Impairment of Assets and Market Reaction during COVID-19 Pandemic on the Example of WSE

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Abstract: The main task of the article is to examine the impact of the reported impairment of assets (IoA) on the market reaction of investors on the Warsaw Stock Exchange [WSE] in the crisis condition caused by the COVID-19 pandemic. There is a need to verify whether the disclosure of this information in the period of economic downturn will cause a similar negative reaction as in previous topics in this area. Research undertaken in this article helps identify the rules of behaviour (in the short term) whether the reaction of investors on updating the company's assets in crisis conditions is different than in times of prosperity. The main hypothesis will be verified using the event study methodology. It allows to verify whether the upcoming information about IoA during the COVID-19 pandemic confirms an existence of statistically significant negative abnormal returns. Based on the 55 cases of current reports informing about IoA, which were submitted to the investors in the year 2020 and finally qualified for the research sample, I have not observed statistically significant negative abnormal returns on the adjacent days. The results are different from those obtained by researchers who study the market reaction to the IoA under non-crisis conditions of the economy.

Keywords: capital markets; accounting; financial reporting; economic crisis; COVID-19; shares; impairment of assets; write-off; event study; market reaction

1. Introduction

The first quarter of 2020 turned out to be the beginning of a difficult period that global economies have had to face, at least since the financial crisis of 2008–2009. It was at this time that the COVID-19 pandemic (caused by the SARS-CoV-2 virus) started to spread around the world. Its appearance led to a destabilization of the world economy on an unprecedented scale. The occurrence of global supply and demand shocks resulted in a real threat of a permanent recession on a hard to estimate scale.

Although the first case of COVID-19 infection was reported in China (in the city of Wuhan) as early as December 2019 (Singh et al. 2020), it was only the surge in cases and deaths from COVID-19 infection outside China that probably led the World Health Organization to declare a global pandemic on 11 March 2020 (World Health Organization 2020).

The fear of a spreading pandemic has caused significant changes in people's lives. Social gatherings were restricted, stores were closed, mass events were canceled, and business travel and tourist traffic were halted. All these changes occurred in order to prevent the virus from entering new regions as much as possible. Such a significant destabilization of everyday life had a drastic impact on the functioning of the economies of many countries. Some economic experts claim that because of the effects of the coronavirus pandemic, the global economy will likely undergo its deepest slump since the Great Depression of the 1930s, which occurred after the stock market crash of 1929. The first estimates as of May 2020 pointed to a decline in global GDP of up to 3 percent, while some European countries were expected to contract by as much as 7.5 percent (International Monetary Fund 2020).

The global-widening tightening, which resulted in the shutdown of economies, also resonated with the capital market reaction. The panic peaked in mid-March, when the

world's largest indices plummeted by more than 20% during the week. The scale and suddenness of the fall should be reflected in the fourfold activation in March of the "automatic suspension of quotations" system on the New York Stock Exchange, which is supposed to slow down further price falls by suspending quotations for a short period of time. Since its introduction in 1987, it has not been necessary to use this price volatility stabilizer in the US market several times in such short intervals (Zhang et al. 2020).

The turmoil in the financial markets did not occur only on the New York Stock Exchange. The UK's FTSE100 index saw declines of up to 10% per day, while Japan's NIKKEI225 saw a more than 20% correction from the historical boost in December 2019. The dramatic fall in the market valuation of listed issuers did not spare the Polish WIG index either. The panic peaked in the second week of March, when the value of the WSE's blue chip index was recorded lower than even at the worst moment of the great financial crisis of 2008–2009 (Stooq.com 2021). The reaction of the markets was not exaggerated, as hardly anyone expected the exact consequences for the functioning of the global economy that the COVID-19 pandemic could cause. Its outbreak was a typical "black swan" described by Taleb (2010), i.e., an unpredictable event with a very large negative impact on investors' behavior.

Central banks also reacted to the development of the COVID-19 pandemic by significantly lowering the main interest rates. A few days after declaring a pandemic state, the Federal Reserve Bank introduced a zero interest rate and announced an unlimited quantitative easing program (Zhang et al. 2020). A similar reaction of the central bank also took place in Poland. The Polish central bank [NBP] lowered the main interest rates to an unprecedented level and introduced the purchase of Treasury securities (National Bank of Poland 2020). All this is justified by the specter of the spread of the negative impact of the COVID-19 pandemic on the economy.

Despite the rapid rebound in securities prices, investors were accompanied by uncertainty about the further development of the pandemic. It could be seen, inter alia, by the increase in the daily deviation of the S&P 500 index, which in March 2020 increased almost fourfold (Zhang et al. 2020). According to some researchers, the increase in price volatility on the stock market during the current turmoil is higher than it was in the periods of previous major crises of 1930, 1987 or 2008 (e.g., (Thakur 2020)). This situation creates motives for scientific exploration, which can be used to discover new dependencies occurring on capital markets. The outbreak of the COVID-19 pandemic and the social and economic consequences of its spread have also had a significant impact on the business activities conducted by the entities. A significant number of them noticed in the consequences of the spread of the SARS-CoV-2 virus the occurrence of "changes of technological, market, economic or legal nature in the area of activity conducted by the entity". These changes are one of the external reasons for entities to test the value of their assets for possible impairment (International Accounting Standard Board 2008, No. 36). Their occurrence, in turn, is a factor of volatility in the prices of financial instruments, which has repeatedly been the subject of research by authors dealing with the topic of capital markets research in accounting (among others, Gu and Lev 2011; Knauer and Wohrmann 2016; Cheng et al. 2017; Lisicki 2021). These researchers made an attempt to verify the market reaction to the disclosure of information on the impairment of assets (IoA). In most cases, the results of their research indicated a short-term negative reaction from investors (Knauer and Wohrmann 2016). However, it was possible to find cases in which the market discounted the news about the write-off differently in the longer term (Gu and Lev 2011). This reaction was also varied due to individual determinants characterizing the issuers (Cheng et al. 2017).

However, they did not focus on the general economic conditions for conducting the analyzes. The research contribution to the state of knowledge is an attempt to verify how the market will react to such information in a situation when the specter of a serious economic crisis hangs over it, which was caused by the pandemic of COVID-19 (Platje et al. 2020). The main purpose of this paper is to show how the market will react to information about IoA in a situation where the prices of securities have already discounted a lot of

negative information due to the existence of negative consequences of the COVID-19 pandemic. Such a reaction may be different from that observed in earlier studies.

To verify this purpose, the author adopted a research hypothesis indicating that submitting information about the impairment of the company's assets during the COVID-19 pandemic first year (2020) results in negative abnormal returns (AR) of their share prices in adjacent days. The negative reaction of investors about IoA was a dominant position in the previous abovementioned research. The research undertaken in this article helps identify the rules of behaviour (in the short term) whether the reaction of investors on updating the company's assets in crisis conditions is different from their reaction in times of prosperity.

The main hypothesis of the research will be verified using the event study methodology created by Fama et al. (1969). The research intends to verify whether the level of achieved AR occurring on the days adjacent to the announcement regarding IoA is significantly different from the average level. The subject of the article will be all current reports about IoA submitted by issuers listed in the main broad market index WIG of the Warsaw Stock Exchange (WSE) in times of the COVID-19 pandemic (year 2020). Results from 2020 will be discussed with other, similar research and with results obtained from previous years from the WSE.

2. Impairment of Assets and Market Reaction—Literature Overview

The first of the studies examining the impact of IoA on the response of investors took place already in the 1980s by Strong and Meyer (1987). The researchers divided their study into six sections. In the first two, they focused on the considerable flexibility of solutions included in accounting standards that allow company managers to be active in the field of write-offs and capital budgeting in the aspect of IoA. The third part described the financial results of companies that reported IoA in their financial statements between 1981 and 1985. The fourth section indicated, in turn, the determinants of such write-offs. The fifth section of the article focused on the core of that research. Using an event study methodology, the researchers analyzed the impact of IoA on "company shareholder wealth". Their study allowed them to determine the positive impact of the occurrence of IoA on the price formation of issuers' securities. Moreover, the positive impact was also noted before the information was actually released to investors. This suggested some information leak contradicting the existence of semi-strong information efficiency of the capital market in the United States at that time.

In the following years, one could see an increase in interest in the issue by capital market researchers from different parts of the world. Ghicas et al. (1996) analyzed the relationship between the annual returns of companies listed on the Athens Stock Exchange and the tax benefits of the revaluation of fixed assets. The study focused on industrial firms. The authors found that the revaluation of fixed assets had a positive effect on cash flows from operations, but a negative effect on firms' returns from revaluation. Elliott and Hanna (1996) attempted to verify the information content of the IoA (which they called "special items"). In the analysed period, an increase in the number of entities disclosing IoA exceeding 1% of their balance sheet total (5% in 1975, 21% in 1993) was observed. Moreover, they usually occurred in the form of multiple write-offs. The market capitalization of entities was decreasing when they were made available, especially when impairment was reported several times. Choi (2008), on the other hand, based on the data of more than five thousand cases of IoA exceeding 1% of the balance sheet total by South Korean companies, verified the timeliness of recording write-offs. In his opinion, the long-term return on investment in shares of companies reporting impairment depends largely on the timeliness of their disclosures. Moreover, IoA is reported in a less appropriate time relative to the other elements that shape financial performance. Researchers also investigated the market response and the adequacy of the value of information contained in IFRS 1 (Horton and Serafeim 2009). Their study reported statistically significant negative AR for companies smoothing net profit in minus through the use of IoA. They confirm that managers delay

the public disclosure of negative information (such as IoA), which in turn is later met with a much more negative market reaction.

Hamberg et al. (2011) constructed two stock portfolios that differed in the recognition of company value in financial statements. The study involved 226 firms listed on the Stockholm Stock Exchange. They found that IoA affects above-average returns (despite lower earnings). Bowen and Khan (2014), in turn, focused on the reaction of investors in connection with the implementation of IoA in the banking sector in 2008–2009. Their audit was conducted in the context of expanding fair value accounting, which was blamed for the aggravation of the economic crisis. Surprisingly, there was a positive reaction from investors to the information on the decline in the recoverable amount of assets as close to fair value as possible. The results indicate that investors acted as if the potential negative effects of the then existing impairment rules outweighed the benefits of having more timely and transparent measurement-to-market data for decision-making purposes, which is somewhat different from the most common observed results on the market reaction to IoA.

Cheng et al. (2017) surprised with the results of their study on the impact of IoA on returns in both short and long horizons. They stood in opposition to previous studies. They showed AR in the long run (more than 250 days after the announcement of the write-down). According to that, in light of current regulations in the field of company value, investors perceive its update as a positive event in the long term.

With regard to recent studies, a trend can be observed to verify the importance of IoA in the context of the market valuation of the issuers writing it off (e.g., Knauer and Wohrmann 2016; Corona and Randhawa 2018; Iatridis et al. 2021). The researchers mainly point to the timeliness of write-off disclosures and their association with market reaction. In their view, write-offs disclosed later are associated with a significantly more negative market reaction than those communicated to investors without delay.

Additionally, in a research, the implications of the implementation of the mark-to-model fair value measures for asset impairment tests on the relevance and reliability of information presented in financial reports were examined (Dudycz and Praznikow 2021). They concluded that the implementation of asset impairment tests that use the mark-to-model fair value measures is not promising for increasing the quality and reliability of the information presented in financial statements. Furthermore, the capital markets' reaction to asset impairment announcements is negative, like in most previous research studies.

3. Research Methodology

Verification of the importance of updating the entity's asset value will be calculated using the event study methodology. It allows to determine the impact of a certain event on the returns of individual securities (in this case shares). It is a tool used to assess the reaction of investors to the occurrence of a certain event (Lisicki 2021). On the other hand, based on the above conditions, the analysis of events allows us to assess the impact (or lack thereof) of a given piece of information on the market valuation of securities of issuers. The capital market receives a lot of announcements every day. It is important for investors to determine which of them are significant for the future cash flows generated by a listed company. When such an impact is noticed, it will be necessary for the investor to take adjusting actions expressed in price volatility or transaction volume (Gurgul and Wójtowicz 2014).

Currently, the methodology of event study is much more often used to "assess the impact of events on company valuations" (Lakshmi and Joshi 2016) or to enable the investor to properly shape the market valuation based on the latest information (Sorescu et al. 2017). It is thanks to it that it is possible to absolutely assess the impact of changes in the company's policy on its market value.

The methodology of event study has been developed over the years by researchers in the field of finance, which does not exclude the possibility of its application in other areas of social sciences, such as management, economics, and accounting. This justifies its application to the study of the impact of disclosure of information on the IoA on the

market valuation of listed entities on the Warsaw Stock Exchange, which are the subject of these considerations (Geiger et al. 2008). The necessary beginning of the event study is to propose the event whose influence on the market valuation of listed issuers will be examined. Once to determine the subject of the study, it is necessary to identify the subject, i.e., the research sample. It is on its example that the significance (or lack thereof) of a given event (information) on the development of securities prices will be verified. After the identification of the event and the entities on which it will be tested, it seems necessary to present the location and length of the estimation and event windows. In relation to the first of them, it is also necessary to indicate the model on the basis of which the expected return will be estimated. Its estimation together with the calculation of AR in the event window should be the next step of the methodology. The last one includes statistical verification of the obtained results determining the significance of the analyzed event for stock prices (Lakshmi and Joshi 2016).

One of the important steps in the event study methodology is specifying the event window (in this project, identical to the issuer's submission of a report on the write-off) and the estimation window (used to calculate the expected return) allowing to quantify how the market is able to respond to the above-mentioned revision of the asset value.

In the simplest terms, the event window is the time period during which the impact of the event on the market valuation of securities of listed companies is examined. Its length is not constant. On the other hand, in estimation window, model parameters are estimated, which will be used to calculate first the expected return on an adopted period. The expected return is to reflect the "normal" behavior of investors when the market would not receive information about the analyzed event (Corrado and Zivney 2011). Sudarsanam (2003) pointed to the existence of the seven most commonly used models, which he divided into: single-index, market, and portfolio.

After determining the expected return, a researcher using the event study can calculate the AR that is at the core of the described methodology. This task is definitely simpler than using one of the above models for estimating the expected return. The AR is the difference between the actually realized return on the day of the event window and the calculated expected return. In the simplest terms, this is illustrated by the following formula:

$$ARit = Rit - E(Rit) \tag{1}$$

where:

ARit—abnormal return of security *i* in period *t*,
Rit—realized return of security *i* in period *t*,
E(Rit)—expected return of security *i* in period *t*.

The last of the presented stages of the event study methodology includes an assessment of the statistical significance of the calculated AR. The obtained outcome may result from the "standard" price volatility recorded on global capital markets.

4. Results

According to the research hypothesis adopted in the introduction, the announcement of the IoA should have a negative impact on the market reaction of investors during the COVID-19 pandemic in 2020. It will manifest itself in the occurrence of negative AR on shares of issuers listed in the WIG index on the days following the date of announcement of the information about the IoA. To verify the abovementioned hypothesis, it is necessary to find current reports submitted by issuers from the WIG index informing about IoA during the year 2020 (all issuers are mentioned in the Appendix A, Table A1). This year was the first year of existence of the COVID-19 pandemic in worldwide capital markets. For this purpose, it is necessary to use the Electronic Information Transfer System (ESPI), which is the main information system for investors and issuers from WSE.

After obtaining all information regarding impairment of assets in the analyzed period, it will be necessary to follow several stages of the event study methodology. These are the following (Sorescu et al. 2017):

- construction of a database containing information about the publication of current reports concerning IoA of issuers listed on the WSE;
- defining the event and estimation windows in each of the obtained cases;
- calculation for each event of the expected return based on stock quotations from the estimation window and AR later;
- statistical analysis of calculated average AR (AAR);
- conclusions regarding the impact of IoA on the market reaction of indicated issuers listed on the WSE during the COVID-19 pandemic.

Expected returns have been calculated based on the Sharpe single-index model (Sharpe 1963). In favor of its use, apart from the simplicity of calculations and a significant frequency of use in the literature on the subject, above all is the significant reliability compared to more sophisticated econometric models (Armitrage 1995). It was noticed that the subsequent factors used in the econometric models built in the literature have little explanatory significance (MacKinlay 1997). Some limitations of use include, for example, the CAPM model in relation to this market model. The market model is supposed to work properly in the case of a large number of unrelated observations as well as events not concentrated in time (Binder 1998). These properties perfectly reflect the characteristics of announcements of IoA, which somehow justifies the choice of the model for estimating the expected rate of return.

After estimation of the expected return in each case of submitting to investors a current report about IoA, it is necessary to calculate the AR in the event window. For this purpose, a seven-day, symmetrical event window has been constructed for each qualified cases to the research sample. It covered publication day (t_0) and three session days immediately preceding (t_{-3}, t_{-2}, t_{-1}) and following (t_{+1}, t_{+2}, t_{+3}) the disclosure of the information studied. It is also necessary to verify whether on the days immediately preceding the date of publication of the information on the IoA, a kind of information leak to some group of investors could be observed.

From the point of view of the conducted research, it was important to verify whether in the adopted event window, in each of the qualified announcement IoA during the COVID-19 year, there are no disruptive events. The occurrence of such a situation may disrupt the cognitive value of the obtained results.

The last part of the research procedure was the statistical verification of the obtained results. To this end, one of the most popular non-parametric Wilcoxon matched-pairs test (Wilcoxon 1945) (for AAR in each day of event window) and the Cowan Generalized Sign Test (Cowan 1992) (for cumulative abnormal returns—CAR) may be used. Parametric tests, which are more appropriate using the event study methodology, may also be used. For this purpose, however, it is necessary to meet the assumptions of the normality of the distribution of the calculated abnormal returns.

Reviewing the current reports in ESPI of the abovementioned companies in the COVID-19 year 2020, 76 announcements with a reference to the IoA were found. They were provided by 53 issuers, as indicated in Table 1.

Detailing the data on current reports in Table 1, it should be indicated that the first 14 cases refer to the announcing IoA provided by companies grouped in the WIG20 index. Another 10 cases were reported by mWIG40 issuers. The next 18 cases were reported by companies grouped in sWIG80 and the last 34 cases were current reports delivered to investors by companies not grouped in any of the three WSE' main indices but grouped in WIG, the broad market index. It is worth mentioning here that the research sample used for the verification of the research hypothesis consists of all issuers grouped in the WIG index as at the end of February 2020. According to the historical index portfolios after the revision in March 2020, the WIG index consisted of 329 issuers (Appendix A). This is also how many were qualified to examine current reports for the occurrence of IoA.

Table 1. Current reports informing about the impairment of assets submitted by issuers grouped in WIG index in the year 2020.

Issuer/Date (s) of Current Report		Issuer/Date (s) of Current Report	
WIG20		**mWIG40**	
ALIOR	07.08.2020	ENEA	27.10.2020
			11.08.2020
			19.05.2020
			14.02.2020
CCC	21.09.2020	ENERGA	23.07.2020
			19.05.2020
			08.05.2020
			31.03.2020
JSW	28.07.2020	FAMUR	10.02.2020
PGE	31.08.2020	GRUPAAZOTY	25.03.2020
	13.03.2020	**Others**	
	14.02.2020	GETINOBLE	27.08.2020
PGNIG	08.10.2020	PZ CORMAY	04.04.2020
	12.05.2020	ATENDE	24.03.2020
	14.02.2020	ZAMET	22.06.2020
PKNORLEN	04.05.2020	MONNARI	13.02.2020
PZU	25.08.2020	BBIDEV	23.03.2020
TAURONPE	05.08.2020	ASM GROUP	30.09.2020
			30.06.2020
sWIG80		RAFAKO	24.09.2020
AGORA	30.04.2020	ELEKTROTIM	02.06.2020
	17.01.2020	POLWAX	11.09.2020
			21.04.2020
BAH	07.08.2020	MOSTOSTAL WARSZAWA	27.03.2020
BIOTON	10.04.2020	SFINKS	29.09.2020
BOOMBIT	28.02.2020	BUMECH	09.09.2020
BORYSZEW	26.05.2020	HERKULES	21.04.2020
	09.03.2020	MEDIACAP	03.04.2020
DATAWALK	04.09.2020	MAKARONY POLSKIE	02.04.2020
	16.11.2020	FASING	02.04.2020
ELEMENTAL	27.02.2020	ARTIFEX MUNDI	19.03.2020
			29.01.2020
PEP	30.12.2019	LARQ	23.10.2020
			24.04.2020
POLNORD	30.06.2020	BEDZIN	18.06.2020
RAFAKO	24.09.2020	OTMUCHOW	07.05.2020
RAINBOW	27.06.2020	PROTEKTOR	08.01.2020

Table 1. *Cont.*

Issuer/Date (s) of Current Report		Issuer/Date (s) of Current Report	
WIG20		**mWIG40**	
SANOK	06.03.2020	4FUN	25.09.2020
TRAKCJA	18.03.2020		23.04.2020
			28.01.2020
ZEPAK	23.09.2020	WIKANA	28.08.2020
			19.02.2020
	26.03.2020	INC	11.05.2020
		GROCLIN	08.05.2020
		PLAZA CENTERS	31.03.2020
		ATLANTIS	09.07.2020
		FON	09.07.2020
		ELKOP	24.04.2020
			07.02.2020

Source: http://infostrefa.com/infostrefa/pl/index/(accessed on 10–20 May 2021).

The sheer number of releases of current reports dealing with IoA is impressive. In the previous years, far fewer reports of this type were available to WSE investors. This can be seen by comparing the number of analyzed reports in the pandemic year 2020 and earlier years. They are presented in Figure 1.

As mentioned earlier, in 2020, 76 current reports indicated the IoA by issuers grouped in the WIG index reached investors. This compares to 163 cases in the entire six-year period of 2013–2018. The annual average was therefore just over 27 current reports. The frequency of asset IoA reporting in 2020 for the entire study population is thus near two times higher than the average value would indicate. The readings relating to the number of current reports on IoA delivered to investors are significantly higher than the average for each subgroup (WIG20, mWIG40, sWIG80, and others). The biggest difference is noticeable in the case of issuers from sWIG80, which in 2020 provided current report on IoA nearly three times more often than in previous years.

The aim of this study was to verify the reaction of WSE investors to the provision of information about the IoA in the conditions of the COVID-19 pandemic. Therefore, each of the IoA current reports found in 2020 was verified for the occurrence of other events in the days accompanying its publication that could affect the estimation of market reaction. This is because the capital markets currently receive a multitude of news on a daily basis, more than one of which may relate to a particular issuer. When two or more price-forming news arrive in close succession, a researcher using the event study methodology must be aware of the need to isolate the impact of a single event. Otherwise, the results obtained may not carry the expected cognitive value (Krivin et al. 2003).

Among the disruptive events, we can mention those such as: dividend information (Akron 2011), analyst recommendation (Green 2006), block trades (Bian et al. 2012), significant changes in oil price (Reboredo 2015), global economic shocks (Gurgul and Wójtowicz 2014), and so on. The occurrence of such a situation may disrupt the cognitive value of the obtained results. The results could not capture the proper significance of the IoA for the market valuation of biggest issuers listed on the WSE during economic crisis, because in the analyzed event window, investors could be more strongly influenced by information with a different content.

	2013	2014	2015	2016	2017	2018	2020
WIG20	1	4	7	11	6	5	14
mWIG40	2	2	1	5	5	9	10
sWIG80	1	0	3	6	9	10	18
Others Issuers from WIG	1	3	11	16	22	23	34
Total amount of current reports about IoA	5	9	22	38	42	47	76
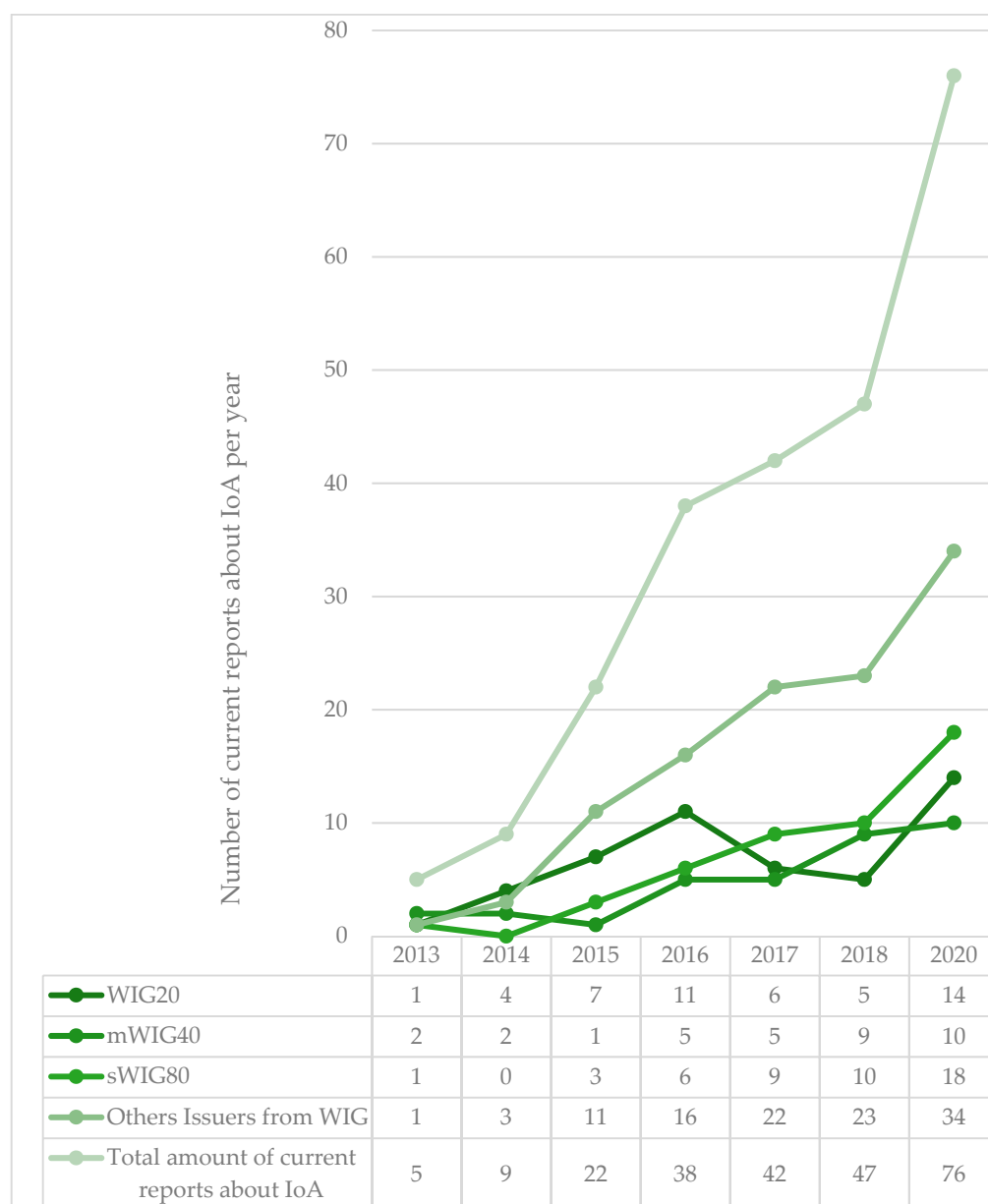
Figure 1. The list of the number of current reports of issuers from the WIG index informing about an impairment of assets in the years 2013–2018 and 2020. Source: own preparation.

Therefore, all 76 cases found were verified for the occurrence of such an event on the days accompanying the release of IoA information to investors. Finally, 55 cases of publications of analyzed current reports were qualified for the research sample; 21 of them had to be rejected due to the occurrence of another event in the event window, which could have a price-determining character.

Table 2 indicates the qualified cases of IoA in the analyzed period, together with the dates on which such information was made public. It also includes information on which group of assets were impaired and the amount of write-off. In the event that the issuer revalued more than one group of assets and it was not possible to indicate which asset was specifically affected, it was decided to create a separate category of write-offs, i.e., "Other". Current reports have been grouped according to the issuers' affiliation to the three largest indices (WIG20, mWIG40 and sWIG80) listed in the broad market index WIG and other issuers (grouped only under WIG).

Table 2. All qualified cases of current reports about impairment of assets submitted by issuers from WIG index in 2020.

Issuer	Date of Current Report	Number of Current Report	Amount of Write-Off (in Million PLN)	Group of Impaired Assets
WIG20				
ALIOR	07.08.2020	37/2020	676	Other
CCC	21.09.2020	61/2020	448.7	Other
JSW	28.07.2020	28/2020	431	Tangible fixed assets
PGE	31.08.2020	25/2020	1012	Other
	13.03.2020	10/2020	7100	Tangible fixed assets
	14.02.2020	5/2020	79	Tangible fixed assets
PGNIG	12.05.2020	18/2020	770	Tangible fixed assets
	14.02.2020	6/2020	837	Other
PZU	25.08.2020	28/2020	1594	Intangible assets
TAURONPE	05.08.2020	37/2020	227	Other
	04.03.2020	5/2020	914	Other
mWIG40				
ENERGA	08.05.2020	39/2020	502	Other
	31.03.2020	26/2020	340	Other
ENEA	27.10.2020	47/2020	254	Long-term investments
	11.08.2020	18/2020	1027	Tangible fixed assets
	19.05.2020	6/2020	53	Long-term investments
GRUPAAZOTY	25.03.2020	17/2020	28.8	Long-term investments
sWIG80				
AGORA	30.04.2020	20/2020	59.5	Long-term investments
	17.01.2020	1/2020	11.2	Long-term investments
BOOMBIT	28.02.2020	6/2020	5.9	Intangible assets
ELEMENTAL	27.02.2020	26/2020	6.06	Other
PEP	30.12.2019	40/2019	16	Long-term investments
POLNORD	30.06.2020	45/2020	52.2	Tangible fixed assets
RAFAKO	24.09.2020	50/2020	166.5	Other
RAINBOW	27.06.2020	25/2020	13.2	Other
SANOK	06.03.2020	2/2020	41.6	Long-term investments
TRAKCJA	18.03.2020	8/2020	252.4	Other
ZEPAK	23.09.2020	45/2020	289	Tangible fixed assets

Table 2. *Cont.*

Issuer	Date of Current Report	Number of Current Report	Amount of Write-Off (in Million PLN)	Group of Impaired Assets
Others				
GETINOBLE	27.08.2020	21/2020	90	Long-term investments
PZ CORMAY	04.04.2020	9/2020	36.98	Intangible assets
ATENDE	24.03.2020	3/2020	3.15	Long-term investments
ZAMET	22.06.2020	8/2020	15.1	Long-term investments
BBIDEV	23.03.2020	6/2020	32.5	Stocks
POLWAX	11.09.2020	29/2020	2.4	Tangible fixed assets
	21.04.2020	10/2020	77.2	Tangible fixed assets
BUMECH	09.09.2020	40/2020	14.2	Other
HERKULES	21.04.2020	20/2020	7.1	Tangible fixed assets
MEDIACAP	03.04.2020	9/2020	2.3	Intangible assets
MAKARONY POLSKIE	02.04.2020	9/2020	2.6	Intangible assets
ARTIFEX MUNDI	19.03.2020	10/2020	11.4	Intangible assets
	29.01.2020	4/2020	3.9	Intangible assets
BEDZIN	18.06.2020	13/2020	104	Other
OTMUCHOW	07.05.2020	9/2020	5.1	Tangible fixed assets
PROTEKTOR	08.01.2020	1/2020	1.93	Investment estates
4FUN	25.09.2020	22/2020	6.98	Long-term investments
	23.04.2020	10/2020	7.7	Long-term investments
	28.01.2020	4/2020	3.2	Long-term investments
WIKANA	28.08.2020	24/2020	2.1	Tangible fixed assets
	19.02.2020	9/2020	4.6	Tangible fixed assets
INC	11.05.2020	10/2020	3.1	Long-term investments
GROCLIN	08.05.2020	7/2020	16.05	Other
ATLANTIS	09.07.2020	5/2020	12.9	Long-term investments
FON	09.07.2020	21/2020	15.3	Long-term investments
ELKOP	24.04.2020	15/2020	1.7	Long-term investments
	07.02.2020	7/2020	7.4	Investment estates

Source: own preparation based one the current reports by issuers available at: http://infostrefa.com/infostrefa/pl/index/ (accessed on 10–20 May 2021).

The next steps of the event study methodology involved the estimation of expected returns (using Sharpe single-index model) and calculation of AR for each of the 55 qualified cases of current reports about IoA. Model parameters in estimation window were calculated

using the least squares method. The estimation window has been set to 30 session days before the seven-day event window. It started from day t_{-34} to day t_{-5}. The return on the market portfolio was calculated using the WIG quotations. As mentioned above, for each qualified current reports, the calculation of AR took place in seven-day, symmetrical event window between days t_{-3} to t_{+3} and also CAR, which is a sum of seven single ARs in event window. Their cross section average values are presented in Table 3.

Table 3. Cross-section analysis of AAR for each qualified case of reporting IoA by issuers from the WIG index in year 2020 (in percentage point).

Issuers/Day of Event Window	T_{-3}	t_{-2}	T_{-1}	t_0	t_{+1}	t_{+2}	t_{+3}	CAR
All qualified Issuers (55)	−0.09	0.14	−0.50	0.00	−0.65	0.33	−0.58	1.04
WIG20, mWIG40, sWIG80 Issuers (28)	−0.23	0.77	0.07	0.31	−0.76	0.68	0.20	1.04
WIG20 Issuers (11)	0.13	−0.02	0.10	−1.96 **	−0.99	1.80	−0.01	−0.95
mWIG40 Issuers (6)	−0.17	0.89	0.27	0.83	0.25	−1.07	−1.60 *	−0.60
sWIG80 Issuers (11)	−0.63	1.48	−0.07	2.30	−1.09	0.52	1.40	3.92
Other Issuers (27)	0.07	−0.51	−1.10	−0.33	−0.53	−0.03	−1.40	−3.83

** statistical significance at level $p < 0.01$. * statistical significance at level $p < 0.05$. Source: own calculation.

In order to confirm the results of the study, it was necessary to conduct a statistical test verifying their significance. One of the most obvious tests that can verify the rejection of the null hypothesis in favor of the alternative (indicating the impact of the event on the market valuation on day t) is the average excess returns test, based on the t-Student statistics (Conventional Cross-Sectional *t*-Test) (Gurgul and Wójtowicz 2014). The necessary condition for its conduct, however, is the fulfillment of the assumption that the distribution of the studied sample is normal.

For this purpose, one of the most popular tests verifying the existence of a normal distribution of the examined variables was used, which was the Shapiro–Wilk *t*-test (Shapiro and Wilk 1965). The obtained value of the W test statistic for ARs was 0.4351 and was lower than the stabilized test value for the indicated number of observations. Therefore, it became necessary to use a non-parametric test.

Therefore, the results from the statistical verification of obtained results (by using non-parametric Wilcoxon matched-pairs test for each AAR and Cowan Generalized Sign Test designed for CAR) were added to Table 3. Detailed ARs for each qualified case are attached in Appendix B, Table A2. The number of qualified cases in each group is added in brackets.

As can be observed in Table 3 above, the market response for all qualifying IoA cases was negligible. The lowest AAR was recorded on the day t_{+1} (on the next trading day after the release of the current report) and was −0.65 percentage points. However, critically important to the results of the study, this AAR was not statistically significant as was the AAR from each remaining day of the event window. Statistical significance could not be seen for CAR either. The lowest AAR on day t_0 was recorded among the twenty largest issuers listed on the WSE and on the day t_{+3} in the group of mWIG40 issuers. Moreover, these rates are statistically significant. This could indicate that the IoA in the era of the COVID-19 pandemic does not cause the negative market reaction that was observed in previous years. Such a reaction can only be observed in relation to the sixty largest issuers grouped in the WIG20 and mWIG40 indices. However, it is important to note that this reaction took place only on one of the days of the analysed event window and concerned a narrow research group (11 cases of IoA for WIG20 and 6 cases for mWIG40, respectively).

Moreover, no statistical significance of AAR can be observed in any of the cases presented in the table in the days preceding the day when the IoA current report was made available to investors. This should be understood as the absence of a privileged

group of investors who would have access to price-making information before the rest of the market. This phenomenon should be viewed positively in the context of possible information asymmetry in the capital market, which could be exacerbated in the conditions of the COVID-19 pandemic.

CAR does not show statistical significance either. However, we should note the significantly higher (sWIG80 issuers) and lower (other issuers) CAR, respectively. Perhaps further analysis of the successive IoA emerging in 2021 will allow us to find more detailed correlations between them and the reaction of investors allocating their capital on the WSE.

In order to compare whether the observed lack of a clearly negative market reaction to IoA among issuers from the WIG index during the pandemic year 2020 is due to the instability on the capital markets caused by the pandemic, or the specificity of the WSE, it was decided to repeat the study for the same companies. The only difference was the research period, which covered the years 2013–2018, i.e., before the outbreak of the COVID-19 pandemic. The test sample included the same companies as in the original study. In the analyzed test period, 87 cases of IoA announcements submitted by issuers grouped in the broad market index WIG were found and finally qualified for the test sample. The market model was used to calculate the AR, as for 2020. The estimation window has been set also to 30 session days before the seven-day event window. It started from day t_{-34} to day t_{-5}. The return on the market portfolio was calculated using the WIG quotations as well. The statistical significance of the obtained results was also verified using the non-parametric Wilcoxon signs test and Cowan Generalized Sign Test. The research results are presented in Table 4 below.

Table 4. Cross-section analysis of AAR for each qualified case of reporting IoA by issuers from the WIG index in years 2013–2018 (in percentage point).

Issuers/Day of Event Window	t_{-3}	t_{-2}	t_{-1}	t_0	t_{+1}	t_{+2}	t_{+3}	CAR
All qualified Issuers (87)	0.08	−0.06	0.03	−0.71 *	−1.05 **	0.34	0.21	−1.16
WIG20, mWIG40, sWIG80 Issuers (49)	−0.11	−0.56	0.06	−0.31	−0.98 *	0.73	0.22	−0.96
WIG20 Issuers (16)	−0.59	−0.17	−0.29	0.61	−0.36	1.06 *	−0.09	0.17
mWIG40 Issuers (12)	−0.48	−1.06 *	0.15	−0.08	−0.01	0.93	0.34	−0.21
sWIG80 Issuers (21)	0.48	−0.58	0.27	−1.14 **	−2.02 **	0.37	0.39	−2.24
Other Issuers (38)	0.31	0.59	−0.01	−1.24 **	−1.13 **	−0.16	0.20	−1.43

** statistical significance at level $p < 0.01$. * statistical significance at level $p < 0.05$. Source: own calculation.

Based on the ARs for the years 2013–2018 calculated in the table, it can be clearly stated that the short-term market reaction to the IoA announcement was negative. It was characterized by the presence of statistically significant AR on day t_0 ($p < 0.05$) and on day t_{+1} ($p < 0.01$). In addition, the calculated AR on those days were significantly lower than those for 2020. These results are in line with the research results achieved by previous researchers exploring foreign markets.

Moreover, when analyzing the obtained results more cross-sectionally, it can be noticed that the strongest negative market reaction was recorded in relation to companies listed in the sWIG80 index and those not grouped in any of the three main WSE indices. (AR statistical significance on day t_0 and t_{+1} $p < 0.01$). The lack of investors' response to similar information in 2020 allows the conclusion to be drawn that the market conditions caused by the COVID-19 pandemic significantly weakened the short-term response of investors from the WSE to the information about IoA. Those in an environment of increased volatility in the markets do not believe that the reduction of the expected benefits from the asset component through the implementation of IoA is a factor that should be seen as a determinant of a short-term downward correction of the market valuation of WSE issuers.

5. Discussion

The research presented in the theoretical part of this article shows the price-making character of the information about the issuer's IoA. The reaction of investors to the release of such news on global stock exchanges varied, but based on most of the cited examples, we can conclude its negative impact on the formation of securities prices (Hamberg et al. 2011; Fernandes et al. 2016; Knauer and Wohrmann 2016, among others). Therefore, the main motivation of the study was an attempt to quantify the importance of the IoA in the realities of the Polish capital market under the conditions of the occurrence of the economic downturn caused by the COVID-19 pandemic. Thus, the aim of the study was to verify whether the negative market reaction to the IoA noted in previous studies on global markets will also be noticed during the negative sentiment to risky securities. Issuers listed in the WIG broad market index were used as samples in this study. The present study was intended to help recognize the relationship between asset recoverable value reduction and the market reaction that was observed, and thus provide a seed for its verification in other global capital markets.

The main hypothesis is verified negatively. This is because no statistically significant AR was observed on any of the event window days examined to suggest an above-average market reaction to the IoA news. These results stand in opposition to the research results of the majority of researchers exploring this issue in the global capital markets since the 1980s (Elliott and Shaw 1988; Zucca and Campbell 1992; Alciatore et al. 2000; Jarva 2009; AbuGhazaleh et al. 2012; Bowen and Khan 2014; Lisicki 2021). Especially the last of the cited items describing comprehensively the importance of IoA for the market valuation of companies from the main market of the Warsaw Stock Exchange in the period 2013–2018 allowed to define the importance of such information sharing as negative (Lisicki 2021). In the research sample of 129 cases of IoA from the six-year research period (in which de facto capital market turbulence was not as significant as in 2020), on the day the current report on asset impairment was made available, the average AR was -0.74 percentage points (statistically significant at the $p < 0.01$ level using Wilxocon's paired rank order test). In addition, on the day following the release of the report, the average AR was -0.97 percentage points (statistical significance at the $p < 0.01$ level). These results were significantly lower than those obtained in this study, in which the AR on the day t_0 was 0.00 percentage points, and on t_{+1} -0.65, and were not characterized by statistical significance. The current report of the IoA was discounted by the market on the day of the report and the following day in previous years. The market reaction was negative, which was not observed in the pandemic of 2020. During the COVID-19 pandemic, the market seemed to disregard this type of information. These results are strongly unexpected. Similar results were observed in the "results" section when the research sample was narrowed down to the issuers grouped in the WIG index only (as in the case of the research in the COVID-19 pandemic year). As well, in this case, there was a short-term negative market reaction to the information about IoA.

The obtained results are also different in relation to the study conducted by Bowen and Khan (2014), who have so far attempted to establish the influence of IoA on investors' reaction in times of instability in the capital markets' crisis met with a positive reception by investors. The valuation of companies' assets at the value as close to fair value as possible was more important for the market than reducing future benefits to gain from them. These results were somewhat surprising compared to most previously carried out. In reference to them, it could be expected that such a market anomaly would be observed in the WSE. However, a similar reaction was also not recorded in the case of investors from the WSE during the pandemic year 2020. The market did not show major changes in the days accompanying the announcement of the IoA information, which should be seen as a kind of curiosity worth exploring in the following years. Moreover, the negative market reaction is not noticeable even when the vast majority of the write-offs qualified in the research sample were characterized by a significant value (exceeding 1% of the issuer's total assets). In such cases, it was pointed to a much stronger market reaction (Grabiński 2011; Lisicki

2021) than in the case of write-offs of insignificant amount. In the year of the spread of the COVID-19 pandemic, it was impossible to see a similar negative market reaction, even when issuers significantly reduced the recoverable value of their assets.

The interesting finding of this paper that coincides with the findings of earlier researchers (e.g., Laghi et al. 2013; Fernandes and Gonçalves 2014) is that there is a stronger negative market reaction when larger issuers (with a higher level of market capitalization) release a current report on IoA. However, these results need to be confirmed on a larger research sample, which will only be possible after more months of pandemic.

6. Conclusions

The main purpose of this paper was an examination the capital market reaction (on the example of WSE) to the information provided by the issuers, in the form of a current report on IoA. The research contribution to the state of knowledge in the field of the implemented paper is an attempt to verify how the market will react to such information in a situation when the specter of a serious economic crisis hangs over it, which was caused by the pandemic of COVID-19 during in 2020.

Finding from the abovementioned references by issuers listed on the WSE, 55 cases of IoA announcements were finally qualified to the research sample. For each of them, a seven-day symmetrical event window was constructed, covering the day of publishing information about the IoA and three days preceding and following that day. The obtained research results, verified with the non-parametric tests, demonstrated no statistical significance of the AAR for each of the analyzed days of the event window, except for two cases: WIG20 day t_0 and mWIG40 day t_{+3}. Unfortunately, a statistically significant market reaction in these cases was related to a very small research sample.

Based on the lack of statistical significance of the vast majority of obtained results, the main hypothesis adopted at the beginning of this study should be rejected. However, the lack of statistically significant AR on the days following the disclosure of information on impairment of assets allows to indicate a different market reaction in the conditions of the economic crisis caused by COVID-19 as compared to the one observed in previous years.

Lack of market reaction about current reports informing about IoA is somewhat surprising. During the COVID-19 pandemic, investors may discount many different negative informations from the environment and ignore absolutely negative information regarding the reduction of recoverable amount of issuers' assets. The situation is unexpected because, in the previous years, there was a negative reaction of WSE investors to IoA (Lisicki 2021). This fact manifested itself in the occurrence of statistically significant negative AAR on the day of publishing the current report about IoA and on the following day. It can therefore be assumed that the COVID-19 pandemic made investors be much less sensitive to other (than about COVID-19) information on the market.

The research undertaken in this article allows world researchers to consider the possible occurrence of a different market reaction (or its complete absence) to the upcoming to the capital markets information during the COVID-19 pandemic. The obtained results constitute a certain contradiction of the research results obtained by previous researchers. For this reason, they should be treated as a type of invitation for further scientific exploration. Nevertheless, at this point, some limitations of the study should be pointed out, which were a significant reduction of the study sample (from 76 to 55 cases) due to the presence of coexisting events in the event window. However, an author using the event analysis methodology must always take such a situation into account.

The obtained results may constitute the basis for undertaking research on the verification of investors' sentiment towards particular data (not only on the WSE), which may have changed in the difficult economic conditions in which we operate. The results of the article may be of interest to stock market analysts, investment advisers, stockbrokers, managers, members of supervisory boards, investors (institutional and individual), and researchers in the field of capital markets research in accounting.

An interesting issue may also be an attempt to verify the market reaction to the announcement of financial results during a COVID-19 pandemic years. The results of that study may indicate that the expected reaction of investors (increase in market valuation/decline in market valuation of shares) to companies' results that differ from the market consensus may be other than that observed in normal world economies. In times of pandemic, the market does not have to react in direct proportion, which would be an interesting issue to be verified.

Data Availability Statement: Data available in a publicly accessible repository that does not issue DOIs: http://infostrefa.com/infostrefa/en/index/ and https://stooq.com/ (both accessed on 10–20 May 2021).

Conflicts of Interest: The author declares no conflict of interest.

Appendix A

Table A1. Composition of the WIG index (after revision on 20 March 2020).

Company Name	Share (%)	Company Name	Share (%)	Company Name	Share (%)	Company Name	Share (%)
PKOBP	10.0000	SELVITA	0.1083	RONSON	0.0184	SIMPLE	0.0062
PZU	8.2109	ATAL	0.0959	OEX	0.0180	MEDIACAP	0.0062
CDPROJEKT	7.7984	CPGROUP	0.0896	MONNARI	0.0175	BUMECH	0.0059
PKNORLEN	7.0473	VIGOSYS	0.0877	EKOEXPORT	0.0171	ESOTIQ	0.0055
PEKAO	6.4563	BOGDANKA	0.0791	SONEL	0.0169	GRODNO	0.0055
KGHM	4.0007	POLICE	0.0790	BIOMEDLUB	0.0166	TALANX	0.0053
LPP	3.7467	KOGENERA	0.0753	ORZBIALY	0.0163	PRAGMAINK	0.0053
SANPL	3.4627	PHN	0.0721	ULTGAMES	0.0163	ARTERIA	0.0053
CYFRPLSAT	2.8845	OPONEO.PL	0.0697	BBIDEV	0.0163	MAKARONPL	0.0052
DINOPL	2.8262	BSCDRUK	0.0669	SYGNITY	0.0163	CAPITAL	0.0051
INGBSK	2.4720	TIM	0.0666	AILLERON	0.0161	SFINKS	0.0050
PGNIG	2.1399	RAINBOW	0.0663	WARIMPEX	0.0160	OTMUCHOW	0.0050
LOTOS	2.1395	VOXEL	0.0663	ODLEWNIE	0.0159	TOWERINVT	0.0050
ORANGEPL	1.6607	DATAWALK	0.0659	LOKUM	0.0156	ATLANTAPL	0.0049
MBANK	1.6103	AMBRA	0.0652	RAFAKO	0.0156	SWISSMED	0.0049
PGE	1.4808	BOS	0.0623	IMMOBILE	0.0153	NORTCOAST	0.0049
PLAY	1.4514	MANGATA	0.0595	EUROTEL	0.0151	IFIRMA	0.0049
KETY	1.4482	ATMGRUPA	0.0585	KREC	0.0151	INTROL	0.0048
ASSECOPOL	1.4100	OVOSTAR	0.0573	VINDEXUS	0.0150	AIRWAY	0.0048
MILLENNIUM	1.2146	DEBICA	0.0563	ASMGROUP	0.0147	MEXPOLSKA	0.0047
AMREST	1.2048	ZEPAK	0.0558	CITYSERV	0.0145	ERG	0.0046
KRUK	0.9803	KRUSZWICA	0.0545	ZUE	0.0143	PEMANAGER	0.0046

Table A1. *Cont.*

Company Name	Share (%)	Company Name	Share (%)	Company Name	Share (%)	Company Name	Share (%)
CCC	0.8352	R22	0.0537	SERINUS	0.0141	BEDZIN	0.0046
BUDIMEX	0.8294	PCCROKITA	0.0528	IPOPEMA	0.0137	REMAK	0.0046
KERNEL	0.8203	ELEMENTAL	0.0480	PGO	0.0136	I2DEV	0.0045
ALIOR	0.7759	CORMAY	0.0478	LENA	0.0136	EUCO	0.0045
HANDLOWY	0.7198	MCI	0.0463	COGNOR	0.0134	PROTEKTOR	0.0044
GTC	0.7074	LENTEX	0.0457	LSISOFT	0.0131	ENAP	0.0044
INTERCARS	0.6805	ARCHICOM	0.0455	FEERUM	0.0131	GLCOSMED	0.0044
EUROCASH	0.5867	UNIBEP	0.0454	RELPOL	0.0131	K2INTERNT	0.0043
ENERGA	0.5859	ASBIS	0.0450	MORIZON	0.0130	NTTSYSTEM	0.0041
WIRTUALNA	0.5531	POLIMEXMS	0.0448	TRANSPOL	0.0129	MAXCOM	0.0041
BENEFIT	0.5508	ENELMED	0.0445	ELBUDOWA	0.0126	ALTA	0.0041
ENEA	0.4984	WIELTON	0.0441	ELEKTROTI	0.0123	SANTANDER	0.0040
TAURONPE	0.4773	TOYA	0.0436	POZBUD	0.0121	SUNEX	0.0038
DEVELIA	0.4689	INSTALKRK	0.0434	MOSTALZAB	0.0121	APSENERGY	0.0037
BNPPPL	0.4326	IMCOMPANY	0.0426	BOOMBIT	0.0118	ATLASEST	0.0037
GPW	0.4297	ASTARTA	0.0414	IZOSTAL	0.0118	HELIO	0.0037
COMARCH	0.4135	PGSSOFT	0.0413	ADIUVO	0.0118	WORKSERV	0.0036
GRUPAAZOTY	0.3958	BIOTON	0.0410	IDEABANK	0.0117	INTERFERI	0.0035
TSGAMES	0.3796	TORPOL	0.0409	PROJPRZEM	0.0115	INC	0.0035
CIECH	0.3747	PEKABEX	0.0408	CNT	0.0115	INTERSPPL	0.0035
ECHO	0.3465	ARCTIC	0.0399	DEKPOL	0.0112	KRVITAMIN	0.0033
11BIT	0.3406	DECORA	0.0396	IMPEL	0.0112	WOJAS	0.0033
MOL	0.3309	RAWLPLUG	0.0396	SILVAIR-REGS	0.0108	TBULL	0.0032
FAMUR	0.3262	POLNORD	0.0390	FERRUM	0.0105	GROCLIN	0.0032
DOMDEV	0.3148	ERBUD	0.0384	MIRACULUM	0.0104	MWTRADE	0.0032
JSW	0.2961	GETIN	0.0377	APLISENS	0.0103	VISTAL	0.0032
ASSECOSEE	0.2957	ZPUE	0.0339	TESGAS	0.0103	4FUNMEDIA	0.0032
UNICREDIT	0.2832	SECOGROUP	0.0334	IZOBLOK	0.0102	PATENTUS	0.0031
ASSECOBS	0.2618	QUERCUS	0.0323	DELKO	0.0102	WIKANA	0.0029
LIVECHAT	0.2452	MERCATOR	0.0320	ELZAB	0.0101	BRASTER	0.0028
AMICA	0.2346	MEDICALG	0.0320	VIVID	0.0097	PAMAPOL	0.0028
CLNPHARMA	0.2332	ATENDE	0.0304	PROCHEM	0.0096	TALEX	0.0027
VRG	0.2238	PANOVA	0.0297	SKOTAN	0.0096	BETACOM	0.0026
NEUCA	0.2204	OAT	0.0284	MOSTALWAR	0.0094	SUWARY	0.0026
MENNICA	0.2046	ULMA	0.0278	OPTEAM	0.0092	MOSTALPLC	0.0025
CEZ	0.2021	XTB	0.0277	RANKPROGR	0.0091	FON	0.0024
NEWAG	0.1915	KINOPOL	0.0271	WASKO	0.0089	RAFAMET	0.0024
FORTE	0.1902	CIGAMES	0.0270	SEKO	0.0088	BOWIM	0.0024
WAWEL	0.1818	UNIMOT	0.0266	KGL	0.0087	ELKOP	0.0023

Table A1. *Cont.*

Company Name	Share (%)	Company Name	Share (%)	Company Name	Share (%)	Company Name	Share (%)
APATOR	0.1744	INTERAOLT	0.0262	MASTERPHA	0.0087	SOLAR	0.0023
AGORA	0.1728	SELENAFM	0.0251	CELTIC	0.0083	PRAGMAFA	0.0022
PEP	0.1725	MERCOR	0.0247	ROPCZYCE	0.0082	ZREMB	0.0020
ALUMETAL	0.1682	MARVIPOL	0.0233	BIK	0.0082	EDINVEST	0.0020
RYVU	0.1597	MFO	0.0232	SETANTA	0.0081	TRITON	0.0020
NETIA	0.1580	TRAKCJA	0.0232	MDIENERGIA	0.0081	ATREM	0.0019
PKPCARGO	0.1577	INPRO	0.0225	PHARMENA	0.0080	EFEKT	0.0019
SNIEZKA	0.1515	SKARBIEC	0.0223	OTLOG	0.0077	ATLANTIS	0.0019
BORYSZEW	0.1435	STALPROFI	0.0221	LIBET	0.0076	KPPD	0.0019
SANOK	0.1417	HYDROTOR	0.0211	BAHOLDING	0.0075	WADEX	0.0018
MABION	0.1402	SYNEKTIK	0.0211	PEPEES	0.0075	TATRY	0.0016
PLAYWAY	0.1387	LUBAWA	0.0210	POLWAX	0.0073	PLAZACNTR	0.0013
ACAUTOGAZ	0.1386	XTPL	0.0206	IIAAV	0.0072	EUROHOLD	0.0006
ENTER	0.1384	IMS	0.0202	CDRL	0.0070	PROVIDENT	0.0003
MLPGROUP	0.1327	ALTUSTFI	0.0201	SILVANO	0.0070	MBWS	0.0003
AUTOPARTN	0.1294	VOTUM	0.0200	PLASTBOX	0.0069	NOVATURAS	0.0003
FERRO	0.1267	KRKA	0.0197	HERKULES	0.0069	FENGHUA	0.0002
COMP	0.1262	MIRBUD	0.0196	ARTIFEX	0.0068	AUGA	0.0002
STALPROD	0.1219	RADPOL	0.0192	FASING	0.0068	SOPHARMA	0.0000
STALEXP	0.1197	ZAMET	0.0192	PRAIRIE	0.0063		
PBKM	0.1123	WITTCHEN	0.0190	LARQ	0.0063		
ABPL	0.1089	MLSYSTEM	0.0189	AGROTON	0.0062		

Source: own preparation based one the https://gpwbenchmark.pl/en-historyczne-portfele (accessed on 10–20 May 2021).

Appendix B

Table A2. Individual AR for each qualified case of reporting IoA by issuers from the WIG index in the year 2020 (in percentage point).

Issuers/Day of Event Window	Date of Current Reports	t_{-3}	t_{-2}	t_{-1}	t_0	t_{+1}	t_{+2}	t_{+3}	CAR
WIG20									
PZU	25.08.2020	0.45%	0.52%	0.33%	−0.10%	−1.50%	0.15%	−0.22%	−0.37%
PGNIG	12.05.2020	1.53%	−0.84%	−1.13%	0.25%	−0.95%	0.95%	−1.41%	−1.59%
	14.02.2020	2.18%	0.53%	0.74%	−0.85%	2.54%	1.04%	0.76%	6.93%
PGE	31.08.2020	−3.99%	0.09%	3.12%	−2.63%	−0.14%	1.10%	1.15%	−1.30%
	13.03.2020	2.77%	−0.56%	−1.70%	−5.64%	8.16%	11.73%	−1.98%	12.79%
	14.02.2020	2.77%	−1.27%	−3.04%	−1.12%	−0.86%	−0.86%	−1.98%	−6.36%
CCC	21.09.2020	−2.81%	−1.66%	5.43%	−0.59%	−6.10%	2.22%	−2.61%	−6.11%
ALIOR	07.08.2020	3.09%	1.85%	−0.58%	−1.87%	−0.30%	8.14%	−0.52%	9.80%
TAURONPE	05.08.2020	−2.63%	−2.28%	−0.77%	−5.49%	−1.57%	−3.39%	−1.86%	−17.99%
	04.03.2020	0.49%	3.51%	1.05%	−0.47%	−0.93%	2.21%	2.35%	8.20%
JSW	28.07.2020	−2.39%	−0.09%	−2.40%	−3.06%	−9.24%	−3.50%	6.23%	−14.45%

Table A2. *Cont.*

Issuers/Day of Event Window	Date of Current Reports	t_{−3}	t_{−2}	t_{−1}	t₀	t₊₁	t₊₂	t₊₃	CAR
				mWIG40					
ENERGA	08.05.2020	0.26%	−0.90%	1.20%	−1.12%	0.11%	−3.02%	−0.16%	−3.63%
	31.03.2020	4.44%	4.47%	−1.09%	2.04%	1.32%	−0.27%	−0.48%	10.44%
ENEA	27.10.2020	0.31%	−0.83%	1.40%	−1.27%	5.61%	−2.50%	−1.57%	1.16%
	11.08.2020	−2.08%	−0.36%	1.39%	1.86%	−1.07%	0.52%	−2.26%	−2.00%
	19.05.2020	1.35%	−0.94%	−0.78%	3.27%	−2.12%	−0.97%	−2.81%	−2.99%
GRUPA AZOTY	25.03.2020	−5.32%	3.90%	−0.49%	0.21%	−2.34%	−0.20%	−2.33%	−6.57%
				sWIG80					
AGORA	30.04.2020	0.36%	−0.54%	−2.47%	5.93%	2.02%	0.96%	0.50%	6.76%
	17.01.2020	8.16%	1.42%	−0.10%	−0.44%	−2.37%	2.32%	−0.62%	8.37%
PEP	30.12.2019	−2.33%	−1.30%	0.23%	−0.60%	−0.86%	2.30%	−1.47%	−4.03%
SANOK	06.03.2020	−7.75%	2.73%	0.97%	4.64%	2.91%	8.74%	1.41%	13.66%
RAINBOW	27.06.2020	−0.99%	−3.84%	−2.16%	−7.16%	−4.88%	5.49%	−0.04%	−13.59%
ELEMENTAL	27.02.2020	−7.53%	4.73%	−6.10%	−1.71%	−16.03%	11.49%	8.10%	−7.05%
ZEPAK	23.09.2020	2.40%	−0.45%	0.26%	2.93%	−1.42%	0.23%	−0.37%	3.57%
POLNORD	30.06.2020	−1.48%	−2.17%	0.23%	4.80%	−3.14%	−3.04%	−1.06%	−5.87%
TRAKCJA	18.03.2020	0.42%	11.47%	1.74%	8.16%	−2.85%	1.67%	2.07%	22.68%
RAFAKO	24.09.2020	1.70%	1.20%	−0.98%	−0.42%	5.01%	−8.24%	−0.67%	−2.40%
BOOMBIT	28.02.2020	0.06%	3.06%	7.62%	9.23%	9.63%	−16.19%	7.55%	20.97%
				Others					
Getinoble	27.08.2020	−1.44%	1.01%	−0.42%	−0.09%	−0.11%	2.56%	0.47%	1.98%
Cormay	04.04.2020	−0.22%	5.12%	5.12%	−13.92%	−13.08%	−6.64%	−10.29%	−33.90%
Atende	24.03.2020	10.89%	−12.52%	6.52%	7.95%	−8.15%	0.47%	−0.46%	4.70%
Zamet	22.06.2020	−0.67%	5.78%	−0.09%	−1.65%	−4.62%	0.28%	0.97%	0.00%
BBIDEV	23.03.2020	9.40%	−3.22%	2.41%	4.11%	−10.15%	−1.59%	−3.56%	−2.60%
Polwax	11.09.2020	3.58%	4.71%	−1.88%	0.31%	2.20%	1.82%	−1.75%	8.99%
	21.04.2020	−0.60%	−1.52%	0.87%	−1.54%	−1.90%	−3.80%	2.26%	−6.23%
Bumech	09.09.2020	−0.91%	11.49%	−3.18%	−1.54%	−3.56%	−0.34%	3.22%	5.18%
Herkules	21.04.2020	2.12%	−5.23%	0.48%	2.53%	−3.33%	−0.22%	1.89%	−1.76%
Mediacap	03.04.2020	−4.35%	0.33%	−11.98%	5.45%	21.57%	−4.74%	1.88%	8.16%
Makarony Polskie	02.04.2020	−0.92%	2.31%	2.33%	−2.96%	−3.09%	0.31%	0.43%	−1.60%
Artifex Mundi	19.03.2020	2.55%	−9.90%	−0.15%	−12.61%	−1.15%	9.10%	−5.08%	−17.23%
	29.01.2020	−3.63%	2.46%	1.65%	0.21%	−3.52%	1.20%	0.07%	−1.56%
Bedzin	18.06.2020	8.14%	−1.75%	−6.04%	−0.08%	23.93%	5.26%	−5.48%	23.98%
Otmuchow	07.05.2020	−12.23%	0.37%	−2.06%	−2.06%	0.30%	−0.17%	−3.18%	−19.03%
Protektor	08.01.2020	−0.77%	−1.24%	−5.38%	4.91%	2.73%	−0.28%	−2.88%	−2.92%
4FUN	25.09.2020	−1.07%	0.58%	2.95%	0.42%	−9.64%	2.56%	−3.16%	−7.36%
	23.04.2020	−1.74%	−4.47%	−1.15%	−0.94%	3.15%	−2.42%	−0.35%	−7.92%
	28.01.2020	−0.44%	−0.71%	−2.25%	0.05%	−5.63%	−0.67%	0.59%	−9.07%
Wikana	28.08.2020	0.34%	−0.06%	1.36%	−0.14%	−0.22%	−0.18%	2.86%	3.96%
	19.02.2020	−3.72%	−0.29%	−2.66%	−2.60%	−0.41%	−1.56%	−2.18%	−13.43%

Table A2. *Cont.*

Issuers/Day of Event Window	Date of Current Reports	t_{-3}	t_{-2}	t_{-1}	t_0	t_{+1}	t_{+2}	t_{+3}	CAR
INC	11.05.2020	−4.39%	−1.86%	1.73%	2.53%	−5.04%	5.82%	−0.64%	−1.84%
Groclin	08.05.2020	−2.62%	0.94%	−2.09%	−2.08%	−2.15%	−6.55%	0.36%	−14.18%
Atlantis	09.07.2020	−2.04%	−0.54%	−0.43%	−3.60%	4.09%	0.25%	0.00%	−2.27%
FON	09.07.2020	−4.79%	2.99%	−1.55%	0.89%	7.13%	−0.40%	−1.35%	2.91%
Elkop	24.04.2020	1.65%	−5.61%	−3.25%	2.24%	−2.36%	0.15%	−4.65%	−11.83%

Source: own calculation.

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