Negative Shocks on the US Capital Market and the Rate of Return on Investments in Gold

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ABSTRACT

Objective: The article examines how strong the sell-off on the capital market in the United States must be to cause above-average, positive rates of return on the gold investment market. The durability of such above-average gains in the gold market was also assessed.

Research Design & Methods: The study was conducted using an event analysis for daily data from 3 January 1994 to 2 November 2022. The AAR and CAAR rates of return and the results for the adjusted Patell test were used to answer the research questions. The Standard & Poor's 500 (S&P 500) and Dow Jones Industrial Average (DJ) indices as a representation of the capital market in the United States, LBMA spot prices for gold prices, and the Bloomberg Commodity Index, which served as a benchmark, were used for the study.

Findings: The paper shows that drops in the S&P 500 and DJ indices, exceeding 3%, result in an immediate, i.e., on the same day and on the following day, above-average price increase on the gold market. The cumulative, above-average, positive and statistically significant rate of return for gold is maintained with such a size of decrease for up to 21 days from the day of the fall on

the capital market. Falls on the capital market not exceeding 2%, however, are not a strong enough stimulus to cause above-average rates of return on the gold market.

Implications/Recommendations: Investors should always buy gold on the event day, when the decline in the US capital market is bigger than 2.3%. As an event, we define the biggest declines in the US capital market. Buying gold on the day after the event depends on which US index declines. Buying gold and holding it for 21 days after a decline in the US market bigger than 3% is always profitable.

Contribution: The current study sheds more light on the connections between capital and gold markets. It measures gold's ability to serve as a safe haven asset in the context of the overreaction hypothesis. This hypothesis, derived from applied psychology, states that people tend to overreact to dramatic events and then make irrational decisions.

Article type: original article.

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JEL Classification: G01, G11, G12, G15.

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1. Introduction

In capital markets, from time to time, certain situations cause strong investor reactions and significant sell-offs. In recent years, the two most important events include the announcement by the WHO of the COVID-19 as a pandemic on 11 March 2020, and the start of the aggression of the Russian Federation against Ukraine on 24 February 2022. Previous examples of such events include the global financial crisis in 2008 or the debt crisis in the euro area in 2009. Each of these events resulted in strong declines in global stock exchanges and, simultaneously, investors turning towards looking for investments that could be described as hedge or safe haven assets (Baur & Lucey, 2010). An example of investments that have been examined in terms of portfolio diversification is, for example, precious metals (Naeem *et al*., 2022), or investments in commodities in general (Roache & Rossi, 2010; Creti, Joëts & Mignon, 2013), but also investment in diamonds (Potrykus, 2015a; D'Ecclesia & Jotanovic, 2018) or investment in wines (Bouri, 2014; Łęt & Siemaszkiewicz, 2020). Among the above-mentioned examples of investments, which are credited with a positive reaction in times of significant declines in financial markets, the most frequent to appear in this context is, however, investment in gold, which is part of the precious metals market (Baur & McDermott, 2010; Hood & Malik, 2013; Potrykus, 2015b).

The fact that investors react strongly to emerging negative information has its theoretical basis in the overreaction hypothesis (De Bondt & Thaler, 1985). According to this hypothesis, derived from applied psychology, it can be stated that "people tend to overreact to dramatic news and events, regardless of whether these

events are positive or negative in nature" (Mun, Vasconcellos & Kish, 2000, p. 53). Based on this hypothesis, it can be assumed, following the previously-cited research (Baur & McDermott, 2010; Hood & Malik, 2013; Potrykus, 2015b), that during a strong sell-off on the capital market (event), caused by negative information, in the short term investors transfer their funds to the gold market, which they perceive to be a safe haven.

In the context of the fore-mentioned theory, it is necessary to acknowledge that there must be the potential for profiting from potential sell-offs in capital markets in order to elicit a significant reaction from investors in the gold market. Other key questions are: How long does a possible increase in gold returns occur following such significant declines in stock markets, and how long does it last? The answers to the above questions will allow for the possible formulation of short-term investment strategies on the gold market in response to significant falls on the capital market. The conclusions of this paper should therefore be of interest not only to capital market researchers, but also to individual and institutional investors, and market analysts.

2. Literature Review

Investment in gold is a subject of research mainly in the context of the properties of gold to perform the function of a so-called hedge or safe haven. One of the first studies on this trend is the work of Baur and Lucey (2010), who state that investing in gold is a form of long-term hedging and a safe haven in times of negative shocks on stock exchanges. Similar conclusions regarding the role of gold as an investment in the investment portfolio were also reached in another paper (Baur & McDermott, 2010). The authors of the above-quoted paper confirm that gold investments perform the function of a hedge and safe haven. It was also emphasised that gold generates profits in times of increased uncertainty in the stock market (Roache & Rossi, 2010). In turn, the multidimensional aspect of gold's ability, or lack of such an ability, to perform the function of a safe haven was also previously discussed in the paper by Joy (2011). Contrary to the previously-quoted papers, the latter emphasises that investing in gold serves as a hedge, but does not fulfil the function of a safe haven. However, these conclusions were not drawn in the context of the capital market, but in the currency market.

Another increase in interest from researchers in investments in the gold market was also observed during the outbreak of the COVID-19 pandemic. In the study (Salisu, Raheem & Vo, 2021), the property of gold to act as an indisputable safe haven during a pandemic was found. In their conclusions, the authors also emphasise that gold fulfils this role better than the capital market in the United States of America or other precious metals such as silver, palladium or platinum. This is true for the research period covered by that study, which means from 31 December 2019

to 28 May 2020. The assessment of the properties of gold to act as a safe haven during the COVID-19 pandemic, was verified in the study conducted by Dutta *et al.* (2020). Based on this study, it can be concluded that gold was a safe haven for the oil market during the pandemic. Identical properties of investments in gold to investments in crude oil, were also shown by Salisu, Vo and Lawal (2021). It should be noted, however, that the risk-reducing function of an investment in gold is also mentioned in numerous pre-pandemic works, such as (Reboredo, 2013; Selmi *et al.*, 2018). In another study (Yousaf *et al.*, 2022), authors use hourly data for research. Despite the change in the frequency of research compared to previously-cited papers, the conclusions they draw remain consistent with previous research, i.e., gold acts as a safe haven investment and a hedge for the oil market. The last conclusion is also highlighted by Shehzad *et al.* (2021).

The indisputable role of gold as a safe haven investment during the COVID-19 pandemic outbreak is also mentioned in the article by Ji, Zhang and Zhao (2020). This paper shows that most of the examined investments do not fulfil the role of a safe haven during the pandemic, yet this was not confirmed for investments in gold and in soybeans, represented by a futures contract. However, alternative views posit and underline that investment in gold is not always a safe haven asset (Akhtaruzzaman *et al.*, 2021). This is in contrast to the previously-quoted works, yet it should be emphasised that the conclusion that investing in gold did not turn out to be a safe haven investment relates only to the second phase of the pandemic, lasting from 17 March 2020 to 24 April 2020. For the first phase (31 December 2019–16 March 2020) of the pandemic defined by Akhtaruzzaman *et al.* (2021), such a claim for investments in gold has already been confirmed. The authors also note a significant increase in the share of gold investments in investment portfolios during the second phase, which relates to the phenomenon known as "flight-to-safety." This process has at least been approximated in the study (Boucher & Tokpavi, 2019). It should also be added that gold was not seen as a safe haven investment in the work by Cheema, Faff and Szulczyk (2022), in which the authors analyse the causes of the crisis in order to determine which of the available investments are perceived by investors as safe havens. They emphasise that gold was a risky investment during the pandemic in countries such as China and Japan. Therefore, when assessing a given investment as a safe haven, the geographical context should also be taken into account.

Another increase in interest in investing in the gold market was observed as a result of Russia's aggression against Ukraine in 2022. Diaconaşu, Mehdian and Stoica (2023) emphasised that investment in oil, and not gold, can act as a safe haven in the initial period of war. The authors also highlight that the rates of return obtained in the gold market indicate that investors in the gold market predicted its boom in 2022 before it happened. As a hedge investment for geopolitical risk, an investment in gold is presented in the paper by Będowska-Sójka, Demir and Zaremba (2022). In addition to gold, similar properties have been observed for

investments in silver, the Swiss franc and investments in the real estate market. Izzeldin *et al*. (2023) also point to the aspect of low volatility of rates of return for investments in gold during the war. Investment in gold as a safe haven was also indicated by Shahzad *et al*. (2023).

Despite numerous studies on the investment properties of gold in times of turmoil in the financial markets, it seems that the question of how significant the decline of the capital market must be to cause above-average rates of return on the gold market remains open. Identifying the scale of a sell-off on the capital market that causes changes in the gold market is the main research goal of this article. A secondary goal is also to determine how long the impulse generated by stock market declines lasts on the gold market. The answers to these questions will allow investment strategies to be formulated in the short term and will contribute to the development of the theory of investment decision-making, in particular, the construction of an investment portfolio. The conclusions of this study should therefore prove valuable to investors, gold market and capital market analysts, as well as companies dealing with the use of gold as a raw material in their production processes.

3. Methodology and Data

3.1. Event Study Analysis and Its Characteristics as a Research Method

The methodology that was used to answer the predefined research questions was event study analysis (Gurgul, 2019). The study was conducted using the Event-Study package in the R programming language (Wolf *et al*., 2014). To determine the reaction on the gold market after the largest falls of US stock indices, the study was conducted for four lengths of event window, i.e.: (0, 4); (0, 7); (0, 15); (0, 21). The lengths of the event windows adopted in this way result from the construction of the research questions and from the fact that the effect on the gold market and the possible outflow of capital from the US stock exchange in previous studies was defined as short-term (Baur & Lucey, 2010). Baur and Lucey (2010) directly state that after 15 days, we can no longer refer to the positive impact of significant declines in capital markets on the price of gold. Research windows adopted in this way will allow this effect to be verified. As both the AAR and CAAR rates were used to answer the research questions the beginning of the event window was defined on the day of the event, which allows an assessment of the cumulative effect without analysing the possible impact of above average rates of return prior to the day of the event. The formulas used to calculate the AAR and CAAR rates were calculated in a standard way, as defined in the paper (Prusak & Potrykus, 2021).

Simultaneous assessment of the AAR and CAAR rates will allow possible dependencies to be captured on each day of the event window, both separately (AAR rate), and in total (CAAR rate). It should be emphasised here that the above-average rates of return for the examined days from the event window were

determined using the market-adjusted model, under the methodology described by Wolf *et al.* (2014). The choice of such a model was determined by the fact that the use of more sophisticated methods to determine the above-average rate of return does not contribute to improving the quality of the results obtained (Castro--Iragorri, 2019). Because the choice of model for determining above-average rates of return is often a subject of discussion (Andrew Coutts, Mills & Roberts, 1995; Cable & Holland, 1999), the study was also repeated with the market model and the EGARCH model. However, the use of these models did not change the presented results. It can be stated that the shorter the examined window and the more significant the size of the discount on the capital market, the more homogeneous were the results obtained. 250 observations preceding the event were used to estimate the parameters of the model for which the results were presented, with the last observation taken into account being dated four days before the event. Such a length of the estimation window, reaching almost one calendar year, is recommended based on research conducted by Corrado (2011).

The adjusted Patell test was used to assess the statistical significance of the obtained results (Kolari & Pynnönen, 2010). In this study (Kolari & Pynnönen, 2010), the procedure for determining the test statistic for this test is presented in detail. The choice of this test was determined by the fact that it accounts for cross-sectional correlation. In addition, all calculations were performed for logarithmic returns. Quotations for the Dow Jones (DJ) and Standard & Poor's 500 (S&P 500) indices were used as data for the capital market. As the research period, the period from 3 January 1994 to 2 November 2022 was adopted. The determined rates of return for both indices were sorted in ascending order and grouped into sets of 50 cases from 1 to 50, and so on, to the group containing the cases of the lowest rates of return with numbers from 251 to 300, which in total accounted for over 4% of all determined rates of return. Thus, a total of six research samples were analysed for four different lengths of event windows.

3.2. Research Sample – Key Descriptive Statistics for the Time Series Used

The adopted length of the event window was influenced by the benchmark, which is the Bloomberg Commodity Index (BCI), for which data were obtained from the beginning of the adopted research window, i.e., from 3 January 1994. Data for both the BCI and capital market indices were obtained from the Investing.com portal (accessed: 20.10.2023), while gold price data were obtained from the portal LBMA Prices and Data (2023). Table 1 presents selected descriptive statistics for the data series determined during the research period.

Based on the data presented in Table 1, it can be concluded that the average daily rate of return on investments in the Dow Jones Industrial Average (DJ) and Standard & Poor's 500 (S&P 500) indices was at a similar level and amounted

Table 1. Descriptive Statistics for Logarithmic Rates of Return of the Analysed Data Series

Descriptive Statistic	LN DJ	LN S&P 500	LN BCI	LN LBMA
Mean (%)	0.030	0.029	0.003	0.018
Median (%)	0.054	0.063	0.032	0.000
Min (%)	–13.842	–12.765	–6.402	–9.596
Max (%)	10.764	10.957	5.647	7.006
Standard deviation (p.p.)	1.147	1.195	0.968	1.003
Range (p.p.)	24.606	23.722	12.049	16.602
Kurtosis	12.359	10.375	3.021	6.492
Skewness	–0.410	–0.417	–0.304	–0.194
Number of observations	7,262	7,262	7,262	7,262

Source: the authors.

to approximately 0.03%, the average rate of return was almost half that level for investments in gold, and the lowest average rate of return was associated with BCI investments. In the case of investment risk, it can be said that investments in stock exchange indices were characterised by a much higher risk than investments in gold or the analysed commodity index. This is confirmed by the minimum and maximum values obtained for these investments and the values of the standard deviation or range, which are the largest in the case of investments in the DJ and S&P 500 indices, the value of the standard deviation of the rate of return exceeds 1 percentage point, while for LBMA investments, it oscillates around 1 percentage point, and for the BCI index, it is less than 1 percentage point. For the analysed investments in the research period, the rule that a higher average rate of return is accompanied by a higher investment risk, measured by the standard deviation of the rate of return, is largely maintained.

Finally, over 4% of the lowest rates of return for each stock indices, grouped by 50 observations, were used for the study, Table 2 presents the extreme values for each of the six tested samples.

Table 2. Extreme Values for the Six Designated Research Samples (in %)

Specification		Analysed Group of Rates of Return					
Index	Range	1 to 50	51 to 100	101 to 150	151 to 200	201 to 250	251 to 300
DJ	from	–13.842	–3.659	–2.889	–2.473	–2.243	–2.068
	to	–3.670	–2.891	–2.476	–2.245	–2.070	–1.922
S&P 500	from	–12.765	–3.899	–3.055	–2.622	–2.401	–2.192
	to	–3.909	–3.060	–2.629	–2.403	–2.193	–2.020

Source: the authors.

Data presented in Table 2 indicate that only those days when the examined indices showed declines of around 2% will be considered as the dates of events. The first sample included those events in which the examined indices recorded drops in the range of –13.842% to –3.670% for the DJ index and from –12.765% to –3.909% for the S&P 500 index. The boundaries of the remaining ranges, constituting subsequent research samples, are more similar and in each case they are within a range of 1 percentage point.

4. Research Results

4.1. Values and Statistical Significance for Average Abnormal Return

As part of the research, the statistical significance of the results obtained for the AAR and CAAR rates was calculated and assessed. The results of the average abnormal rates of return (AAR) on individual days of the longest event window (0, 21) are presented in Figure 1.
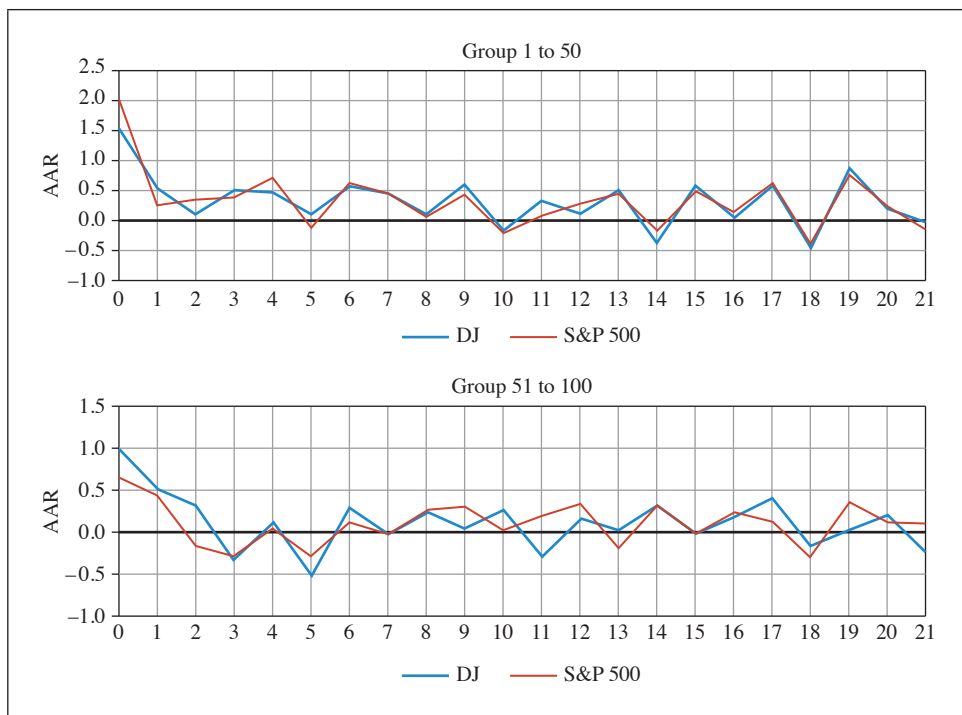

Fig. 1. AAR Rate on Individual Days of the Longest Event Window – Graphical Analysis (in %)

Source: the authors.

Based on the data in Figure 1, it can be seen that the highest values of the average above-average interest rates were obtained on the day of the event, or possibly the day after the event. This means a strong reaction and increase in the price of gold at a time when the US capital market saw record falls. On the remaining days of the study, for the two samples examining the largest drops, the fluctuations of above--average rates of return did not exceed 1%.

For the other four tested samples containing drops on the US stock market, from 101 to 300, the fluctuations on individual days were even smaller and were almost entirely in the range of –0.5% to 0.5%. Such results testify to the immediate reaction of investors to the sell-off on the capital market and the increase in gold prices – the higher the analysed sell-off on the capital market, the greater the increase in gold prices. This conclusion is confirmed by the detailed results, including the value of the test statistic, the *p*-value (in brackets), and the significance level of the obtained result.

The initial graphical analysis of the obtained results is the basis for an in-depth analysis based on AAR rates. The results of this analysis are shown in Table 3. Table 3 presents the results obtained for the DJ index and for S&P 500 index. Based on research questions from the introduction, Table 3 contains data for the event day and the day after the event, the rest of the results of the AAR analysis can be sent on request.

Table 3. Values of Test Statistics, *p*-values and Significance Levels for AAR Rates in the Tested Samples for the Longest Event Window in the Case of the DJ Index

Index	Day	1 to 50	51 to 100	101 to 150	151 to 200	201 to 250	251 to 300
DJ declines	event day	6.543*** (0)	5.81*** (0)	3.772*** (0)	2.216** (0.027)	3.607*** (0)	1.83* (0.067)
	one day after the event	2.414** (0.016)	4.149*** (0)	0.837^{ns} (0.402)	0.43^{ns} (0.667)	1.742* (0.082)	0.734^{ns} (0.463)
S&P 500 declines	event day	8.659*** (0)	3.907*** (0)	3.219*** (0.001)	3.421*** (0.001)	1.335^{ns} (0.182)	2.318** (0.021)
	one day after the event	0.749^{ns} (0.454)	3.248*** (0.001)	2.678*** (0.007)	1.245^{ns} (0.213)	1.635^{ns} (0.102)	3.642*** (0)

Notes: The symbol *** means the significance level $\alpha = 0.01$, and the symbols **, *, ^{ns}, respectively, represent results at the significance levels $\alpha = 0.05$, $\alpha = 0.1$, and not statistically significant.

Source: the authors.

Based on the data in Table 3, it can be concluded that in the case of a DJ index drop of more than 2% (up to the 201–250 group), statistically significant, above--average and positive rates of return for investments in gold could already be observed on the day of the event. This indicates an immediate reaction of US stock

market investors and an outflow of their capital towards investing in gold. For the last examined group of investments (from 251 to 300), the value of the obtained result was statistically significant, but only at the level of α = 0.1. This proves that the reaction of capital shifting to the gold market dissipates as we analyse lower and lower negative rates of return for the DJ index. In addition, on the day after the event, for the two groups with the largest decreases, further above-average, positive and statistically significant rates of return on the gold investment market were observed. Similar results were also obtained for the second examined index, i.e., S&P 500. In this case, also on the day of the event, statistically significant, positive, above--average rates of return were observed on the gold market. Such rates were observed for all study groups except for the group marked "201 to 250." This is a surprising result as this group contains a larger, in terms of absolute value, decrease than the same group for the DJ index.

4.2. Values and Statistical Significance for Cumulative Average Abnormal Return

The analysis of AAR rates, although interesting, did not provide grounds for formulating an investment strategy lasting several days in the event of significant declines on capital markets. Such an opportunity is provided only by analysing the results for the CAAR rate. Figure 2 shows the obtained values for the CAAR rates in the studied research areas in a graphical form.

Based on the data presented in Figure 2, it can be concluded that the largest drops (research group 1–50) on the examined stock indices generate positive, above-average, cumulative rates of return. The value of these rates of return is approximately 3.5%, approximately 4.5%, approximately 6% and approximately 7%, respectively, for the analysed event window lengths, starting with the shortest. In the other surveyed groups, except the 251–300 group, above-average rates of return are also at a positive level, fluctuating between 1% and 2%.

It should be noted, however, that satisfactory results were obtained for the five examined groups of declines, while the last group, marked "251 to 300," does not display high values of above-average rates of return for the S&P 500 index, and in the case of the two longest windows of events, an above-average loss was recorded. This allows for the determination of a threshold value of declines in capital markets affecting the gold market in a strong, albeit short-term, way, which is –2.070% for the DJ index and –2.193% for the S&P 500 index. It is also worth emphasising that the results obtained for the "151 to 200" group (for the DJ index) are lower than for the next group, "201 to 250." The market reaction in this group also allows for the determination of limit values of decreases that affect the gold market in a very strong way, amounting to –2.476% for the DJ index and –2.629% for the S&P 500 index.
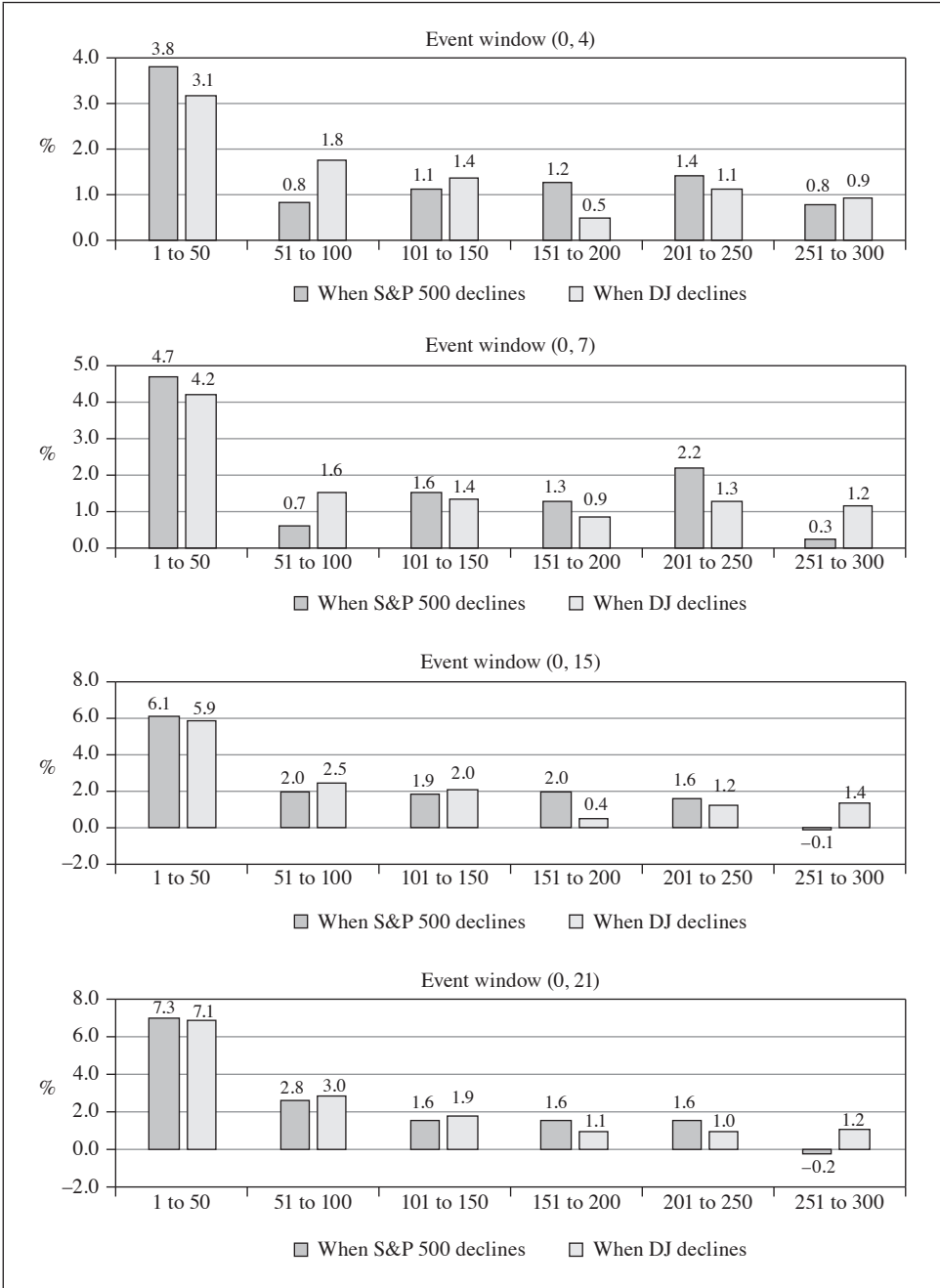
Fig. 2. CAAR Values from the Conducted Research

Source: the authors.

The observations confirmed above, based on the graphical analysis, support the values of the obtained test statistics within the studied groups and indices. Data on the value of the test statistics, the *p*-value level and the statistical significance of the obtained result are presented in Table 4.

Table 4. Values of the Test Statistics, *p*-values and Significance Levels for CAAR Rates in the Study Groups

Specification	Event Window	Group					
		1 to 50	51 to 100	101 to 150	151 to 200	201 to 250	251 to 300
When DJ declines	(0, 4)	6.053*** (0.000)	5.104*** (0.000)	2.628*** (0.009)	1.028 ns (0.304)	2.863*** (0.004)	2.726*** (0.006)
	(0, 7)	6.823*** (0.000)	3.775*** (0.000)	2.226** (0.026)	1.684* (0.092)	2.684*** (0.007)	2.670*** (0.008)
	(0, 15)	6.663*** (0.000)	4.208*** (0.000)	2.026** (0.043)	0.413 ns (0.680)	2.100** (0.036)	2.235** (0.025)
	(0, 21)	6.992*** (0.000)	4.025*** (0.000)	1.452 ns (0.147)	1.148 ns (0.251)	1.577 ns (0.115)	1.571 ns (0.116)
When S&P 500 declines	(0, 4)	6.927*** (0.000)	2.512** (0.012)	2.431** (0.015)	2.930*** (0.003)	3.207*** (0.001)	2.591*** (0.010)
	(0, 7)	7.292*** (0.000)	1.740* (0.082)	2.597*** (0.009)	2.521** (0.012)	4.081*** (0.000)	1.423 ns (0.155)
	(0, 15)	6.727*** (0.000)	2.756*** (0.006)	2.204** (0.028)	2.698*** (0.007)	1.840* (0.066)	0.383 ns (0.702)
	(0, 21)	6.985*** (0.000)	3.058*** (0.002)	1.619 ns (0.106)	1.698* (0.089)	1.345 ns (0.179)	−0.057 ns (0.954)

Notes: the same as for Table 3.

Source: the authors.

The data presented in Table 4 are the basis for the statement that, regardless of the analysed index and the assumed length of the event window, the largest decreases in the examined indices generate statistically significant (with the highest considered significance level, marked as "***"), positive, above-average cumulative returns. A similar situation occurs for the second study group marked as "51 to 100." In the next study group, no statistically significant results were obtained for the longest considered event window, and for the remaining lengths, the obtained results usually have statistical significance at the level of $\alpha = 0.05$. Similarly, due to the statistical significance of the obtained results, the situation for the next study group is presented, but only for the S&P 500 index, while for the DJ index the results of the cumulative, above-average rates of return in the "151 to 200" group turned out to be statistically insignificant, which requires further research in the future as

the authors of this study failed to find a satisfactory answer to this phenomenon. For the group "201 to 250," no statistically significant results were recorded for the longest event window, but for both indices, the two shorter event windows showed statistically significant results at the highest level considered. What both surveyed indices have in common is the fact that statistically significant results occurred for the shortest event window in the last analysed group.

The illustrative relationships that will help formulate a gold market strategy in the event of significant drops in the US stock market are presented in Table 5.

Table 5. Summary of the Dependencies Found on the Gold Market in Response to the Largest Drops on the US Stock Exchange

Questions	Declines in US Stock Indices					
	Bigger than −3.8%	From −3.8% to −3.0%	From −3.0% to −2.6%	From −2.6% to −2.3%	From −2.3% to −2.1%	Smaller than −2.1%
Buy gold on the event day?	Yes	Yes	Yes	Yes	DJ – yes S&P 500 – no	DJ – no S&P 500 – yes
Buy gold on the day after the event?	DJ – yes S&P 500 – no	Yes	DJ – no S&P 500 – yes	No	No	DJ – no S&P 500 – yes
Buy gold on the event day and hold it for 4 days?	Yes	Yes	Yes	DJ – no S&P 500 – yes	Yes	Yes
Buy gold on the event day and hold it for 7 days?	Yes	Yes	Yes	Yes	Yes	DJ – yes S&P 500 – no
Buy gold on the event day and hold it for 15 days?	Yes	Yes	Yes	DJ – no S&P 500 – yes	DJ – yes S&P 500 – no	DJ – yes S&P 500 – no
Buy gold on the event day and hold it for 21 days?	Yes	Yes	No	No	No	No

Source: the authors.

In Table 5, the arithmetic mean of the two examined indices was used for the limits of the presented ranges. If the answer to the questions asked was identical for both indices, then "yes" or "no" was entered in such a field. If discrepancies were found between the indices, the name of the index was given as an answer, followed by the answer to the question asked. The matrix with the results presented in this way is the basis for answering the research questions adopted at the beginning of the paper and allows for the formulation of an investment strategy in the event of signif-

icant drops in the main indices of the US stock exchange. A description of both of
the above issues is included in the summary.

5. Conclusion

Several interesting conclusions can be drawn from the conducted research.
Firstly, declines on US indices exceeding 3% in one day should encourage investors
to buy gold on such a day and on the following day. Its sale will be profitable even
after 21 days from the moment of purchase and will allow the seller to generate
an above-average rate of return from such a strategy. Secondly, drops in the analysed
capital market in the range of 3% to 2.3% are an indication for investors to buy gold
on the day of such drops, but buying gold the day after such an event will not be
optimal from the point of view of historical data analysis. With declines of such
a scale, it is also safe to hold the purchased gold on the day of the event for seven
days. Drops of less than 2.3% should generate an above-average return for investors
within four days of purchasing gold on the day of the event.

Ultimately, it can be concluded that the stronger the decline in the capital market,
the longer the period of holding gold by investors and the longer the time to decide
on the possible purchase of the precious metal (the day of the event or the day after
the event). This conforms to the position that gold plays the role of a safe haven
indicated in the works (Baur & McDermott, 2010; Joy, 2011; Dutta *et al*., 2020;
Salisu, Raheem & Vo, 2021; Shehzad *et al*., 2021). Thirdly, decreases in the analysed
capital indices which are smaller than 2% do not generate above-average rates of
return for investors on the gold market on the day of the event and the day after it
and do not allow above-average profits to be obtained in the period exceeding four
days after the event, which is in agreement with the observation of Baur and Lucey
(2010) regarding the effect of such a signal coming from the capital market for only
a few days.

Conclusions formulated in this way should be of particular interest to investors
and analysts of gold and capital markets, who, along with investment scientists, have
been indicated as the main stakeholders in the text above. Based on these conclu-
sions, it is possible to implement short-term investment strategies in the gold market.
However it should be noted that we tested extremely negative quotations which are
not specific to traditional investments (Cremers, Kritzman & Page, 2004). In the
future, the reverse relationship should be analysed, i.e., whether above-average
increases on stock exchanges cause a (negative?) reaction on the gold market, and
if so, whether it has a similar duration to the reaction in the case of significant
decreases. Also, identical durability described in that paper for gold should be tested
for other precious metals such as silver, palladium and platinum.

Authors' Contribution

Conflict of Interest

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