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MEASURING THE EFFECTS OF BREXIT USING EVENT STUDY METHODOLOGY

Utvrđivanje efekata Bregzita primenom metodologije studije događaja

Abstract

The aim of the paper is to determine the effects of the results of the UK EU membership referendum on stock prices on the London Stock Exchange. The event study methodology is used to quantify the effects and determine the statistical significance of the conducted test. The research was carried out on the sample of 167 stocks listed on the London Stock Exchange, classified into five groups by the company business sector. Given the high level of integration of EU economies, the referendum outcome is expected to show negative effects. As a general conclusion, the conducted tests confirm the assumptions regarding the expected effects. Consistent results of parametric and non-parametric tests in three of the five observed sectors (financial, technology, and food) confirm the relevance of the results obtained. Parametric tests show statistical significance of negative effects on energy companies, but non-parametric tests do not confirm these results. Statistical significance of the referendum outcome regarding medical companies' return has not been determined.

Keywords: *event study, abnormal return, market return, parametric tests, non-parametric tests.*

Sažetak

Predmet rada je utvrđivanje efekata rezultata referenduma u Velikoj Britaniji o ostanku u Evropskoj uniji na kretanje cena akcija na Londonskoj berzi. Za kvantifikovanje efekata i utvrđivanje statističke značajnosti testa korišćena je metodologija studije događaja. Istraživanje je sprovedeno na primeru 167 akcija listiranih na Londonskoj berzi, grupisanih u 5 uzoraka prema sektoru poslovanja kompanije. Imajući u vidu visok stepen integrisanosti privreda zemalja Evropske unije, očekivan je negativan efekat ishoda referenduma. Generalni zaključak je da su testovi pokazali opravdanost pretpostavki u vezi sa očekivanim efektima. Konzistentni rezultati parametarskih i neparametarskih testova u tri od pet posmatranih sektora (finansijskom, tehnološom i prehrambenom) potvrda su relevantnosti dobijenih rezultata. Parametarski testovi su pokazali statističku značajnost negativnih efekata na kompanije energetskog sektora, ali neparametarski testovi nisu potvrdili ove rezultate. Nije utvrđena statistička značajnost ishoda referenduma na kretanje prinosa kompanija sektora medicinskih usluga.

Ključne reči: *studija događaja, ekstra prinos, tržišni prinos, parametarski testovi, neparametarski testovi.*

Introduction

Event study methodology is used for the purpose of analyzing the impact of an individual event on return on stocks. This methodology measures the statistical significance of a positive or negative deviation of return on stocks from the predicted trend. Applying event study to a selected stock portfolio makes sense, because the obtained results allow for broader conclusions. This methodology relies on the assumption of market rationality of economic entities, which is why it is considered that the event will immediately be reflected in the stock price trend on the stock exchange.

The aim of the paper is to determine the effects of the UK referendum results using event study methodology. This event is widely known as Brexit. The research will be carried out on the sample of 167 stocks listed on the London Stock Exchange (LSE), classified into five groups according to the company business sector. The paper aims to test the existence of a statistically significant effect of the referendum outcome on return on stocks selected from different sectors.

By passing the European Union Referendum Act (UK Parliament, 2015), the issue of deciding on the UK's stay in the EU through a referendum was raised. The referendum was held on 23 June 2016 in all constituent parts of the United Kingdom, including Gibraltar. Next morning, preliminary referendum results hinted at the clear lead of the option to leave the EU, and, later that day, it became clear that this option had won. The final results showed a very small difference between the two options: 51.9% of votes for exit and 48.1% of votes for staying in the EU. Based on the referendum results, the government is obliged to initiate negotiations on leaving the EU in accordance with Article 50 of the Treaty on the Functioning of the European Union.

The effects of such a referendum outcome have undoubtedly had a significant influence on the economy and political relations of the EU countries. Shortly before the referendum, surveys highlighted a small difference in the final outcome, but they all gave priority to the stay option [9], [25]. The assumption is that stocks reacted strongly in view of the EU member states' interconnected economic flows. The indicators of a strong reaction are the turbulent events in the days following the referendum, which included the fall of the government [38], the announcement of the Scottish independence re-referendum [40], and a petition to repeat the referendum [8].

The first part of the paper gives an overview of previous event studies on political events. Event study methodology is most commonly used in the analysis of economic events, although many authors have so far used it to analyze the impact of election results on the financial market. This paper is part of pioneering efforts to measure the impact of referendum outcome on stock prices. The second part of the paper provides the sample structure and explains event study methodology, the starting research hypotheses, and the methodology used in the paper. The research results are presented in the third part, followed by the final evaluation of the referendum effect on stock prices.

Literature review

A great number of studies prove the existence of abnormal return caused by political events (elections in the first place). In [26], a market reaction to presidential election results in the USA was analyzed over a long period of time and it was concluded that it depended on whether the winner was a Republican or a Democratic candidate. The results of this analysis indicate that the global market grows after the victory of the Republican Party candidates and shrinks after the victory of the Democratic Party candidates. In another analysis of market reaction to Republican Party victories [31], it was concluded that the market grew after their victory, while in the case of the Democrats' victory, the market grew until the election itself, but experienced a decline afterwards. One comparative analysis of the presidential election effects in the United States and Great Britain covered a period of as many as 7 decades. The analyses conducted within it did not employ the event study methodology, but the GARCH method [22]. A regression analysis of the impact of Ronald Reagan's 1980 victory on military companies' stock prices had positive results [32]. Barack Obama's victory at the 2008 election produced a negative impact on the financial sector stocks

[27]. A comprehensive study of the 1992 U.S. election effects on as many as 74 different sectors revealed a statistically significant effect in 15 sectors [18]. There were also two analyses of George Bush Junior's victory over Al Gore in 2000 [20], [37].

Several studies analyzed the referendum impact, primarily focusing on the character of internationalization and overflow of the referendum effect onto different markets. In the analysis of the global referendum impact on financial markets, the conclusion was that the referendum outcome positively affected the return on the U.S. and emerging markets [1]. The most pronounced negative effects on average and cumulative abnormal return in different sectors during the post-referendum period are found in financial companies and the consumer goods sector [30]. Similar results were obtained in [19], where regression analysis showed that financial companies and consumer goods companies were most exposed to possible losses. An event study analysis was applied to a number of companies listed on the LSE, concluding, surprisingly, that companies oriented toward the domestic market experienced more pronounced negative effects than companies operating internationally [28]. A cross-sectoral event study concluded that the referendum itself produced a negative effect, but that the post-referendum events gave a positive abnormal return [36]. Examination of the negative effect overflow from the British financial market to the rest of Europe revealed negative effects, but also a quick market recovery [34]. Using a detrended fluctuation analysis to examine the relationship of the European financial markets before and after Brexit, it was concluded that the European financial markets would be negatively correlated in the future [2].

Analysis procedure and methodology

Sample construction

The research objective is to test whether the outcome of the referendum significantly affected LSE stocks. Bearing in mind the high level of integration of the European Union economies, it is expected that the referendum outcome will have negative effects. Since companies react totally differently to the outcome, the market will not be viewed as a whole. The companies are divided into five groups according to the business sector. The sectors were selected using the study and the assumptions from [39] and [17], respectively. The following sectors are identified as those most likely to suffer as the result of the UK leaving the EU: financial, chemical, automotive, food, energy, technology, medical, and air transport. The idea behind the paper is to analyze only the effects on the stocks of UK-based companies, not of all listed companies of a given sector. That is why the chemical, air transport and automotive sectors are excluded from the analysis due to insufficient number of companies meeting the requirements for an unbiased analysis. The final sample includes 167 companies from the financial, food, technology, energy, and medical sectors.

Applied methodology

Event study methodology was first applied in the late 1960s in the study [16]. The methodology itself was formulated in the following period [4], [5], [10], [14]. It relies on regression analysis and parametric and non-parametric statistical tests. The essence of event study lies in testing the existence of abnormal return on observed stocks over the period when a particular event produces effects. Therefore, it is important for the research to precisely and irreversibly define the event, to determine whether it was expected or unexpected and carefully select stocks to be monitored and tests to be performed.

In the analysis, it is important to select an event whose effects on return on stocks will be isolated. Since a certain period of market research before the event itself is required in order to determine normal return, it would not be appropriate to choose an event preceded by one or more other significant events that could affect return. Since a longer period of time has been chosen to determine normal return, the effects of minor events could be mutually compensated, enabling an unbiased statistical conclusion to be made. Generally, the inclusion of as many stocks as possible in the survey gives more reliable results. However, companies whose stocks are not traded for more than 2 consecutive days are not suitable because they lead to statistical bias.

After the selection of the event, the effects of which will be subject to analysis, and the definition of the set of stocks to be analyzed, it is necessary to determine the estimation window, the event window, as well as normal and abnormal return. The estimation window is a time period (2 to 8 months) without turbulent events that could significantly disturb the market. In this period, numerous events that affect the stocks of individual companies or a group of companies on a daily or weekly basis are compensated [35, p. 2]. It is necessary to monitor the daily return on each stock during the estimation window, as well as the daily return on a market indicator (usually the market index) in order to determine normal return. Some scholars [3] prefer the analysis with estimation windows of different lengths (for example, 2, 4, 6, and 8 months), while other authors choose a longer estimation window (for example, 8 months). A too short estimation window poses the risk of estimating normal return on the basis of a too short period, where a minor event may have a key impact if it remains uncompensated, leading to a biased statistical conclusion. The risk of an estimation window being too long is that it would pick up too many events over a long period of time and again lead to a biased decision. A long estimation window is also a precondition for the variation measurement formulas to be valid with different categories of abnormal return.

Due to a long estimation window, a regression analysis can determine the predicted return, i.e., the market trend of an individual stock. The predicted return might not be positive –it may also have a negative value if the stock value has fallen during the observed period. This is a necessary value for determining abnormal return, which quantifies the event effects on the market. Abnormal return is determined as the difference in historical return generated during the event window and the predicted return for this period [11]. Abnormal return may not necessarily be positive either – if it is an event that leads to a reduction in the company value, abnormal return will be negative.

If the event is expected, the event window will cover several days before the event itself and fewer afterwards, because the effects of the upcoming event are felt even before it happens. If the event is unexpected, the event window will cover fewer days before the event itself and more after it, because unexpected events are later felt on the market. For research purpose, in this paper an asymmetric four-day event window is constructed (i.e., $T_0 - T_{+3)}$. Estimation window will cover 6 months, which period was determined arbitrarily based on different experiences from previous studies.

In order to determine abnormal return, normal return should first be determined. There are several models for determining normal return [24, pp. 17-19]. After a deeper analysis of the differences and potentials of each model [6], the market model, which is most commonly used in practice, will be applied in the paper. For any stock *i*, the market model is:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \quad (1)$$

where R_{it} is the return on security (stock) *i* in time *t* belonging to the estimation window, R_{mt} is the return on market indicator (usually the market index) in the same time period, andis, statistically speaking, a random error or effect of residual factors (the mentioned possibility that individual factors at the daily level have a strong influence on the daily trend of return on stock), which has the expected value $E(\varepsilon_{it}) = 0$ and variance $var(\varepsilon_{it}) = \sigma_i^2$, i.e., has normal distribution. α_i and β_i are market model parameters and are obtained by the regression of market return on each stock to return on a market indicator.

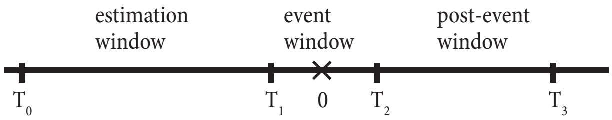
In order to determine abnormal return, the first thing one should do is calculate the expected return for each stock during the event window, using the market model methodology [35]. Once obtained, the expected return $E(R_i)$ will be used to test the existence of abnormal return:

$$AR_{it} = R_{it} - E(R_{it}) \quad (2)$$

$$Var(AR_{it}) = \sigma_{\varepsilon i}^2 \quad (3)$$

where AR_{it} is abnormal return on stock *i* on day *t* belonging to the event window, R_{it} is the return on stock *i* on that day, and $E(R_{it})$ is the expected return on the same stock on that day, with estimation constructed on the basis of a market model. In practice, abnormal return will always exist, but the question is whether it will be statistically significant or not. One should pay attention to Figure 1: *t* in formula (1) is between T_{0+1} and T_1 (this period is denoted by L_1), and in formula (2) it is between T_1 and T_2 (this period is denoted by L_2), where 0 denotes the event day.

Figure 1: Time dimension of the event study



Source: [7].

For the needs of the analysis, abnormal return shall not refer to individual stocks, but aggregation will be carried out. Aggregation can be done in several ways: it can be done at the level of each day of the event window, where the average abnormal return for the day t, $\overline{AR}_t$, can be determined as:

$$\overline{AR}_t = \frac{1}{N}\sum_{i=1}^{N} AR_{it} \tag{4}$$

$$Var\,(\overline{AR}_t) = \frac{1}{N^2}\sum_{i=1}^{N}\sigma_{\varepsilon_i}^2 \tag{5}$$

The second approach to aggregation is at the level of individual stocks over several days of the event window and most often covering all days of the event window, resulting in a cumulative abnormal return on stock i, CAR_i:

$$CAR_{i(t_1,\,t_2)} = \sum_{t=t_1}^{t_2} AR_{it}, T_1 < t_1 \leq t_2 \leq T_2 \tag{6}$$

$$Var(CAR_{i(t_1,\,t_2)}) = \sigma_{i(t_1,t_2)}^2 = (t_2 - t_1 + 1)\,\sigma_{\varepsilon_i}^2 \tag{7}$$

Finally, average cumulative abnormal return, $\overline{CAR}$, can be determined. One should keep in mind that CAR and $\overline{CAR}$ do not have to be calculated only for the entire event window, but can also be calculated for two individual or several consecutive days.

$$\overline{CAR}_{(t_1,t_2)} = \frac{1}{N}\sum_{i=1}^{N} CAR_{i(t_1,t_2)} \tag{8}$$

$$Var(\overline{CAR}_{(t_1,t_2)}) = \frac{1}{N^2}\sum_{i=1}^{N}\sigma_{i(t_1,t_2)}^2 \tag{9}$$

Derivation of all categories of abnormal return at all aggregation levels with variation measures can be found in [10], [15], [35]. The condition for (3), (5), (7), and (9) is a high value of L_1, with which the variance formulas are reduced to a given form [24, p. 21]. For the purpose of the analysis, we will also need a standardized cumulative abnormal return – $SCAR_i$, which is standardized for each individual stock by dividing the value of CAR_i with the standard deviation of the corresponding stock:

$$SCAR_{i(t_1,t_2)} = \frac{CAR_{i(t_1,t_2)}}{\sigma_i} \tag{10}$$

After determining all categories of abnormal return, it is possible to test the hypothesis of its statistical significance. It should be emphasized that two types of tests are usually applied – parametric and non-parametric. The requirement for the application of parametric tests is a normal distribution of test statistics, which a sufficiently large sample (N> 30) meets. For non-parametric tests this condition is not necessary, which is why non-parametric tests are recommended in the analysis of small financial markets. As regards parametric tests, the t-test, J_1 and J_2 tests will be applied, while non-parametric test will include J_3 (Sign test) and J_4 (Corrado test).

The t-test, one of the most commonly used, tests the difference between the historical and the hypothetical value of some statistics. The zero hypothesis in the case of the t-test is the absence of statistically significant abnormal return, and the alternative hypothesis rejects the zero hypothesis:

$$H_0 : \overline{AR} = 0, H_1 : \overline{AR} \neq 0 \text{ or } H_0 : \text{CAR} = 0, H_1 : \text{CAR} \neq 0 \tag{11}$$

Equation (11) shows that the t-test makes it possible to test average abnormal return for each day or cumulative abnormal return for each observed stock. For practical reasons it is far simpler to use the first variant because it yields a far smaller number of results, allows for transparency and makes it easier to draw a conclusion at the level of the sector. Also, the t-test can be one-tailed, i.e., the alternative hypothesis may contain greater than or less than symbols in place of the inequality symbol, when one explicitly wants to test whether the observed event leads to positive or negative abnormal return. In this paper, the alternative hypothesis will be two-tailed, because it tests the existence of abnormal return, without a priori determining whether it is positive or negative. The formula for the t-test statistics is:

$$t = \frac{\overline{AR}_t - AR_0}{S/\sqrt{N}} \tag{12}$$

Since the hypothetical value is $AR_0 = 0$, t-statistics will be obtained by dividing the average abnormal return on a particular day by the standard deviation quotient of the entire sample during the estimation window (according to [33, p. 9]) and the root of the number of stocks considered.

Since this is a two-tailed test, the critical value for rejecting the zero hypothesis is ± 1.96 with a confidence level of 95%.

The remaining two parametric tests, J_1 and J_2, give uniform results at the level of the entire event window. J_1 tests the value, and J_2 the value, which presents the average of all values for all observed stocks. The zero hypothesis is that and values are not statistically significantly different from 0, and alternative hypothesis rejects the zero hypothesis.

$$H_0 : \overline{CAR} = 0, H_1 : \overline{CAR} \neq 0,$$
$$\text{and } H_0 : \overline{SCAR} = 0, H_1 : \overline{SCAR} \neq 0 \quad (13)$$

$$J_1 = \frac{\overline{CAR}(t_1,t_2)}{\sqrt{\bar{\sigma}^2_{i(t_1,t_2)}}} \quad (14)$$

$$J_2 = \sqrt{\left(\frac{N(L_1-4)}{L_1-2}\right)}\overline{SCAR}_{(t_1,t_2)} \quad (15)$$

where t_1 and t_2 values in (14) and (15) can represent any days during the event window. However, this study will use the first and last day of the event window, i.e., J_1 and J_2 will be performed at the level of the entire event window. The critical value for these tests is also ± 1.96 with a confidence level of 95%, as they are two-tailed tests.

As regards non-parametric tests, this study will apply the Sign test and Corrado test, also specified as J_3 and J_4 tests in studies. According to [23], the Sign test examines the distribution of observed statistics around the median value. The zero hypothesis states that there is equal distribution of positive and negative values of the observed statistics around the median value, and alternative hypothesis rejects it, with the conclusion that sign distribution is not symmetric around the median value.

$$H_0 : Me = 0.5 , \quad H_1 : Me \neq 0.5 \quad (16)$$

In this case, cumulative abnormal return (CAR) values will be statistically important. The CAR values for all stocks included in the analysis should be placed in the ascending order in order to find the median value of CAR by the principle (N+1)/2, where N is the number of observations. Formula for calculating J_3 is:

$$J_3 = \left(\frac{N^{+(-)}}{N} - 0.5\right)\frac{\sqrt{N}}{0.5} \quad (17)$$

N is the number of all observed stocks and $N^{+(-)}$ is the number of positive or negative values of statistics (in this case, the number of positive values of CAR). Usually the number of positive values is taken, except in the case of one-tailed tests when examining whether the observed event leads to negative abnormal return. The critical test value is ± 1.64 in the case of a two-tailed test, which will be applied in this paper.

The Corrado test or J_4 shows the return rank for each of the observed companies [12]. The observation period presents the combination of the estimation window and event window. The advantage of this kind of test over parametric tests is that only the rank of return is important for analysis, which is why extreme values do not affect the test value. This test can be performed in two ways. The first is to view the entire event window as one period, in which case CAR is ranked for each individual stock. The problem is that, in this case, the estimation window is shortened (as in this case CAR aggregates four days, four days would have to be aggregated in the estimation window too). Another way is to perform the test for each day in the event window individually, with some days showing statistical significance, and some not (similar to the t-test). The zero hypothesis is that there is equal distribution of the positive and negative values of the observed statistics around the median value, and alternative hypothesis rejects it, with the conclusion that distribution is not equal. The formula for the J_4 test is found in [13], and [21]:

$$J_4 = \frac{1}{N}\sum_{i=1}^{N}\left(K_{i0} - \frac{L_2+1}{2}\right)/S(L_2) \quad (18)$$

$$S(L_2) = \sqrt{\frac{1}{L_2}\sum_{t=T_0+1}^{T_2}\left(\frac{1}{N}\sum_{i=1}^{N}\left(K_{it} - \frac{L_2+1}{2}\right)\right)^2} \quad (19)$$

where $(L_2 + 1)/2$ is the median rank, K_{io} is the return rank on the event day, $S(L_2)$ is the standard deviation of return rank, K_{it} is the return rank of the stock i on the observed day t, $t \in L_2$. In the case of a two-tailed test, which will be applied in this paper, the critical test value is ± 1.64. The field of non-parametric tests is subject to continuous procedural and test methodology adjustments.

Results

The analysis used the asymmetric event window $T_0 - T_{+3}$, where T_0 is the event day, specifically 23 June 2016. A six-month estimation window was used to estimate market trends, starting from 21 December 2015. The FTSE 100 Index was used as an indicator of market trends. Analysis was carried out on 167 stocks of UK-based companies listed on the London Stock Exchange. Historical data was downloaded from Yahoo! Finance, and all statistical calculations were carried out in the IBM SPSS 20.0 software package. Each day's adjusted closing price was used to determine the return, as price adjustments were pronounced.

The stocks were divided into 5 groups according to the business sector. The parametric tests performed included the t-test, J_1 and J_2, with the t-test performed for each day of the event window individually. Non-parametric tests included J_3 and J_4. The statistics of all the tests individually for each sector can be seen in Table 1. The underlined values have statistical significance.

The performed tests show a strong negative effect of the referendum results on the stocks of all sectors except the medical sector. This confirms the assumption that the referendum outcome will significantly affect the London Stock Exchange. All parametric tests show statistical significance with high negative statistical values, with all three tests yielding the highest results from the stocks of the financial technology sectors. Regarding the t-test, in all sectors statistical significance was established on T+1 and T+2 days. On these days the t-test statistics is negative in the medical sector, but without any significance.

Non-parametric tests confirm the conclusion reached after conducting parametric tests in the financial, technology and food sectors, but not in the energy sector. The values of the J_3 test are high above the limit value, while the J_4 test shows significance on the days T_{+1} and T_{+2}. J_4 confirms the results of the t-test, as both tests show significance on the same days. Both non-parametric tests record the highest negative values in the technology sector. In the energy sector, non-parametric tests do not confirm the conclusion made after parametric tests. The reason for this can be the amplitude of AR and CAR negative values, which directly affect the values of parametric tests, but lose significance in non-parametric ones, because all values are converted to positive or negative signs (J_3) or ranks (J_4). It should be emphasized that non-parametric tests reveal a negative effect on key event days (T_{+1} and T_{+2}), but without statistical significance.

Finally, none of the tests shows significance of the negative outcome in the medical sector, and even the t-test shows statistical significance of the positive values for the days T_{+0} and T_{+3}. While this outcome could have been somewhat expected on the referendum day, a strong market recovery after two days of a very modest fall was

Table 1: Values of test statistics and sample size by sector

Sectors	Observations	Period	t-test	J_1	J_2	J_3	J_4
Food sector	25	T_0	0.670828	-4.45544	-2.33213	-3	1.08709
		T_{+1}	-3.75427				-2.30798
		T_{+2}	-2.90425				-2.18533
		T_{+3}	1.809464				1.79510
Financial sector	39	T_0	-0.58242	-12.9324	-15.9739	-4.0032	0.88379
		T_{+1}	-4.73065				-2.47423
		T_{+2}	-5.33068				-2.57068
		T_{+3}	0.09178				0.86214
Energy sector	34	T_0	-0.19962	-2.79376	-3.19015	-1.37199	0.27948
		T_{+1}	-0.70834				-0.09561
		T_{+2}	-2.00118				-0.66928
		T_{+3}	-0.09256				-0.26232
Medical sector	32	T_0	3.140431	0.095587	0.825923	0.353553	1.37914
		T_{+1}	-1.7021				-1.62268
		T_{+2}	-1.40802				-0.96321
		T_{+3}	2.830032				1.76497
Technology sector	37	T_0	1.087971	-10.14	-12.7536	-4.75757	0.74227
		T_{+1}	-4.70252				-3.28795
		T_{+2}	-6.46533				-4.06884
		T_{+3}	0.337088				0.16440

Source: Authors' analysis based on research.

not expected. J_4 confirms the statistical significance of recovery on day T_{+3}.

Conclusion

The general conclusion is that the tests confirmed the assumptions regarding the expectation of the negative referendum effects on the London Stock Exchange. Consistent results of parametric and non-parametric tests in three of the five observed sectors confirmed the relevance of the results obtained. There is room for further analysis only in the energy sector, where non-parametric tests did not confirm the statistical significance of parametric tests. Given the claim above stating that parametric tests depend on the amplitude of negative effects, it could be concluded that a different selection of companies would yield different results. However, having in mind the size of the sample and the total number of companies in this sector registered on the London Stock Exchange, this assumption can be ignored. All relevant companies registered in the UK are included in the analysis which is why the results can be considered relevant. The absence of statistical significance of the stocks of medical companies is a clear indication of the relative strength of this sector in comparison with others.

The choice of the portfolio and event window construction can always be considered possible research limitations. Nevertheless, in the light of earlier assumptions about the referendum impact, the selection of these sectors can be considered justified. In the future, it would be possible to carry out a comparative analysis of the reaction of one or more sectors within different stock exchanges, and include, besides London, the Paris Stock Exchange, Frankfurt Stock Exchange, and New York Stock Exchange. It would be interesting to compare the results of European stock exchanges with New York, potentially obtaining the result of statistically significant trends in opposite directions.

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