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The January Effect in the Time of the Pandemic and the Post-Pandemic Economic Reality – Case of the Warsaw Stock Exchange

Keywords: stock exchanges; efficient market hypothesis; calendar anomalies; January effect; event study

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Abstract

Theoretical background: One of the market anomalies is the so-called "January effect", which involves mass purchases of securities triggered by replenishing investment portfolios at the beginning of the calendar year. The January effect is associated with the end-of-year sale of securities whose valuations brought a loss to investors. In the new year, investors re-purchase securities that they consider undervalued (which were sold at the end of the year). More recently, studies into this group of anomalies (including the January effect) can be seen to undertake consideration of their occurrence from the point of view of the impact of the COVID-19 pandemic and the post-pandemic economic reality. In these years have seen periods of historically high readings of the market volatility. Situations of heightened uncertainty in the markets create motivations for scientific exploration that can be used to discover new correlations (or confirm existing ones) taking place in global capital markets.

Purpose of the article: The aim of the paper is to verify the occurrence of one of the most common market anomalies, the January effect, in the time of the pandemic and the post-pandemic economic reality (2020–2024). During this time, markets faced two "black swans" in the form of the COVID-19 pandemic

and the outbreak of war in Ukraine. This period was characterized by increased uncertainty (volatility), which could be noted, for example, by analysing the readings of the VIX index ("CBOE volatility index").
Research methods: Based on the event study and the index of the measure of implied price volatility (VIX index), the January effect was verified in the time of the pandemic and the post-pandemic economic reality. The study was conducted on a group of 18 indices of the main market of the WSE (WIG20, mWIG40, sWIG80, sector indices, WIG-DIV, WIG-ESG).
Main findings: The study found that above-average volatility was recorded in the month of January in the years 2020–2022. However, the January effect occurred in only one of these years (2021). In the remaining years (2020 and 2022), no statistical significance in the calculated average abnormal returns was recorded. Moreover, in 2022 these returns were negative, which is in contrast to previous observations made as part of the January effect. Thanks to the research results, certain implications can be drawn for participants of the WSE. Based on the presented sample of 18 indices, it can be seen that the calendar anomalies described earlier do not necessarily have to apply in periods of above-average uncertainty. Therefore, it is necessary to encourage investors to be careful when investing their funds on the WSE and other capital markets.

Introduction

Tempted by the prospect of profits greater than the average return in the market (Kahneman & Tversky 1979, 1982), they use various methods that contradict the assumptions of the efficient market hypothesis (Fama, 1965). Such behaviour by market participants leads to the occurrence of market anomalies, which in economics literature are understood as interferences in the expected result (Szymański & Wojtalik, 2020).

Examples of market anomalies are calendar effects (also called seasonal effects), which are one of the topics of greatest interest among capital market researchers (e.g. Dragota & Oprea, 2014; Pieloch-Babiarz, 2020; Rossi, 2015). Such effects cover a broadly identifiable category encompassing anomalies resulting from investor behaviour that deviates from the assumptions of the efficient market hypothesis, and which occur cyclically in particular periods or moments of time (Karasiński, 2020).

One of the calendar anomalies is the so-called "January effect", which involves mass purchases of securities triggered by replenishing investment portfolios at the beginning of the calendar year. The January effect is associated with the end-of-year sale of securities whose valuations brought a loss to investors (Klock & Bacon, 2014). In the new year, investors re-purchase securities that they consider undervalued (which were sold at the end of the year). The significant demand generated by them causes their prices to increase (Lewandowska, 2017). The cyclical repetition of this phenomenon, noted by numerous researchers (e.g. Gu, 2003; Lisicki, 2018; Ozkan, 2021; Podgórski, 2018; Reinganum, 1983; Rozeff & Kinney, 1976), includes a certain market anomaly, which, according to the month when it occurs, is called the January effect (the effect of the first month of the year).

More recently, studies into this group of anomalies (including the January effect) can be seen to undertake consideration of their occurrence from the point of view of the impact of the COVID-19 pandemic and the post-pandemic economic reality (Bassiouny et al., 2023; Chatzitzisi et al., 2021; Luo & Tian, 2020; Żebrowska-Suchodolska, 2021).

The years of the COVID-19 pandemic and the war in Ukraine (2020–2024) have seen periods of historically high readings of the VIX index value (Investing.com, 2024), which gave rise to predictions of above-average volatility in the prices of financial instruments in global markets. Situations of heightened uncertainty in the markets (caused by crises, pandemics, terrorist attacks, wars, etc.) create motivations for scientific exploration that can be used to discover new correlations (or confirm existing ones) taking place in global capital markets and in the financial conditions of the enterprises (Chrobak, 2025). These include, undoubtedly, the topic of calendar effects, which has recently been taken up by global researchers in the era of the pandemic and post-pandemic economic realities (Jasiniak, 2022; Krawiec & Górska, 2021; Tauseef, 2023).

This study will examine one of the most common calendar anomalies – the January effect – by applying event study methodology, which allows for examination of the impact of information flowing to the market on the valuation of financial instruments (Kurek, 2020). Similar studies by Polish authors have already adopted this subject of investigation (Lisicki, 2018; Podgórski, 2018; Szyszka, 2009; Tarczyński, 1997), but none of them have conducted scientific research on the January effect on the WSE in times of increased uncertainty in the markets. Conducting research on the above-mentioned anomalies is justified because to date no study has verified the occurrence of these calendar anomalies in the pandemic and post-pandemic economic reality, which were periods of above-average market volatility (Thakur, 2020; Zhang et al., 2020). Moreover, previous studies (Chatzitzisi et al., 2021; Fuksiewicz, 2021; Tauseef, 2023) also indicate the need to verify departures from the efficient market hypothesis in less developed financial markets, which undoubtedly include the Warsaw Stock Exchange (WSE).

The main aim of this paper is to verify whether, in times of increased market volatility caused by the outbreak of the COVID-19 pandemic and the war in Ukraine, the January effect could be observed among the indices of the WSE. This requires finding an answer to the research question posed, which is as follows:

Q: During the COVID-19 pandemic and the war in Ukraine, has there been a noticeable January effect on the indices listed on the WSE?

Achieving the main aim of the paper and finding an answer to the research question is supported by the main study hypothesis, formulated on the basis of previous studies in this area (Krawiec & Górska, 2021; Tauseef, 2023), which is as follows:

H: In times of increased uncertainty on the markets (caused by the pandemic and war), there has been a noticeable January effect on the indices listed on the WSE.

The structure of the paper is as follows. Firstly, we will present a literature review about the January effect. In the next section, attention will be focused on the data and methodology used in the research. The following section provides the results of research on the January effect among the indices listed on the WSE in 2020–2024, when two "black swans" (Taleb, 2010) were recorded on the markets, i.e. the COVID-19 pandemic and Russia's armed aggression against Ukraine. The last (summary) section provides the main conclusions of the paper.

Literature review

Studies conducted by many authors (e.g. Buła, 2014; Cross, 1973; Kamaly & Tooma, 2009; Ozkan, 2021; Pieloch-Babiarz, 2020) have not provided clear and complete confirmation of even a weak form of information efficiency. Moreover, during the years this issue has been explored, certain kinds of deviations (interferences) in the market efficiency hypothesis began to be noticed, which over time were referred to as capital market anomalies (Mahdian & Perry, 2002). Several examples of groups of market anomalies can be distinguished in previous studies of global capital markets. One such market anomaly that is one of the most widely recognized among capital market researchers (e.g. Dragota & Oprea, 2014; Rossi, 2015; Żebrowska-Suchodolska, 2021) are calendar (seasonal) effects. These are a broadly identifiable category which includes anomalies that result from investor behaviour deviating from the assumptions of the efficient market hypothesis, and which occur cyclically at particular periods or moments in time (Karasiński, 2020).

One of such effects is the January effect (Budka et al., 2017). It is explained by short-term selling of securities for tax reasons (the tax-loss selling hypothesis) at the end of the year. According to regulations in many tax systems around the world, a loss incurred on some securities can be written off against a gain made on others (Obalade & Muzindutsi, 2019). This results in a reduction of the tax base in capital gains tax. The increased supply of stocks due to tax targets causes declines in stock markets at the end of the year. However, at the beginning of the following year (in January), investors usually decide to update their portfolios, which leads to an increase in demand and the prices of securities (Jasiniak, 2022). Other explanations suggest that the January effect results from the demand for cash in December, which creates pressure on the supply side (Ogden, 1990) as a consequence of business cycles (Gu, 2003) or increased turnover, causing statistically insignificant returns (Borowski, 2014).

The January effect was first mentioned as early as 1942. At that time it was described by the American economist Wachtel (1942), who observed such a relationship on the basis of studies of the behaviour of companies belonging to the Dow Jones Industrial Average (DJIA) index between 1927 and 1942. The discussion of the January effect flared up again in the 1970s as a result of research by Rozeff and Kinney (1976) confirming Wachtel's earlier conclusions. Another explanation for this anomaly pointed to the occurrence of window dressing by stock portfolio managers (Haugen & Lakonishok, 1988). Initially, it was believed that the January effect was negatively correlated with the size of companies, with smaller companies being much more sensitive to its occurrence (Keim, 1983). This was explained by much lower liquidity among securities from this segment. In the event of significant demand from institutional investors, at the beginning of the year there were significant increases in the quotations of issuers whose securities were much less popular throughout the year. However, later research negated this hypothesis. Gu (2003) pointed out that this anomaly also applies to companies from the blue-chip segment.

Of great significance is the fact that the effect of the first month of the year has not only been noted in the US stock market and other mature financial markets. It has also been found to take place in less developed world markets such as Macedonia (Svrtinov et al., 2017), Pakistan (Ullah & Ullah, 2016), Turkey (Özkan & Zeytinoğlu, 2022) and Taiwan (Shiu et al., 2014).

Research on the January effect was also conducted in the era of the pandemic and post-pandemic economic reality, in which there was above-average variability of prices of financial instruments. On the Turkish market, it was observed that the month effects recognized on global markets (the January effect and also August effect) did not take place on the BIST 100 index (Özkan & Zeytinoğlu, 2022). In Pakistan, research into the stocks of 496 entities listed on the stock exchange there (Tauseef, 2023) proved that the January effect is particularly correlated with events such as financial crises, the COVID-19 pandemic and unexpected political announcements, which are important factors that increase the level of uncertainty in the markets.

Among the calendar effects characterized by occurrence over longer time intervals during the study period, partially similar to the duration of the COVID-19 pandemic, consideration was given to the shaping of the "Halloween effect" and the impact of the January effect (Krawiec & Górska, 2021). The study was conducted on the market of selected commodities (cotton, sugar, cocoa, coffee, frozen orange juice concentrate and rubber). The January effect taken into account as a disturbing factor did not affect sugar returns to any extent, while it was significant in shaping cotton returns. In another study the January effect was shown with regard to gold quotations (Naz et al., 2023). This indicates that year-end selling not only causes the stock market to generate abnormal returns, but also affects trade in certain commodities.

The January effect has not escaped the attention of Polish researchers, resulting in the works of Tarczyński (1997), Marianowska et al. (2016), Lizińska (2017), and Fuksiewicz (2021). The authors confirmed its occurrence in relation to financial instruments listed on the WSE. However, the research results were not conclusive and depended on the adopted period (Keller, 2016), research method (Lewandowska, 2017) or company business sector (Lisicki, 2018).

Each author attempted to present the occurrence (or not) of this anomaly using an original approach and various methods, or by selecting a diverse research sample. Unfortunately, it is hard to find any attempts to determine the significance of calendar effects in the era of pandemic and post-pandemic economic reality characterized by increased economic uncertainty. Only Suliga (2023) covers similar topics and includes the initial phase of the COVID-19 pandemic in the research period. However, the subject of her research was not strictly the January effect. There are still opinions indicating that, despite significant destabilizations in global markets in recent years, calendar anomalies continue to be an important factor countering the efficient market hypothesis (Fuksiewicz, 2021), therefore further verification of their occurrence is necessary.

This study aims to fill the indicated research gap in terms of verifying the occurrence of the January effect in periods of increased volatility using the WSE as an example. This type of procedure has not been undertaken in previous studies. The study uses indices listed on the WSE and attempts to detect the January effect in the years 2020–2024, when "black swans" took place (Taleb, 2010) in the form of the COVID-19 pandemic and Russia's armed invasion of Ukraine. This will make it possible to verify previously observed dependencies regarding the Polish stock exchange in terms of one of the most popular calendar anomalies. The research results may be useful in further considerations by scientists on verifying the hypothesis of the efficient market, and for investors investing funds on the WSE.

Research methods

To achieve the main aim of the study, the abnormal return methodology, developed over fifty years ago, has been applied. This was called an event study, which allows for the direction and strength of investors' reactions to various types of information coming to the financial market to be assessed (Lisicki, 2018). A milestone in the development of event study methodology was the work of two research teams published within a short space of time. The first was a study conducted by Ball and Brown (1968) on the impact of a report containing information on the financial performance of listed companies on their market valuation. The second publication that introduced event study methodology to global research was implemented by the research team of Fama (1969). This methodology can also be used to verify the occurrence of calendar effects (such as the January effect). This type of studies can be found in the literature (Árendáš & Kotlebová; 2023; Gurgul & Suliga, 2020; Suliga, 2023), which justifies its use in this study.

However, before details of the applied research process following the assumptions of event study are presented, it is necessary to present the research sample that will be used to verify the January effect in periods of increased market volatility (measured by the VIX index) in the years 2020–2024. The study used monthly quotations of selected indices listed on the main market of the WSE (18 indices) in the period from January 2019 to January 2024. It would appear justified to verify the January effect among indices representing individual public company groups due to the relatively simple representation of the behaviour of certain groups of issuers in the context of the occurrence (or not) of the January effect. This may, in turn, give premises for further development of research into individual issuers grouped in a given index (Szymański & Wojtalik, 2020). The indices of the WSE used in the research are presented in Table 1. This also shows the number of companies in individual indices and their value at the beginning and the end of the study period.

Table 1. Selected indices of the WSE main market qualified for the research sample

Name of index	Number of companies in index	Value at the end of January 2019	Value at the end of January 2024
WIG20	20	2380.11	2279.86
mWIG40	40	4076.71	5847.28
sWIG80	80	11081.31	22916.62
WIG-banking	13	7622.93	11241.72
WIG-construction	36	1915.51	8145.21
WIG-chemicals	4	10868.61	10163.58
WIG-energy	14	2740.69	2760.43
WIG-mining	5	3597.74	4028.48
WIG-gaming	22	16893.77	12326.79
WIG-IT	27	2087.51	4609.63
WIG-pharmaceuticals	8	4849.25	2764.97
WIG-media	13	4850.52	8267.02
WIG-automobiles & parts	4	3674.35	8607.39
WIG-real estate	23	2081.82	3853.23
WIG-clothes	14	6131.01	8631.14
WIG-oil & gas	3	8129.74	6420.54
WIG-food	16	3469.01	2321.27
WIG-div	30	1100.61	1569.40

Source: Author's own study based on https://gpwbenchmark.pl/notowania (access: 17.07.2024).

The study used three main indices of the WSE (WIG20, mWIG40 and sWIG80) grouping respectively the 20 largest companies (blue chips), 40 medium-sized companies and 80 small companies. Monthly data was also taken into account for 14 sectoral indices and one index grouping entities regularly paying out dividends (WIG-div). Quotations were taken from the website stoooq.com (2024). The monthly logarithmic returns were calculated for closing prices at the end of every month in the research period (January 2019–January 2024) using the following formula.

This approach is like to that of Grotowski (2008), Gajdošová et al. (2011).

$$r_m = ln(P_m/P_{m-1}) \quad (1)$$

where:
r_m – the logarithmic return in the following January m,
P_m – the index price at the end of the trading January m,
P_{m-1} – the index price at the end of the trading December $m_{-1.}$

Following this, the event study procedure was used, which enables verification of the impact of various types of events on the valuation of financial instruments.

An event which impacted on the market valuation of 18 selected indices listed on the WSE is the occurrence of the January effect in the pandemic and post-pandemic time. It is therefore necessary to open an event window that includes the months of

January in the years 2020–2024. The statistically significant occurrence of positive returns in this window will demonstrate the existence of the January effect on the studied indices. Another important issue is to use the VIX index (Ruan, 2018) to indicate those event windows in which above-average volatility occurred. Based on the assumptions of this indicator, when its value exceeds 30% there is high volatility, which as a rule is associated with a rise in uncertainty on markets. A value between 20 and 30% is understood as indicating above-average volatility (XTB, 2024). This research process made it possible to indicate whether the January effect did actually occur among indices listed on the WSE at times when significant or above-average volatility was noted on markets. This may be a certain "pointer" for the future that can be valuable for investors in subsequent worldwide upheavals that generate a rise in uncertainty.

The next of the event study steps involves indicating the location and length of the estimation windows within which (using the selected model) the expected return will be estimated. In this study, the event window was defined as February to December (11 months) in the year preceding the event window. For example, for calculating abnormal returns in January 2020 (the beginning of the COVID-19 pandemic) an estimation window was used stretching from February 2019 to December 2019. The model used for its calculation was the market model (Sudarsanam, 2003), which is based on the single-index Sharpe model (1963). This is one of the most popular models used when analysing events affecting one company, as is the case in this study (Kurek, 2017). When calculating expected returns using market models, it is necessary to select a portfolio of securities that reflects the behaviour of the wider market (McWilliams & Siegel, 1997). For the WSE, the only suitable candidate seems to be the WIG index.

The most important part of the presented methodology is the calculation of the abnormal returns. In this study, they represent the difference between the realized return of the index *i* in the following January *m* of the event window, and the expected return calculated using the market model. The formula for calculating abnormal returns is presented in following formula (Perepeczo, 2010).

$$AR_{im} = R_{im} - E(R_{im}) \tag{2}$$

where:
AR_{im} – abnormal return on the index *i* in January *m*,
R_{im} – realized return on the index *i* in January *m*,
$E(R_{im})$ – expected return on the index *i* in January *m*.

The last stage of the event study contains statistical verification of results with the use of parametric and non-parametric tests. The values of abnormal returns in each of the first months of the years 2020–2024 for 18 selected indices from the WSE were subjected to statistical verification using a conventional cross-sectional *t*-Test

(Saens & Sandoval, 2005) to verify the averages (Peng & Tong, 2011), while the signed rank test by Wilcoxon (Martínez-Murcia et al., 2012) provided the medians. In this conventional cross-sectional *t*-Test (parametric test), instead of the standard deviation of abnormal returns calculated only from the event window, the standard deviation of average abnormal returns from all days of the estimation and event window is used (Sorrescu et al., 2017). The Wilcoxon signed rank test (nonparametric test) is in turn based on the difference in ranks between individual abnormal returns (Podgórski, 2018).

Results and discussion

At the beginning of verifying the January effect in the era of pandemic and post-pandemic economic reality (the years 2020–2024), it is necessary to present abnormal returns calculated according to the presented research process as part of the event study. Table 2 presents these for all 18 WSE indices qualified for the study.

The highest abnormal return in the individual first months of 2020–2024 was noted in the case of the indices WIG-automobiles & parts (15.99% in 2021), WIG-media (15.01% in 2020) and WIG-food (12.83% in 2021). At the opposite end of the scale was the index WIG-clothes (-16.05% in 2023 and -12.11% in 2022) and WIG-pharmaceuticals (-11.37% in 2022). A relatively low level of abnormal returns was noted for 3 standard WSE indices: WIG20, mWIG40 and sWIG80. In none of the years studied did their value exceed +/-10%, and in only one case (sWIG80 in 2023) was it at a level above 5% (7.1%). This may mean that the January effect did not occur in their case. Undoubtedly, the abnormal returns in January calculated for the studied WSE indices were characterised by considerable volatility, which did not make it possible to clearly determine whether the January effect had occurred or not.

Table 2. Abnormal returns for selected indices of the WSE during the months of January 2020–2024 (in %)

Index/Year	2020	2021	2022	2023	2024
WIG20	-1.14	-1.31	1.12	-1.35	-0.22
mWIG40	4.41	3.31	-1.70	1.56	1.02
sWIG80	4.88	2.89	-1.96	7.10	-0.25
WIG-banking	1.17	4.62	7.83	1.21	3.09
WIG-construction	6.23	2.69	1.45	-1.61	3.50
WIG-chemicals	-4.44	3.13	-2.60	6.16	-0.52
WIG-energy	-4.73	0.43	-1.89	6.60	0.21
WIG-mining	-0.42	-2.68	6.66	1.12	-1.82
WIG-gaming	-2.30	7.31	-7.29	3.22	-0.87
WIG-IT	0.58	-1.94	-7.09	3.71	0.39
WIG-pharmaceuticals	-1.35	4.84	-11.37	4.61	2.69
WIG-media	15.01	-2.71	-4.37	7.38	-1.29
WIG-automobiles & parts	11.82	15.99	-0.97	-4.47	-9.58
WIG-real estate	3.40	3.89	3.10	2.10	7.12

Index/Year	2020	2021	2022	2023	2024
WIG-clothes	-1.44	-6.98	-12.11	-16.05	-3.96
WIG-oil & gas	-9.68	-0.49	-4.64	-5.87	-0.59
WIG-food	7.58	12.83	-8.34	1.18	5.91
WIG-div	0.23	1.00	-4.27	1.09	0.74

Source: Author's own study based on https://stooq.pl/ (access: 15–17.05.2024).

It is necessary to make statistical inferences based on average values in individual periods. Before this is done, however, it is necessary to estimate the value of the VIX index measuring implied price volatility in individual months of January in the years 2020–2024. Only these results make it possible to indicate the periods in which markets experienced increased uncertainty, and thus achieve the main aim of this paper, that is verifying whether, in times of increased market volatility caused by the outbreak of the COVID-19 pandemic and the war in Ukraine, the January effect could be observed among the indices of the WSE. Figure 1 presents the values of the VIX index in the months of January in the years 2020–2024.

Based on the previously mentioned assumptions of the VIX index (XTB, 2024), high volatility is when the value exceeds 30%, which is usually associated with an increase in uncertainty on the markets. Such a situation was observed in January 2021 (36.79%), when the whole world was struggling with the already well-developed COVID-19 pandemic (Ulfa et al., 2022), which saw tens (and even hundreds) of thousands of infections daily in individual countries. A value of between 20 and 30% is understood to indicate above-normal volatility. Such cases occurred in 2020 (24.62%), when the Sars-Cov2 virus spread to further countries but a state of global pandemic had not formally been announced (WHO, 2020), and in 2022 (26.32%), when the world was a day away from the outbreak of the war in Ukraine (de Rassenfosse et al., 2023). In the remaining two periods (2023 and 2024), January did not see even above-normal uncertainties measured using the VIX index. For this reason, drawing conclusions as to the occurrence of the January effect among selected WSE indices should be based mainly on average abnormal returns from the years 2020–2022. To draw such conclusions, it is necessary to present the averaged abnormal returns in the individual years in the study period, and to verify them in terms of statistical significance.

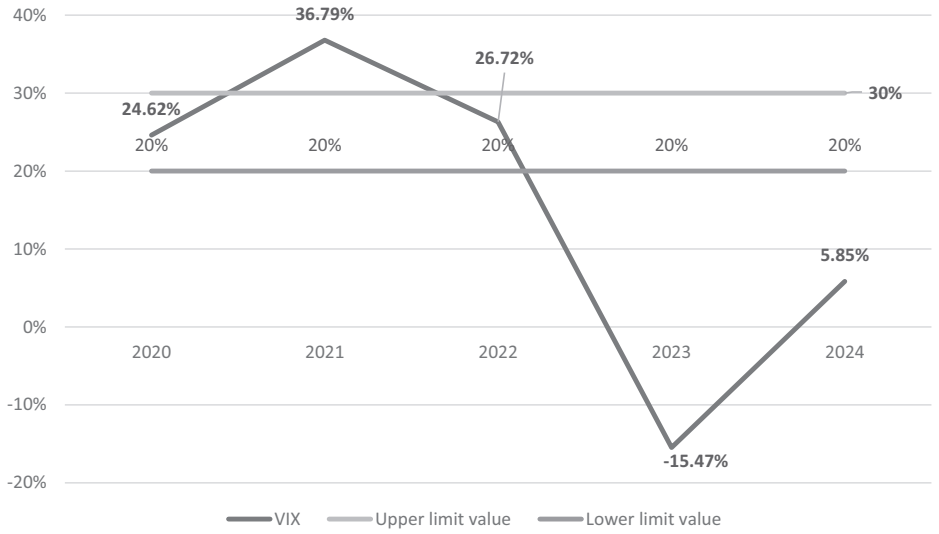

Figure 1. VIX index in the months of January 2020–2024

Source: Author's own study based on https://pl.investing.com/indices/volatility-s-p-500 (access: 25.05.2024).

As mentioned above, the calculated values of abnormal returns in each of the first months of the year 2020–2024 for 18 selected indices from the WSE were subjected to statistical verification. For this reason, Table 3 includes the results of the statistical tests for the calculated abnormal returns for the indices in individual study period years. The average values are also given as these constituted the basis for the tests, i.e. the averages (AAR) and medians (MeAR). The normality of distribution for the abnormal returns were verified in the case of the use of a parametric test using the Shapiro–Wilk test for small groups (1965).

Table 3. Results of statistical verification of abnormal returns for WSE indices during the months of January 2020–2024

Statistics/Year	2020	2021	2022	2023	2024
Cross-sectional *T*-test					
AAR	1.66%	2.60%	-2.69%	0.98%	0.31%
t stat	1.0451	2.1220	-2.2104	0.7357	0.4478
p value	0.3098	0.0480*	0.0403*	0.4717	0.6597
Normality *p* value	0.7544	0.0676	0.7759	0.01263*	0.0603
Wilcoxon signed rank test					
MeAR	0.40%	2.79%	-2.28%	1.39%	-0.01%
Z stat	0.7847	1.9635	1.992	1.3079	0.2213
P value	0.4326	0.0489*	0.0464*	0.1909	0.8248

* p value < 0.05

Source: Author's own study.

As can be seen from the results of the statistical inference, the averaged abnormal returns (AAR's) for selected WSE indices in January in times of increased uncertainty on markets (the years 2020–2022) achieved values of -2.69% (2022) to 2.60% (2021). What is more, only readings from 2021 and 2022 were characterised by statistical significance at the level of p value <0.05, verified through the use of a cross-sectional T-test. A similar situation occurred for median abnormal return (MeAR's) in periods of increased volatility measured by the VIX index. Middle values ranged from -2.28% (2022) to 2.79% (2021). Verification of their statistical significance based on a Wilcoxon signed rank test showed that only in 2021 and 2022 were the values significant. Interestingly, in 2021 both the AAR and MeAR showed values above zero, which could indicate the occurrence of the January effect in the analysed sample. The AAR and MeAR were positive, which should be interpreted as an average higher than the expected (estimated using the single-index Sharpe model) realised rate of return in January 2021.

This period was characterised by a high level of uncertainty (VIX 36.79%) caused by high COVID-19 infection rates in the winter period (Ulfa et al., 2022). In the face of the rapidly spreading threat, severe restrictions were introduced, including the closure of shops, the cancellation of mass events and the banning of business travel and tourism. People had to face negative, surprising information in a short space of time (Haroon & Rivzi, 2020). This undoubtedly also had an effect on financial markets, which saw large fluctuations in prices during periods of high infection rates (Zhang et al., 2020). However, as can be seen in the average values for 2021 presented in Table 2, this did not prevent the occurrence of the January effect on indices listed on the WSE, understood as the achievement of higher-than-average returns (Budka et al., 2017; Obalade & Muzindutsi, 2019; Reinganum, 1983). This research result is in line with the discoveries of authors (Naz et al., 2023; Tauseef, 2023) confirming the occurrence of the January effect in periods of high uncertainty on other markets.

Further analysis of the presented values in periods of increased volatility on the markets does not give such unequivocal indications in terms of the occurrence of the January effect on the WSE. The average abnormal returns in 2020 are positive, however, they lack statistical significance. Most surprising, however, are the average abnormal returns from 2022, when the AAR was -2.69% and the MeAR -2.28%. Both these values demonstrated statistical significance at the level of p value <0.05. However, the minus sign in these values indicates lower than expected realised returns, which contradicts the previous assumptions of the January effect observed in earlier years. These types of results can also be found in the extant literature (Krawiec & Górska, 2021; Özkan & Zeytinoğlu, 2022). Among the reasons for the completely different research results noted for 2022 is above all the military threat beyond Poland's eastern border. The war in Ukraine broke out at the end of February 2022, however, it was expected several months earlier (Pawłuszko, 2023). The direct threat to the neighbouring country could have affected the decisions of investors investing on the WSE, who in the face of potential war in the region of Eastern

Europe decided to escape from risky assets (Assaf et al., 2023; Izzeldin et al., 2022, 2023) that generated on average negative abnormal returns in the preceding month, i.e. January 2022.

For the sake of clarity, it should be indicated that both in January 2023 and 2024, the average abnormal returns did not significantly differ from zero, which points to the lack of the January effect at this time. It is also worth adding that in these months, there were no significant (or even increased) uncertainties on the markets measured by the level of the VIX index.

Nevertheless, the research results obtained for periods of above average volatility on the markets (the months of January 2020–2022) did not indicate the unequivocal occurrence of the January effect among the selected indices listed on the WSE. Only in January 2021 could the January effect be observed in its hitherto understanding. In the remaining periods of increased uncertainty, the averaged abnormal returns were not statistically significant (2020) or were characterised by a minus sign (2022), indicating the occurrence of an effect opposite to the January effect known to investors for years.

Thus, positive verification of the research hypothesis presented at the beginning of the paper would appear to be impossible. In periods of increased uncertainty (volatility) on the markets, it is not possible to unequivocally indicate the occurrence of the January effect among indices listed on the WSE. However, periods can be identified in which this anomaly did take place. These discrepancies determine the need to conduct further research on this calendar anomaly – one of the most commonplace – in the times of the pandemic and post-pandemic economic reality. Subsequent conclusions drawn from such research may be useful both for researchers verifying the relationships on contemporary financial markets and for investors.

Conclusions

January effect (as the calendar anomaly) involves mass purchases of securities triggered by replenishing investment portfolios at the beginning of the calendar year. It is also associated with the end-of-year sale of securities whose valuations brought a loss to investors (Klock & Bacon, 2014). The cyclical repetition of this phenomenon, noted by numerous researchers (e.g. Gu, 2003; Lisicki, 2018; Ozkan, 2021; Podgórski, 2018; Reinganum, 1983; Rozeff & Kinney, 1976), represents a certain deviation from the efficient market hypothesis, which, according to the month of its occurrence, was called the January effect (the effect of the first month of the year).

The main aim of this study was to verify the occurrence of the January effect in the era of pandemic and post-pandemic economic reality using the WSE as an example. Conducting research on the above-mentioned anomaly is justified because to date no similar study has been prepared verifying the occurrence of this calendar anomaly in the pandemic and post-pandemic economic reality, which were periods

of above-average market volatility (Thakur, 2020; Zhang et al., 2020). Achieving the main aim of the paper and finding an answer to the research question is supported by the main hypothesis of the study formulated on the basis of previous studies in this area (Krawiec & Górska, 2021; Tauseef, 2023), which is as follows: In times of increased uncertainty on the markets, has there been a noticeable January effect on the indices listed on the WSE?

Based on event study methodology, research was conducted on the monthly quotations of 18 indices grouped on the main WSE market in the years 2020–2024. The VIX index was also used to identify months characterised by above average uncertainty on the market. This distinguished months of January in the study period in which there was higher volatility than average (2020–2022). However, calculation of the averaged abnormal returns in individual months of January in the study period only confirmed the occurrence of the January effect in 2021, when the averaged abnormal return was 2.60%, and the median abnormal returns were 2.79%. both were statistically significant at the level of $p < 0.05$. In the remaining months of January which saw above average volatility, the January effect was not noted for the example indices listed on the WSE. Interestingly, in 2022, the average abnormal returns were characterised by negative values (although not statistically significant), indicating the opposite effect to the previously identified January effect. On the basis of the conducted considerations, it is therefore difficult to unequivocally confirm the occurrence of the January effect on the WSE in the era of the pandemic and post-pandemic economic reality. A similar situation was already noted in the literature (Krawiec & Górska, 2021; Özkan & Zeytinoğlu, 2022), which may constitute the basis for further considerations on deviations from the efficient market hypothesis in times characterised by increased uncertainty on financial markets.

The conclusions resulting from this paper are characterised by certain limitations, one of which is undoubtedly the inclusion in the research sample only of indices listed on the WSE. If the study had been conducted only on the stocks of individual issuers, then there might have been a higher likelihood of confirming the occurrence of the January effect in the era of the pandemic and post-pandemic economic reality. Nevertheless, the research results may serve as an incentive for other researchers to address the topic of calendar anomalies in their work. Thanks to the presented results, certain implications may be drawn for participants in the WSE who took their decisions based on research from before the COVID-19 pandemic. Based on the presented sample of 18 indices, it can be seen that the previously described calendar anomalies may not necessarily apply to periods of above average uncertainty. This should therefore encourage investors to be cautious when investing their funds on the WSE and in other markets.

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