0.5199147	0.44436276	MNS.WA	–0.1779638	0.35908491	–2.1035803
AREP.WA	2.6989306	0.92167652	–0.1344469	MOVP.WA	0.1698383	0.43775313	2.5996531
ATDP.WA	–2.1594629	–1.1047109	0.69803218	MRCP.WA	–2.0717803	–0.1385922	1.56148622
ATRP.WA	–3.501617	–0.4698336	–0.204316	MSZ.WA	0.99579209	–2.560338	0.71183487
AUX.WA	–2.4364221	–0.255406	–0.5739773	MTEP.WA	2.08025297	0.41072981	0.01981232
AVTP.WA	–3.085492	–0.9581577	–1.3348001	MVPP.WA	–2.0804332	–2.5501218	–2.7441972
AWM.WA	–2.4427636	–0.1371291	1.55227068	NFP.WA	–1.9865952	–0.248978	1.9684874
AZC.WA	–2.7990646	–2.8037393	–1.0168401	NGGP.WA	–3.4748359	–0.1756991	–1.9573155
B24P.WA	2.94791504	1.89257817	0.62174576	NRSP.WA	2.73281349	0.39926963	0.86500571
BAHP.WA	3.99470392	0.85273906	0.30915065	NSTP.WA	–0.3460237	2.2605684	–1.6164796
BHW.WA	–1.6039251	–1.7686532	–2.231805	NVGP.WA	–2.3998685	–0.5824948	0.8503769
BLOP.WA	–3.4916601	0.30794807	–0.561071	NVT.WA	–2.7113879	–2.8838671	0.83796085
BLRP.WA	–0.2535263	–0.9957767	–2.0120379	NVV.WA	–2.3669663	1.08231825	–1.528579
BMCP.WA	1.532896	2.3317003	0.57788119	NXGP.WA	–5.8566796	–4.4217409	–3.5494991
BNP1.WA	1.98525565	–0.4696184	–0.4810112	ODL.WA	–2.0968457	–0.6710865	0.69228394
BPN.WA	0.90037392	–0.0523423	–2.3614323	OPMP.WA	–3.7443866	–0.8709226	–4.1412287

Table 9 cont.

RIC POLAND	PRE-EVENT WINDOW TEST	EVENT WINDOW TEST	POST-EVENT WINDOW TEST	RIC POLAND	PRE-EVENT WINDOW TEST	EVENT WINDOW TEST	POST-EVENT WINDOW TEST
BRHP.WA	–4.2838909	–0.3621836	–3.2224774	OPN.WA	–2.179676	–0.4975331	–0.2904306
BTC1.WA	–2.9249643	–0.4895511	0.6598071	OTMP.WA	–2.7574987	0.22513453	–0.2018279
BTGP.WA	–2.1779933	–0.6542315	0.11630361	OTSL.WA	–2.2929161	0.34341874	–0.7141768
CAIP.WA	–0.3988479	–2.3702282	–0.5618552	OXYP.WA	–0.8363071	1.98274655	–2.6323433
CAM.WA	–2.8223296	–1.0443652	–1.2361982	PBKM.WA	–2.2427449	2.19768872	–0.0918664
CARP.WA	–2.6421938	–1.1351682	0.85882196	PBT1.WA	–1.9287857	–2.389769	0.41300549
CCCP.WA	–2.7204672	–3.053729	1.79567368	PCE.WA	0.59215347	0.7592232	2.16130589
CDTP.WA	–4.3177235	–2.0241943	–1.2655883	PCR.WA	–0.7616054	–0.5329867	2.01887651
CFG.WA	–2.6294518	–0.0449715	1.00135546	PEO.WA	–0.963708	–3.0431196	–0.9582394
CHPP.WA	2.53978397	–0.7779425	0.63157488	PGE.WA	–2.4707139	0.50016639	1.77306075
CIEP.WA	–2.5690834	–0.0167965	1.12678121	PGN.WA	2.20882402	2.05407072	1.30935422
CMP.WA	–0.1503163	–2.8712484	0.02164014	PGVP.WA	1.2045532	–0.6521082	3.20548324
CPAP.WA	2.35104491	0.90568617	1.58599567	PHN.WA	–2.7587659	–0.838564	0.63162038
DDIP.WA	–2.8007021	–0.0996342	0.86594361	PKO.WA	0.96796151	–1.8091061	–2.3119264
DELP.WA	0.26922392	–3.6467985	0.44484157	PKPP.WA	–2.210853	–0.3939565	1.60578601
DOMP.WA	0.20491573	–2.3642219	–0.0964031	PLGP.WA	–2.6157192	0.07557211	0.08254981
DPL.WA	–4.6000212	–0.787691	–0.0709026	PLMP.WA	–3.6064841	0.15847082	0.53951913
DRF.WA	–1.9792175	–0.3764356	–1.9983743	PMPP.WA	0.75147921	–2.4006006	–1.4867891
DVLP.WA	–0.0803769	–2.6939854	–0.4559688	PPSP.WA	–1.0301009	–1.0539678	2.19115346
EAHP.WA	–0.8227748	–2.933551	–0.4686692	PRD.WA	3.09679953	0.47108637	1.62768336
EDIP.WA	–0.1132991	–0.2832326	2.62944767	PRIP.WA	2.41338621	1.24946637	–1.3455671
EDNP.WA	–3.890063	0.0217647	–0.2426447	PROP.WA	–3.8943382	–0.3932246	–1.5612836
EGH.WA	–3.2361506	–2.05751	–3.3011419	PSW.WA	–2.7137472	–0.123374	0.06603971
ELZ.WA	–0.1105242	–1.5862607	–2.5305152	PTW.WA	–4.2130053	–0.7861098	–0.4743327
EMCM.WA	4.31618856	0.65488428	–1.2893256	PUNP.WA	–2.4999124	–0.5787582	0.06984453
ENGP.WA	0.21114853	–2.8474687	0.92674375	PXMP.WA	–1.4830868	–0.1236953	2.45362009
ENTP.WA	–2.6578422	–0.1781383	0.5007012	PYL.WA	–2.9526386	–1.7102043	0.20064179
EPPJ.J	–1.2209738	–3.0929768	–0.0399769	PZUAKORD.WA	–0.627879	–2.0135061	1.09421078
EPRP.WA	–3.4320907	–1.1391468	–2.6455176	QNT.WA	2.39535655	0.2734333	–1.9696882
ERB.WA	–3.3207527	–1.0842746	0.86229867	QUBP.WA	–0.1645703	1.36613608	–2.4531895
ERHP.WA	–4.0285008	–0.5217346	0.55065076	RBW.WA	–2.7180128	–0.1764725	0.55967609
ESKP.WA	–2.0389558	–0.83912	2.16309123	RDG.WA	1.81618911	–2.9043418	0.77295994

Table 9 cont.

RIC POLAND	PRE-EVENT WINDOW TEST	EVENT WINDOW TEST	POST-EVENT WINDOW TEST	RIC POLAND	PRE-EVENT WINDOW TEST	EVENT WINDOW TEST	POST-EVENT WINDOW TEST
EURTL.WA	–2.6462853	–3.7294395	–0.6377911	RDNP.WA	–3.1006758	–1.0042277	1.66926241
FERR.WA	–2.350895	–0.342655	0.06471474	RDSP.WA	1.83805842	0.43721172	–1.984939
FIGP.WA	–4.4031216	–0.398674	–0.8095067	RFK.WA	–2.6948812	–0.1627937	1.5099536
FIVP.WA	–2.0922425	0.14436186	1.41866233	RMK.WA	–1.167572	–1.9091661	2.04633063
FKD.WA	–1.7713479	–0.9887541	–2.6548334	RSP1.WA	–2.1692978	–0.3356921	–0.1154801
FMF.WA	–0.8517757	–1.2687674	2.38457612	RVU.WA	–1.000915	–0.3546196	2.59876286
FROP.WA	–1.5236828	–3.0909483	1.11452402	RWLP.WA	–0.9104461	–2.8672352	1.16637615
FTEP.WA	–3.0548564	–2.1926422	0.64068849	SCPP.WA	–2.1753807	1.218 ki8179	–1.1821685
FTH.WA	–0.1620198	–1.966712	0.34052125	SEKO.WA	–0.0985928	–4.3925916	0.86264763
FVEP.WA	–2.1798828	–0.2588122	0.71847764	SEV.WA	–3.9574759	–0.7573953	0.41053088
GAL.WA	–1.7847356	–2.1435641	–0.866028	SFSP.WA	–0.9493748	–2.0872501	0.54678259
GLC.WA	–0.9801273	–0.3434279	2.14177078	SGN.WA	–2.3823085	–0.8503963	–0.4288106
GNB.WA	2.16190257	0.24864065	–1.6036868	SKA.WA	1.98465654	–0.1352821	–0.0928055
GNGP.WA	–2.3081961	–0.3778068	–0.3203555	SKH1.WA	–2.1557815	–1.019462	0.42699222
GTP.WA	–4.2599474	–0.7360329	–0.6559101	SKLP.WA	–1.9943536	–0.085365	1.29685397
GTSP.WA	–2.4232714	–0.2493169	0.70735192	SKTP.WA	–1.4275106	–3.5499483	0.51274295
HMIP.WA	–4.3722317	–1.5192364	–4.9418527	SNGP.WA	0.6112961	0.21366388	–3.3888844
HORP.WA	–0.091178	–0.0134449	–4.1393118	SNK.WA	–1.5701114	–2.0110428	0.35397024
HRSP.WA	–2.4046789	–0.2104452	0.4663593	SNTP.WA	–2.3013949	–0.2446116	0.49747095
I2D.WA	–2.4973314	–1.7877307	0.63102097	SNXP.WA	–2.4216323	1.1391537	–1.7667702
ICEP.WA	–2.0285831	–0.2943598	0.8057889	SOLP.WA	–4.0934085	–0.6768129	0.09996377
ICIP.WA	–1.1205744	–2.6172739	–10.720664	SONP.WA	–0.5009265	–2.8037922	–0.5870489
IDM.WA	–0.3353272	–1.9723157	2.26350908	SPL1.WA	1.11713648	0.01324102	–3.0559976
IGSP.WA	–2.882261	–0.4229441	–0.3529092	SSKP.WA	–1.9665048	–0.7724596	–0.2651267
IMPP.WA	1.02888522	–2.3240916	0.44122788	STFP.WA	–2.5654275	–3.842498	1.10241216
IMRP.WA	–0.0493023	0.02498885	–2.6254426	STXPP.WA	–2.1061883	–0.1769426	1.88681596
IMS.WA	–2.0217792	–2.4266812	0.02720828	SZR.WA	–3.2355654	–0.8029071	–0.5961095
INGP.WA	–2.0731987	–0.4445781	–0.187741	T2P.WA	–2.0549708	0.0267422	0.55663543
INK.WA	–2.8799834	–0.3630481	–0.6482768	TENP.WA	3.21401584	0.30395622	–0.194575
INMP.WA	–0.8789762	–0.56488	–2.6152406	TMP.WA	2.60787442	1.57742819	1.5627407
INP.WA	2.47383631	–0.342986	–1.1680112	TPE.WA	–0.5686185	2.03709954	–0.2237311
INVLBFIZ.WA	2.65180134	0.4508009	0.42053581	TRIP.WA	–3.2622295	–0.2732839	0.28272427

Table 9 cont.

RIC POLAND	PRE-EVENT WINDOW TEST	EVENT WINDOW TEST	POST-EVENT WINDOW TEST	RIC POLAND	PRE-EVENT WINDOW TEST	EVENT WINDOW TEST	POST-EVENT WINDOW TEST
IPE.WA	0.53614249	–0.1404069	–2.4644168	TRKP.WA	–1.1763471	0.45687046	1.98946373
IPOP.WA	0.08368628	–2.0963927	0.9392087	TRNP.WA	–3.1713611	–0.6141997	1.45887257
ISTP.WA	–0.1600452	0.21205387	2.14480389	TSGP.WA	–1.1085381	–0.5786135	–2.9742562
ITL.WA	–3.9292787	–0.9423683	0.36905216	U2K.WA	–1.1297832	–1.2473903	3.07660243
IZB.WA	3.44959986	–1.0746149	1.06429541	URSP.WA	–2.5969905	–0.2227597	–1.6219143
JRH.WA	–2.8990394	–0.0231916	–2.0866942	VGOP.WA	1.28079484	–3.1832484	–0.0628992
JSW.WA	0.92498212	2.38543089	–0.6754314	VINP.WA	–2.1844997	–1.5241361	1.50183467
JWW.WA	–2.6248551	–0.9417324	0.48940736	VRGP.WA	–2.3776474	–1.0354579	2.11568398
KGLP.WA	–3.2448907	–1.7722257	0.32348789	VVD.WA	–1.2882576	1.27195604	–2.7375839
KMP.WA	2.79440929	0.75180014	–1.3099837	WLTP.WA	–3.1090548	–4.0571048	0.5809904
KORP.WA	2.16377803	0.92801644	1.56224915	WSEP.WA	2.33894183	0.63198248	–0.5776156
KPC.WA	–0.4743139	–0.7567533	2.44589005	WTN.WA	–2.0652	–1.8655543	1.18871861
KPI.WA	2.7468376	0.49726692	–0.9828259	XPL.WA	–1.2108581	–1.9238922	–2.1154295
KPL.WA	–2.747796	–1.1110804	0.68654215	XTB.WA	2.20630084	0.51374084	1.08997739
KRCP.WA	–2.950043	–1.8658963	0.95553884	YOL.WA	–2.4260484	2.33128118	1.33416889
KRU.WA	–1.9612155	–2.5731545	0.32857597	ZAPP.WA	–2.2996196	–0.6610894	1.81783126
KVT.WA	–2.1248487	–0.6564487	0.7911262	ZUE.WA	–2.1215556	0.01925374	–0.6579611

Source: Own elaboration.