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The Effect of Political Instability on the UK Stock Returns: Evidence from 2016 Referendum and the Major Events that Followed

Bomin Liu[1], Mohammed Hamdan[2], Chloe Whiteley[3], Nasir Aminu[2]

[1]Shanghai Dianji Univeristy, Shanghai, China
[2]Department of Accounting, Economics and Finance, Cardiff Metropolitan University, Cardiff, UK
[3]Cardiff University, Cardiff, UK
Email: Liubm@sdju.edu.cn, MHamdan@cardiffmet.ac.uk, chloewhiteley241@hotmail.co.uk, NAminu@cardiffmet.ac.uk

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Abstract

This study examines the consequences of six events on the FTSE100 companies since the UK voted to leave the EU. These are the events that created political uncertainty leading to two General Elections within 30 months. The study examines the relationship between political instability and stock return abnormalities, using event study methodology and regression analysis to establish if such a link exists. Following each event, the UK stock market index declined except when Brexit was extended by six months (Event 5). The results of this study find a definite relationship between instability and return abnormalities, with the post-event abnormal returns proving to be the most significant over the event window. The industry variables were found to be most strongly linked with the CAR values out of all the independent variables, with the healthcare, utilities and basic materials industries exhibiting the most significant reactions. The findings of this study are an additional expectational tool for investors. It will be essential for investors during times of uncertainty.

Keywords

Brexit, Stock Returns, Stock Price Effect, Event Study

1. Introduction

Since the Brexit referendum result, on 24 June 2016, a series of events have oc-

curred that created political uncertainty in the United Kingdom (UK). Three Prime Ministers have resigned, two general elections have been called, numerous delays have occurred, and the conditions of the leave has been ever-changing. Brexit has not been resolved, resulting in the confusion of the public in both the UK and countries within the European Union (EU). Political instability is present when change occurs within political policies or administration, causing uncertainty within the government. "Brexit" has been debated within parliament and heavily publicised by news outlets, making it the most talked about topic in the UK. This investigation will focus primarily on the referendum event and five related events following. The overarching question of this study is whether political instability, caused by any event, has a relationship with stock return abnormalities.

In an efficient market with rational investors, like in the macroeconomy, only unanticipated shocks influence the stock market volatility. Thus, unanticipated announcements can have effects on the economy's economic indicators. This study investigates whether the lack of political cooperation has effects on the stock market and if so, identify the company characteristics which are most firmly linked to abnormality. The primary focus within this work is the stock returns, observing how they change during periods of political instability. Using event studies, the results show that the post-event period was more strongly linked to abnormalities than the day of the event.

The study aims to establish the relationship between political instability and abnormal returns in the stock market. The objectives will include using event study methodology, investigating the daily abnormal returns surrounding the event date[1], the cumulative abnormal returns for each firm and how they differ by industry; the proportion of foreign assets; firm age; cross-listing. This will allow for the study to identify the highest returns impact for a day and how long it took the market to rebound following each event. The study will also establish the relationships between the selection of company-specific factors and the return abnormalities. This will be done using regression analysis, identifying which variables exhibited the most significant relationships with the abnormal returns and if there was a positive or negative trend. The structure of the study will continue with literature review in section 2 include the methodology, section 3, where the two methods used in this research, will be discussed. The results will be presented in section 4, and the discussion of findings will be in section 5. Finally, section 6 will present the conclusion of the study.

2. Literature Review

Oehler, Horn, & Wendt (2017) examined the extent to which firm internationalisation can interpret abnormal stock returns following the Brexit referendum. FTSE 100 companies were observed to have a significant international exposure,

[1]The event date refers to the actual date which the event has occurred, which must be exact for this study to be accurate.

and Brexit is considered a primary cause of uncertainty in the global context. The study found that companies with lower levels of internationalisation had abnormal returns more negative than stocks of companies with higher levels of international exposure. That was mainly on the trading day after the Brexit referendum with no pricing effect in the following days, which implies market efficiency. Haupenthal & Neuenkirch (2017) observed the likelihood of Grexit (Greek exit) from related statements issued by six key European politicians on stock return stock returns in Greece, Germany and the euro area. Using the approach of event study, they found that positive statements (Grexit is less likely) associated with the higher stock return and negative statements (Grexit is more likely) associated with lower stock return. Also, the cumulative effects on stock returns are considerable with the statements contributing to up to 58 percentage points on the ATHEX.

Niederhoffer (1971) examined how major world events from 1950 to 1966 affected the stock market. The most significant changes were observed following a cluster of events, whereas singular, isolated events only gave rise to smaller changes in the stock prices. This study also determined that national events triggered more significant stock price changes than regional events. The most significant effect on the stock market was apparent in the five days following the event, after which it was unclear if a later event was causing the price effect. Research examined the link between the international stock market and the occurrence of terror attacks; when compared to other unanticipated events, like earthquakes, the adverse reactions following terror attacks were found to be more pronounced and significant. Overall, the occurrence of a significant event resulted in a significant market reaction, whether this is positive or negative. Domestic stocks were more significantly affected by events occurring in the local area than international stocks.

Bouoiyour & Selmi (2017) examined the effect that Presidential elections have on the stock market, looking specifically at the 2016 US election. The initial observation of negative abnormal returns on the event day was mostly offset by positive abnormal returns on the days following. Gala, Pagliardi, & Zenios (2020) concluded that there was a clear link between changes in political policy and the occurrence of abnormal returns. In both emerging and developed countries, increased political stability and confidence in economic policy was followed by an increase in future cash flows. This increase also led to an increase in stock market returns for those developed countries. However, it is unclear whether this impact is positive or negative, as both reactions have been observed in similar scenarios.

Hira (2017) investigated how the behaviour of corporate investing was affected by political uncertainty from 1998 to 2012, observing both the short and long-term changes in stock market returns following the event that caused the uncertainty. There was an overall negative relationship apparent between the stock prices and political instability which was attributed to several factors. The

change in the level of inflation following the political events had a negative relationship with the stock prices, whereas the change in the level of industrial production had a positive relationship with the stock prices. The researcher noted that special attention should be paid to maximising the industrial production during a time of political instability as the stock market prices will, consequently, be maximised.

Zach (2003) explored the effect that changes in the political environment of Israel had on the stock market between 1993 and 1997; the political events observed were highly varied in nature. The stock returns following an event were found to be larger in absolute value than those that did not follow a political event, with the overall conclusion being that the occurrence of a political event gives immediate rise to more extreme returns. The stock returns for those stock listed in both Israel and the US also displayed the same extreme reaction following a political event than not following one. This reaction was not apparent for those Israeli firms that were not listed in Israel but instead only listed in the US. It is unclear from the literature above whether the cross-listing of stocks makes them more, or less, susceptible to abnormal returns following political events. Due to this, the study will also investigate cross-listing to increase the understanding of this variable.

Bin, Chen, & Chen (2005) looked specifically into the reaction to the occurrence of political events exhibited by high and low foreign holding firms. They found that the most significant reactions were apparent following events associated with political elections, changes to economic policy and cross-strait relationships, with a significant set of abnormal returns observed. Firms with a low holding of foreign assets exhibited a more significant reaction to political uncertainty when compared to firms with a high foreign asset holding. When a risk-adjusted, multi-variate regression model was examined, there were no longer significant abnormal returns observed.

Firms with both a low and high holding of foreign assets exhibited the same level of abnormal returns following the political event, with the returns characterised as less volatile post-event. As with the investigation of cross-listed firms, this variable is not one that has been widely investigated. Conclusions cannot be drawn on this issue due to little available information. For this reason, this variable will also be examined in this study with the view of drawing useful conclusions.

The impact that political instability has on stock return volatility has been widely debated (Beaulieu, Cosset, & Essaddam, 2005; Beaulieu, Cosset, & Essaddam, 2006; Darby & Roy, 2019). The former found that the level of stock volatility fluctuates with the degree of political instability that the firm experiences, with an apparent increase in the total variance. The shock from political announcements, like election polls, has a significant impact on the stock return volatility. Such shock influences the fluctuations of stocks as well as exchange rates. The stock return volatility was affected strongly by political instability in

firms that were purely domestic, but unaffected in firms that focused mostly on international operations. In addition to this, when the degree of political instability increased, the stock returns were significantly reduced (Mehdian, Nas, & Perry, 2008; Arouri, Estay, Rault, & Rouband, 2016). This impact was more apparent during periods of extreme volatility, with the effect persisting for longer than in lower volatility periods (Hudson & Urquhart, 2015). A weaker effect was observed when there was a period of lower volatility, and the effect was not persistent, like in the extreme periods.

Hillier & Loncan (2019) found that prior to the political event, politically connected firm returns were found to experience lower volatility than the market average. Following an event, the firm returns became more volatile, with the volatility level exceeding that of the market average. The stock return volatility was significantly affected, both following an event and prior to one. Following an event, the stock return volatility increased in most cases, however, the degree of which the volatility changes correlates to the degree of political instability present. Domestic firms were found to be more strongly affected than international ones, with international firms exhibiting insignificant volatility abnormalities.

Bouoiyour & Selmi (2017) observed that the technological and utilities sectors were the most negatively affected by this political event, whereas the healthcare, oil, gas and real estate sectors were instead positively affected. Recent studies (Aminu, 2017; Aminu, 2019) show that volatile energy prices amplify economic recessions. The degree of which the stock returns are affected varies significantly by industry, with a definite relationship present between these variable and stock return abnormalities. The most significantly affected industries were the airline, hotel, financial, technological, healthcare, utilities, oil and gas, and real estate industries. As there is not a considerable amount of research into this variable, it will be explored within this study to establish whether the suggested relationship is valid.

Evidence from literature has shown that political instability around the world is consistently affecting both government and trading decisions. If the effects are understood, then they are easier to anticipate, and can consequently be minimised or, at the very least, considered when making financial decisions following a significant political event. The exploration of this topic and the identification of a set of companies which are most affected in this situation will mean that the company types which commonly produce a positive abnormal return during periods of uncertainty can be established. The study will observe factors like the industry which each company belongs to, the proportion of foreign assets held by each company, the age of each firm and the number of exchanges that each company is cross-listed in outside of the EU.

Subsequent recommendations concerning which companies should be invested in can be made, and which should be avoided to minimise any loss. As the combination of variables chosen is one which has not yet been explored, the re-

sults could yield new conclusions and therefore make valuable contributions to this subject area.

3. Methodology

This is an event (case) study of testing a causal relationship between two variables based on real world data. This event study is a quantitative investigation which examines how a firm is affected by the occurrence of an unexpected event. As the impact that political events have on the stock market is being observed, this method is, in theory, the optimal method to be use.

Table 1 shows a selection of six political events, and the date of each, for this study. Depending on the individuals political outlook, the nature of each event does not give any indication of whether the stock market should, in theory, respond positively, neutrally or negatively.

A sample of 101 companies listed on the FTSE100[2] is selected, over the period spanning from 17/09/2015 to 04/06/2019. The choice of FTSE100 firms also offers a cross-section of industries, ages, foreign asset holding and cross-listing. Using daily return data, abnormal returns are directly calculable from stock market returns using this method and, subsequently, can be analysed to infer their significance. The data used is susceptible to change by external stimuli.

3.1. Choosing the Time Parameters

The event date, the estimation window[3] and the event window determines the time parameter. As this period is theoretically unaffected by the event in question, it is used to represent the normal returns which would be observed if the event had not occurred. In the case of this period, it will span 160 days, from 200 days before the event date to 40 days before the event date, [−200, −40]. The event window is defined as the window around each event in which the abnormal changes in the stock returns will be observed. This study will initially define an 11-day event window as 5 days before and after the event date, [−5, +5], but will also examine the significance of smaller windows within this period. As this study is investigating the immediate effects surrounding political events, this small event window will suffice to infer the short-term impact caused.

3.2. Market Model Parameters

Before the abnormal returns observed by a firm over an event period can be calculated, the normal daily returns which would have been observed if this event had not taken place must first be established. In this study the market model to obtain these normal return values will be used.

[2]The companies included on the FTSE100 are, by definition, UK listed and would, consequently, be assumed to be more strongly affected by British political events than a different sample of primarily foreign companies.

[3]The estimation window refers to the time period in which the parameters used to calculate the abnormal returns are estimated.

Table 1. Summary of event information.

	Event date	Description
Event 1	23/06/2016	EU referendum result announced
Event 2	29/03/2017	Article 50 triggered
Event 3	15/01/2019	EU exit deal rejected for first time
Event 4	21/03/2019	EU exit two-week delay
Event 5	11/04/2019	EU exit 'flexibly' delayed for six months
Event 6	24/05/2019	Prime Minister resignation

According to Mackinlay (1997), the market model assumes that the individual return of any firm is related to the market portfolio return, and so, by calculating the parameters of this relation, predictions can be made concerning the values of future normal returns. This relation is defined by (1), where R is the return of firm i on day t and R_m is the market return on day t, calculated as the average return of all firms included in the market portfolio.

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} \tag{1}$$

$$E\left(R_{i,t}\right) = \alpha_i + \beta_i R_{m,t} \tag{2}$$

$$AR_{i,t} = R_{i,t} + E\left(R_{i,t}\right) \tag{3}$$

$$CAR = \sum_t AR_{i,t} \tag{4}$$

These parameters are calculated using the returns observed from the estimation window. The parameters α_i and β_i are the firm specific regression coefficients, obtained using OLS regression, whereby the individual firm returns are regressed on the market returns.

Once the calculation of the market model parameters from the estimation window has been completed, the calculation of the expected individual firm returns for the 11 days in the event window can be conducted by (2), where α_i and β_i are the regression coefficients calculated over the estimation window. This will give the theoretical value for the normal firm returns that would have been obtained in the absence of a political event.

Using the expected normal return calculation, the abnormal return value for each event day can now be obtained. This is calculated by observing the difference between the expected firm return for the specific day, obtained using the method discussed above, and the actual observed return. This is given by (3), where AR is the abnormal return of firm i on day t.

If this abnormal return value is negative, it implies that the firm return in this event period is lower than what was expected, meaning the event negatively affected the stock return. If this abnormal return value is positive, it indicates that the firm return in this event period is higher than what was expected, meaning that the event positively affected the stock return.

The cumulative abnormal returns are used to examine the significance of the

abnormal returns over a short period of time around an event date. These values are calculated by summing the abnormal returns over a chosen period. A selection of short periods will be examined in this study to obtain a full representation of how the event has impacted the stock returns and at which point it was most affected. The value of the cumulative abnormal return is calculated by (4).

3.3. Defining Variables

Regression analysis is used to examine the relationship between two or more variables. Annual data is used for each time series variable and dummy variables will be used to incorporate static variables. The variables in this study are categorised below:

Dependent: Cumulative Abnormal Returns = CAR;

Control: ln(Total Assets) = ln(TA);

Total Debt/Total Assets = TD/TA;

Market Value of Firm/Book Value of Firm = MV/BV;

Return on Equity of Firm = ROE;

Independent: Industry, D_i;

Foreign Assets/Total Assets = FA/TA;

Cross-Listing, C_i;

Firm Age, F_i;

Beginning with the industry type, these dummy variables are defined as follows:

$$D_i = \begin{cases} 1, \text{if stock is in industry } i \\ 0, \text{otherwise} \end{cases}$$

where i is defined for all but one industry, to avoid the dummy variable trap. The control industry in this case is the financial industry, so all other industries[4] (D_1-D_9) are measured against this. The regression coefficient for each dummy measures the difference in value between the control dummy coefficient and the variable dummy coefficient. This means that a higher variable coefficient indicates that this industry is associated with higher cumulative abnormal returns.

For the cross-listing variable the focus is on the number of foreign exchanges which the stock is listed on, outside of EU exchanges. Every company in the sample is listed on at least one exchange outside of the EU, so this variable will focus on companies that are listed on only one exchange outside of the EU and those listed on more than one, where j is the number of exchanges the company is listed on outside of the EU. This dummy variable is defined below:

$$C = \begin{cases} 1, \text{if } j = 1 \\ 0, \text{otherwise} \end{cases}$$

3.4. Regression Model

The regression model is given as follows:

[4]See Table 2 for details.

$$CAR = \alpha_0 + \alpha_1 D_1 + \cdots + \alpha_9 D_9 + \alpha_{10} C_1 + \cdots + \alpha_{13} C_3 + \alpha_{14} F_1 + \cdots + \alpha_{20} F_6 + \alpha_{21}\left(\frac{FA}{TA}\right) + \alpha_{22} \ln(TA) + \alpha_{23}\left(\frac{TD}{TA}\right) + \alpha_{24}\left(\frac{MV}{BV}\right) + \alpha_{25} ROE + \varepsilon_t \quad (5)$$

where ε_t is the residual error term in the model and the α_n terms refer to the regression coefficients for each variable. These coefficient values are all with respect to the control variable, which is represented by the intercept term, α_0. A negative (or positive) value present for each variable coefficient would indicate that this variable had a weaker (or stronger) effect on the cumulative abnormal return value than the control variable.

4. Results

Investors are consequently more informed when making investment decisions during periods of political uncertainty and can strategise to minimise losses.

4.1. Descriptive Statistics

The sample size for each event consists of 101 companies, of varying age, sector, percentage holding in foreign assets and number of listed exchanges outside of the UK and the EU. As there is sometimes data missing for certain variables, some observations will have to be omitted when performing the regression analysis.

Table 2 shows the distribution of companies selected for each sector. The weighing between industries is not equal, as there is a higher number of companies in the consumer services industry when compared to other industries like the telecommunications or the technological industries. For the industries with a greater number of companies, it will be possible to make inferences into the trends of how this industry is impacted by the political events whereas, for the industries with fewer companies in the sample it will be less clear if there is a reaction trend.

Figure shows the daily closing values[5] of FTSE100 for the six of events. The index fell after each event except for the day when Brexit was delayed for six more months. However, the picture is not clear as peculiar when one studies the market holistically as will be seen below.

Like with industries, the ages of the firms in the sample are very diverse, spanning from 3 years to 129 years old. Although there is a fair amount of companies in each age range, the highest volume lies within the 21 to 40 years old, whereas the lowest volume is found to be less than 10 years old. Even with this somewhat more equal distribution of companies amongst the different age ranges, there is still a small number in each range, which will make it difficult to drawn firm conclusions about the relationship between this variable and political instability. The results can be used to make speculations about the relationships and suggest future methods to test these ideas further.

[5]The index value is on the *y*-axis, while the intervals are on the *x*-axis. 0 represents the event day.

Table 2. Distribution of companies across sectors.

Variable	Sector	Number of companies
Control	Financial	23
D_1	Basic materials	10
D_2	Industrial goods	16
D_3	Consumer goods	12
D_4	Healthcare	5
D_5	Consumer services	23
D_6	Oil and gas	3
D_7	Telecommunications	2
D_8	Utilities	5
D_9	Technology	2

All firms to be examined in this study are cross-listed outside of the UK, with all listed on more than one other exchange. Most of these exchanges, however, are still within the EU meaning that they would also be affected by the political instability to some degree. This variable examines the companies which are only minimally listed outside of the EU to determine if even a small amount of cross listing outside of the affected area impacts the significance of this variable. The companies in this sample are listed on between one and six exchanges outside of the EU, with the variable referring to the 54 companies that are listed on only one other exchange outside of the EU. The study will at most be able to speculate a pattern from the data for these firms as there is insufficient information to draw any firm conclusions. Further research on this topic should incorporate a selection of firms that are not listed at all outside of the EU in order to make a comparison with the sample.

The proportions of foreign assets held by each company in this sample are very diverse. There are 18 companies with no data concerning this variable, meaning that the results obtained may not be as valid and reliable as results obtained from data without missing values. There are 24 firms that do not hold any foreign assets, 34 firms whose total assets held are over 50% foreign and 24 firms whose total assets held are under 50% foreign. This distribution is relatively equal amongst the intervals, and therefore will be easier to make comparisons between the results. To gain results that are more representative of the overall reaction following the occurrence of political instability, a sample with a full set of values would be preferable. Additionally, the use of a higher number of observations would add to the validity of the results and assist when making inferences from the data.

4.2. Cumulative Abnormal Returns

For each company, the cumulative abnormal returns (CARs) were calculated for the six events over a selection of intervals: [−5, +5], [0, +5], [0, +2], [−5, −1] and

[−1, +1]. Figure 1 depicts the daily closing values of the FTSE100 index. These values differ from individual company closing value. These intervals represent both a pre-event and post-event period, as well as an overall, and sub-intervals representing the entire event window. The CAR values for each of the companies are varying in size for all intervals, some being negative and others being positive.

Event 1: *EU Referendum Results*

The interval spanning the entire event window, [−5, +5], was examined initially, with only nine companies demonstrating significant CARs over this period. The strongest significant, negative CAR had a value of −0.1681, proving to be higher in absolute value than the most strongly significant, positive CAR which had a value of 0.0842. There was, however, a greater number of significant, positive CARs found in this interval. When this interval size was decreased to [−1, +1], only one company showed a significant result, meaning that this interval was effectively insignificant.

Two post-event periods were then examined, [0, +5] and [0, +2]. Like with the above intervals, the larger of the two displayed a greater number of significant CARs, with the smaller interval only exhibiting two significant results making it basically insignificant. The significant CAR with the greatest absolute value over either of these periods was −0.3506, which was significantly larger than the other values. The pre-event interval, [−5, −1], exhibited the same number of significant CARs as [0, +5] but with the largest abnormality being significantly smaller and positive, with a value of 0.0811.

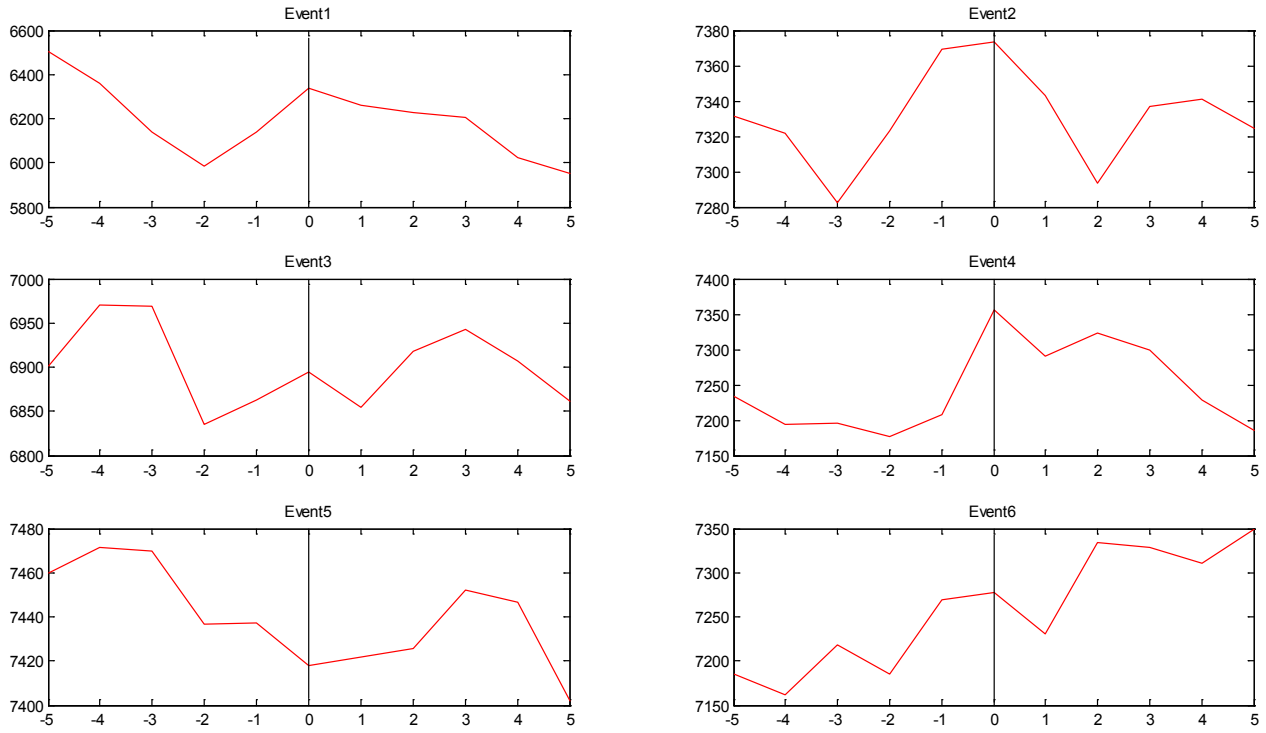

Figure 1. FTSE100 daily closing values across events.

Event 2: *Article* 50 *Triggered*

The overall event windows for this event displayed results similar to event 1. There were fourteen companies with significant CARs in the larger interval, the largest of which being 0.1062, however, the smaller window saw only two companies significantly affected which again made this interval effectively insignificant. With respect to the post-event intervals, a total of twelve companies displayed significant CARs over [0, +5] which, again, was significantly more than the smaller post-event window, [0, +2], where only two companies exhibited significant CARs. The CAR with the largest absolute value was again positive, with a value of 0.0722. The pre-event interval exhibited the most significant results out of all intervals. Twenty companies were found to exhibit significant CARs, the majority of which were positive in nature with the largest being 0.0971.

Event 3: *EU Exit Deal Rejected for First Time*

On examination of the event windows [−5, +5] and [−1, +1], a total of twenty-two companies reacted significantly over the larger interval, whereas only nine companies were found to be significant in the smaller interval. In both intervals most significant results were found to be positive in nature, the largest of which being 0.1738. The post-event intervals, [0, +5] and [0, +2], displayed slightly different results to the other events, with this event exhibiting a greater number of significant CARs over the smaller interval rather than the larger. Over both intervals, however, the CAR that was greatest in absolute value was found in the larger interval with a value of −0.1146 and was significantly greater than that of the smaller interval. Whilst one of these intervals did display mostly positive results, the other was primarily negative in nature, disagreeing with the other intervals in this event. The pre-event window saw twelve significant results which were, again, mostly positive, the greatest of which being 0.103.

Event 4: *EU Exit Two-Week Delay*

Investigation of the reaction of the entire event window, [−5, +5], for this event found only six companies with significant CARs, most of which showing positive abnormalities. The greatest abnormality was, however, negative in nature with a value of −0.205. A slightly higher volume of companies displayed significant abnormalities for the interval [−1, +1], with ten in total reacting significantly. In this case most were displaying negative abnormalities. There were notably more significant CARs in the post-event intervals compared to the overall periods that were examined. Whilst the larger window, [0, +5], displayed thirteen significant results, the smaller period, [0, +2], saw fifteen significant abnormalities apparent. Both intervals saw the significant abnormalities mostly negative in nature, the greatest of which was valued −0.0751. The pre-event window, [−5, −1], displayed considerably less significant CARs than the other intervals with only four companies showing significant abnormalities, an equal number of which being positive or negative. The CAR that was highest in absolute value was negative with a value of −0.0965.

Event 5: *EU Exit "Flexibly" Delayed for Six Months*

This event exhibited the most significant overall reaction out of all the events. There were twenty-one companies in total that were significantly impacted in the period [−5, +5], whilst the observation of a smaller interval, [−1, +1], only saw eight significant CARs. The abnormalities for these intervals were mostly equally positive and negative, with the larger interval exhibiting significant results that were primarily greater in value than the smaller. The highest of these abnormalities was −0.1411. The post-event window, [0, +5], saw nearly a third of companies exhibit a significant abnormality following this event, this interval displaying the greatest volume of significant CARs over the entire investigation. The smaller interval, [0, +2], displayed a much lower number of significant abnormalities, with only thirteen companies showing an impact. Both post-event intervals indicated an overall negative reaction, the greatest of which being −0.1785. The pre-event interval, [−5, −1], was notably less impacted than the other windows, exhibiting only ten significant CARs. The majority of these significant CARs were positive, contradictory to the other intervals which displayed primarily negative or neutral overall abnormalities. The CAR with the highest absolute value for this interval, however, was considerable smaller in value than that of the others but still negative in nature, with a value of −0.0683.

Event 6: *Prime Minister Resignation*

The reactions from this event were noticeably less significant than from the other events. Over the interval [−5, +5], there were only five companies which exhibited significant CARs, whilst only one company displayed a significant result for the period [−1, +1]. These abnormalities were mostly negative, but only slightly, with the CAR with the greatest absolute value being 0.0724 which is clearly positive in nature. The post-event window, [0, +5], displayed eight significant results, whereas the smaller interval, [0. +2], showed no significant abnormalities. The abnormalities were mostly positive in this case, but again only just, with the strongest valued CAR being −0.0917, which is negative in nature. The pre-event interval, [−5, −1], showed the greatest value of significant CARs for this event, with eleven companies exhibiting significant abnormalities. These abnormalities were strongly negative in nature, the strongest of which being −0.0704.

4.3. Abnormal Returns

The *AR* was calculated for each company for each day in the interval five days prior to the event and five days following.

Event 1: *EU Referendum Results Announcement*

Data from event 1 showed several companies with significant abnormal returns prior to the results announcement from the EU referendum, indicating that the anticipation of the result may have impacted the stock market on the days prior to the event. The abnormality with the highest absolute value was also found on the pre-event day with the greatest number of significant abnormal

company returns, with a value of 0.0061. On the day of the actual event, only four companies exhibited significant abnormal returns which do not clearly imply that there is a significant overall effect on this day or the days preceding. The next day, however, saw seventy-eight companies in total suffer incredibly significant abnormalities in their returns with these abnormalities, somewhat, persisting for the days following. Day 1 post event exhibited an average abnormal return of −0.0173 which was then followed by a stronger, negative abnormality of −0.0192 the next day, with sixty-four companies demonstrating significant abnormalities. This was the most apparent abnormal return exhibited over the entire interval for this event, with the third and fourth days following the event displaying mild positive abnormalities of 0.0062 and 0.0001. On day 3, 4 and 5 post-event, however, there was at most, approximately, a third of companies found to be significantly affected by the event indicating that, whilst the returns from day 1 and 2 were significantly abnormal, the days following were somewhat normally impacted.

Event 2: *Article* 50 *Triggered*

Unlike with event 1, the triggering of Article 50 did not seem to cause a significant impact on the stock market. A maximum number of seven companies were found to suffer significant abnormalities over the interval, with this peak occurring on the first day following the event. The average abnormality on this day was still very small, displaying a value of 0.0016. The remaining days in this interval were equally, if not more, uneventful, with the actual day of the event not giving rise to a single significant abnormality. It is unclear through these results whether the market was in fact at all impacted by this event, pre or post-event, as the abnormalities are both minimal in value and insignificant.

Event 3: *EU Exit Deal Rejected for First Time*

This event proved to have a stronger impact on the stock market than event 2, though not nearly as strong as event 1. The most significant days in this case were found to be five days prior to the event and the day after, with twenty-nine and eighteen companies exhibiting significant abnormalities, respectively. The pre-event interval displayed marginally more significant abnormalities than the post-event window in this case, perhaps implying that either the event was anticipated, or that the results were affected by a different event. An average abnormal return of 0.006 arose five days before the event occurred, this being the strongest abnormality apparent over the entire event window. This value varied over the event window with some days exhibiting negative abnormal returns, whilst others positive. The first day following the event saw an average abnormality of 0.0045, with this abnormal return value fluctuating from positive to negative over the remaining days, steadily becoming less significant.

Event 4: *EU Exit Two-Week Delay*

This event, like event 2, had a somewhat insignificant impact on the stock market over the event period. The day prior to the event occurring saw fourteen companies exhibit significant abnormalities, with an average abnormal return of

0.0015. The day of the event was fairly insignificant with only four companies showing significant abnormalities and an average abnormal return of −0.0025. This level of significance persisted for the remainder of the interval, with the average abnormality fluctuating around zero. The strongest abnormal return was exhibited two days prior to the event occurring with a value of 0.0039, however, this significant abnormality was only observable in eight companies. Whilst these results do not give much indication as to whether the market was significantly impacted by this event, it is apparent that there were abnormalities in the returns present following the exit delay, regardless of their small size.

Event 5: *EU Exit "Flexibly" Delayed for Six Months*

In contrary to the other events, the results following this delay displayed the strongest, most significant abnormality occurring on the actual day of the event. There were eighteen companies in total that exhibited significant abnormal returns on this day, with an average value of −0.0049. The post-event interval was clearly more significantly impacted than the pre-event interval due to the greater number of significant companies on each day, with the highest volume apparent four days after the event had taken place. Each of the average abnormalities from the event day were negative in value, clearly indicating a negative effect from the event, whilst the average abnormalities prior to the event fluctuated in value between both positive and negative. Five days prior to the event, the average abnormal return was very small in absolute value, with an abnormality of −0.0001, which steadily increased until its peak on the announcement day of the delay.

Event 6: *Prime Minister Resignation*

On the day the Prime Minister announced her resignation, the effect of the stock market was essentially insignificant, with just two companies exhibiting significant abnormal returns. The day following this announcement did not see a single company in this sample display significant abnormalities, with the value of the average abnormality equalling −0.0001, which is trivial in size. Two days post-event saw fourteen companies in total display significant abnormal returns, the highest number in the post-event period, with an average abnormality of 0.0026. The highest volume of significant companies was found two days prior to the resignation announcement, where nearly a third of companies exhibited significant abnormal returns, the average value being −0.0033. This peak in significant companies was an anomaly compared to the surrounding days in the pre-event period, where the next highest volume of significant companies was equal to six. Out of this set of pre-event average abnormal returns, nearly all were negative in value, potentially implying that this event was anticipated and thought of in a negative fashion

4.4. Regression Analysis

Regression analysis was undertaken to test if there was any significant correlation between each of the independent variables and the cumulative abnormalities in the stock returns.

Event 1: *EU Referendum Results Announcement*

The second column in Table 3 shows four variables are significantly linked with the CARs for this event. Two industries were found to be significantly impacted by the occurrence the referendum, these being the healthcare and the utilities industries. Companies in the healthcare industry showed to be very significantly linked at the 1% level, with a strong coefficient value of 0.1343 present from this regression. The utilities industry was also significantly linked at the 5% level, with a slightly lower but still strong coefficient value of 0.1164 present. The other industries, however, proved to be insignificant in this regression and therefore cannot be linked to the CARs. Also significantly linked to the CARs at the 5% level was the proportion of foreign assets held by each company. This variable, however, exhibited a weak coefficient value of 0.0008, implying that whilst the foreign asset holdings had a definite impact on the overall abnormalities observed following this event, this impact was small at best. The final variable that was found to be significantly linked at the 10% level to the CAR variable was the control variable total leverage of each company, defined as the total debt over total assets, with a coefficient value of 0.1513, the strongest found in this

Table 3. Summary of regression analysis results for the six events.

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
Constant	−0.1660	−0.0392	−0.0609	0.0361	−0.0210	0.0109
ln(TA)	0.0036	0.0015	0.0063	−0.0023	−0.0009	−0.0027
TD/TA	0.1513*	0.1154***	−0.0348	−0.0469	−0.0359	0.0419
MV/BV	0.0006	0.0001	−0.0057	−0.0056	0.0007	−0.0004
ROE	−0.0002	0.0001	0.0005*	0.001***	−0.0001	0.0001
Industry 1	−0.0570	−0.0611	−0.0781	−0.0554	0.0504	−0.0233
Industry 2	0.0396	−0.0001	0.0227	−0.0120	0.0068	−0.0145
Industry 3	0.0097	−0.0050	0.0511***	−0.0130	0.0181	−0.0164
Industry 4	0.1343***	0.0100	−0.0521	0.0073	0.0782***	0.0167
Industry 5	−0.0080	−0.0008	0.0192	−0.0178	0.0091	0.0039
Industry 6	0.0780	−0.0361	−0.0660	−0.0048	−0.0054	−0.0018
Industry 7	0.0011	−0.0054	−0.0747	0.0094	0.0384	0.0220
Industry 8	0.1164**	−0.0414	0.0117	0.0569*	0.0766**	0.0379
Industry 9	0.0169	0.0017	0.0292	−0.0342	0.0867**	−0.0086
FA/TA	0.0008**	0.0000	−0.0001	0.0003	0.0002	0.0005***
Firm Age	0.0001	0.0000	−0.0003	0.0000	0.0004**	0.0001
Cross-listing	0.0008	0.0005	0.0080	0.0124	−0.0086	−0.0048
R-Squared	0.4629	0.377	0.555	0.3076	0.3416	0.3203
No. of Observations	74	76	75	75	75	74
F-Test	3.07	2.23	4.52	1.61	1.88	1.71

regression. This model had an R^2 value of 0.4629 meaning that approximately 47% of the data was accurately represented by the model. The F-statistic was very significant at the 1% level, with a value of 0.0009 implying that there is evidence to conclude that at least one significant regression coefficient that differs from zero.

Event 2: *Article* 50 *Triggered*

The third column in **Table 3** shows three variables for this event proved to be significant in the regression analysis. The first was the total leverage of the companies which was strongly significant at the 1% level, displaying a strong coefficient value of 0.1154. The other significant variables were industry variables, these being the basic materials and the utilities industries. The basic materials industry had a stronger coefficient than utilities, with a value of −0.0611 compared to −0.0414, and was more significant at the 1% level. The R^2 measure for this regression was equal to 0.3770, indicating that around 38% of the data was fitted successfully by this model. The F-statistic was again significant but in this case at the 5% level, with a value of 0.0133 implying at least one significant regression coefficient in the model.

Event 3: *EU Exit Deal Rejected for First Time*

This event displayed the greatest number of significant variables out of all the events. The fourth column in **Table 3** shows five industries in total exhibited significant *p*-values at either the 1%, 5% or 10% level, these industries being the basic materials, consumer goods, healthcare, oil and gas and telecommunications industries. The strongest coefficient out of these was exhibited by the basic materials industry, with a value of −0.0781. The most significant industry, however, was found to be the consumer goods industry, displaying a coefficient of 0.051. Two of the control variables were also found to be significant in this event, with the growth and performance variables exhibiting significant results at the 1% and 10% levels, respectively. Whilst neither of the coefficients were particularly strong, the strongest was displayed by the growth variable, with a value of −0.0056458, whereas the performance variable displayed a small coefficient value of 0.0004867. The final variable to show a significant result was the firm age variable which was found significant at the 10% level, with a coefficient of −0.0003. The R^2 value for this event was equal to 0.5550, meaning that just under 56% of the data was fitted well by the model. This implies that this model is a better one than those for both event 1 and 2. The F-statistic *p*-value was very small, practically non-existent, with a value of 0.0001, indicating clearly that at least one of the stated variables had a significant effect on the CAR value during this event.

Event 4: *EU Exit Two-Week Delay*

Event 4, fifth column in **Table 3**, saw a total of four variables significantly linked to the dependent CAR variable. The first, and most significant, was the control variable referring to the performance of each company. The coefficient for this variable, however, was small, with a value of 0.001, whereas the growth variable displayed a slightly larger coefficient of −0.0056 and was significant at the 1% level. The other significant variables referred to the different industries,

these being basic materials and utilities. These industries were significant at the 10% level, with similar strength coefficients of −0.0554 and 0.0569, respectively. The R^2 value for this model was 0.3076, indicating that only approximately 30% of the data was well fitted using this model, a significantly lower amount than the first three events. The *p*-value for the F-statistic was significant at the 10% level, implying that there is potential that at least one variable is significantly different from zero.

Event 5: *EU Exit "Flexibly" Delayed for Six Months*

This event saw three industry variables significantly linked to the CAR value, with all of these displaying significant coefficients at the 1% or 5% level. Table 3, sixth column, shows the significant industries were healthcare, utilities and technology, with the technology industry displaying the strongest coefficient of 0.0867, significant at the 5% level. The healthcare industry was the most significant out of the three, with a coefficient value of 0.0782. The utilities industry was slightly less significant but similar in coefficient value, with a significant value of 0.0766 at the 5%. The final variable to display significance was the firm age of each company. Whilst found to be significant at the 5% level, this variable exhibited a potentially insignificantly small coefficient value of 0.0004. This model had an R^2 value of 0.3416, indicating that less than 35% of the data was well fitted by this model. The F-statistic *p*-value proved to be significant at the 5% level with a value of 0.0416. Thus, the evidence that the CARs were linked to at least one of these variables.

Event 6: *Prime Minister Resignation*

This event only had one variable that was found to be significant, presented in the seventh column of Table 3, which is the variable representing the proportion of foreign assets held by a company. Whilst this variable was found to be highly significant at the 1% level, its coefficient of 0.0005 was very weak in value and therefore somewhat insignificant. The R^2 value for this model was 0.3203 indicating that just over 32% of the data was well represented by the model. The F-statistic *p*-value was significant at the 10% level with a value of 0.0708, indicating that there is sufficient evidence to conclude that at least one of the variables has a significant impact on the CAR value.

4.5. Robustness

Testing the regression models for multicollinearity, heteroskedasticity and outliers is conducted to determine whether any of these factors have affected the validity of the results. The variance inflation test is used to test for multicollinearity where the results from are observed to distinguish if any have a value greater than ten. The Breusch-Pagan test for heteroskedasticity is used to observe if this condition is violated. Finally, to eliminate outliers in the results a prediction of a group of studentised residuals to fit the data must be made and then those that are greater in absolute value than two disregarded. Rerunning the regression without these values will improve the accuracy of the model and should make

the results more accurate.

Event 1: *EU Referendum Results Announcement*

The variables in this event showed no sign of multicollinearity, with every variable returning a VIF value lower than three. This was reinforced by a correlation table which showed no definite correlation between any of the variables, neither positive nor negative. The heteroskedasticity test returned a *p*-value of 0.001, which clearly shows sufficient evidence to reject the presence of homoskedasticity at every level meaning heteroskedasticity is present. To accommodate for this and alleviate the effects, the robust regression model must then be used instead of the standard OLS regression model. Whilst the R^2 value remained unchanged, this model showed only industries 4 and 8 and the foreign assets variable to be significant at any level, meaning that the leverage variable was no longer significant. When looking again at the standard regression model, there were thirty-one observations that were deemed to be outliers and therefore excluded from the sample. The new regression model displayed an R^2 value of 0.5091, a significant improvement on the original model, and showed industries 2, 4, 6 and 8 to be significant at the 1% or 5% level, as well as the foreign assets variable.

Event 2: *Article* 50 *Triggered*

These variables, again, all displayed VIF values of less than four, meaning there was no sign of multicollinearity. This result was echoed by the correlation matrix, implying that none of the variables were linked and consequently affecting the results. The test for heteroskedasticity exhibited an insignificant *p*-value of 0.4441, indicating a constant variance which is what is wanted. In the test for outliers, thirty values were found to be anomalous and were therefore excluded from the model. This model displayed a significantly higher R^2 value than the original model of 0.5466 compared with 0.3770, implying that the data is a much better fit for this model. The significant variables were very similar with the leverage variable and industries 1 and 8 still showing significant results, as well as the growth variable.

Event 3: *EU Exit Deal Rejected for First Time*

There was no multicollinearity detected in this model, with the VIF results all displaying a value of three or less. A correlation matrix also implied no significant correlation between any of the variables, meaning that it can assume that the results are unaffected by multicollinearity. A *p*-value of 0.4023 was observed from the Breusch-Pagan test for heteroskedasticity, implying that the presence of homoskedasticity cannot be rejected and it can be assumed that there is a constant variance. There were thirty values eliminated from the model that were found to be outliers, improving the R^2 value by nearly 10% from 0.5550 to 0.6535. The significant variables showed strong similarities to the original model, with the variables firm age, industries 1, 4, 6 and 7, growth, performance and the natural log of total assets showing significant results and industry 3 now display an insignificant result.

Event 4: *EU Exit Two-Week Delay*

This event saw all VIF values to be less than three, implying that, like with the other events, there was no multicollinearity present. This was reinforced by the correlation matrix which displayed the same implications. The test for heteroskedasticity returned a *p*-value of 0.0019, which means there is evidence to reject the presence of homoskedasticity at the 1% and conclude that the variance in this case is not constant. A robust regression model was run following this which resulted in industries 1, 8 and 9 displaying significant results, as well as the growth and performance variables. The R^2 value, however, remained unchanged implying that this model did not fit the data any better than the original. The outliers were assessed on the original regression model, where thirty-one values were found to be anomalous and removed from the sample. The significant variables in this case were performance and industries 1 and 8. The R^2 value decreased for this model by 0.1%, indicating that this model was a worse fit for the data and perhaps the original model was the best fit.

Event 5: *EU Exit "Flexibly" Delayed for Six Months*

These variables were not found to be multicollinear, showcased by their VIF values of below 3 and their insignificant correlation matrix. A test for heteroskedasticity returned a *p*-value of 0.1025, implying that the presence of homoskedasticity cannot be rejected at any level, and can conclude that there is a constant variance. Examination of the outliers in this data saw thirty-two observations removed from the sample and rerunning the regression with this sample saw the R^2 value increase significantly from 0.3416 to 0.5125. The significance of the variables became more apparent with firm age and industries 4, 8 and 9 found to be significant at the 1% level and industry 1 significant at the 5% level.

Event 6: *Prime Minister Resignation*

Finally, event 6 again found that there was no multicollinearity present within these variables, with the VIF values all below three and the correlation matrix showing no signs of a relationship between any of the variables. The Breusch-Pagan test for heteroskedasticity resulted in a *p*-value of 0.6212, meaning that is insufficient evidence to reject the presence of homoskedasticity and it can be concluded that heteroskedasticity is not present within the variables. Predicting and investigating the studentised residuals meant that twenty-nine observations were removed from the sample to eliminate outliers and the new model was regressed. This new model had an R^2 value of 0.4765 compared to the original models which was only 0.3203, meaning that an extra 15% of the data was well fitted to this new model. Industry 8 was now found to be significant at the 5% level, with the foreign assets variable still showing strong significance.

5. Discussion

The results depict a weak effect on some event days. Investors are rational and have anticipated some outcome, thus the lack of reaction. Also, rational investment decisions are taken based on future expected outcome, not current event.

The presence of political uncertainty has contributed to the UK stock market volatility despite the deep institutional structures in the economy. Overall, the data suggest that the day of the event is unaffected by the occurrence of the political events studied. The first-day following, however, was more strongly impacted by the uncertainty, with the results indicating in general that the post-event period was more strongly linked to abnormalities than the day of the event. The larger intervals when examining the CARs were generally found to be more significant. However, no common trends were indicating the nature of these abnormalities. The utilities, healthcare and basic materials industries exhibited significant abnormalities in half of the events indicating a significant link between these industries and abnormal returns in the stock market. The variable representing the proportion of foreign assets held by each company was also found to be significant in two of the events, suggesting a link between this variable and the return abnormalities. Each event was found to have a significant number of outliers present in its sample, the removal of which was found to increase the R^2 value for most of these events. The significant variables, however, for the most part, remained unchanged when outliers and heteroscedasticity were eliminated.

The occurrence of the political events that were examined displayed an apparent correlation with the abnormalities in the stock market. Whilst the lack of reaction on the actual event day is a shock, it is understandable due to the fact that the news of most of the events was released late in the day and, therefore, the stock market would have been closed before it had a chance to react. This also explains why the effect is displayed on the first day following an event, as this would be the first chance available for the market to reflect the abnormalities. The occasional observation of substantial abnormalities prior to the event day is also explainable. As Brexit is a topic that is very present in the news and therefore very public, it is realistic to speculate that some of the events were not a shock and the pre-event abnormal returns are due to investors anticipating their occurrence.

Following observations of the CARs over several intervals, it is not possible to draw any firm conclusions concerning the significance of a relationship between the CAR values and political instability. It appears that generally, the results are more significant over a considerable period compared to a small one, but it is unclear whether these abnormalities usually are more positive or negative.

There was a definite correlation apparent between the industry variables and the dependent CAR variable, with three industries showing significant results in more than one regression. As the foreign assets were only found to be significant in a third of the events, the evidence points to a significant link between this variable and the CARs. The results can, however, speculate a relationship and suggest investigating this link further in the future as it makes sense for the proportion of foreign assets held by a company to contribute to how it is impacted by the change. A company entirely reliant on assets in one country would assu-

medly be more susceptible to that country's instability than one that holds assets based in a country not experiencing this same instability. The firm age variable was also found to be significant in two of the regressions, again implying that there is potential for there to be a relationship present, but not a strong enough link between this variable and the CARs to draw any firm conclusions at this stage. Realistically, an older firm would be assumed to react less significantly to instability than a younger, potential fledgeling firm. The cross-listing variable was insignificant in every model, indicating that there was insufficient evidence to conclude any significant link with the CARs. Again, as all the firms in the sample are cross-listed outside of the EU to some degree, it makes sense that this variable is insignificant as these exchanges would be mostly unaffected by UK politics and would, therefore, not generally exhibit any abnormalities.

The idea that there is a relationship between political instability and abnormalities in the stock market returns is one which is supported by prior research. This research and research done previously has found significant evidence that abnormalities do not exist following a political event. The relationship between cross-listed firms and CARs during times of political instability has little prior research into it. As the only firms that could be investigated were all cross-listed to some degree, the results cannot comment on the relationship of non-cross listed firms but can conclude that in this case there was not a significant relationship between cross-listed firms and abnormalities in the stock returns following a political event. This does not support the conclusions of the previous research, as Zach (2003) found, firms listed both in and outside of their primary country were just as affected as firms not cross-listed at all. Hillier & Loncan (2019) also disagreed with the results, with their research indicating that cross-listed firms suffered negative abnormalities, whilst the abnormalities were equally positive, negative and neutral. With respect to the industry variable, the degree of which the CARs were affected differed significantly by industry. Whilst the prior information on this topic is limited, Bouoiyour & Selmi (2017) are in support of this conclusion, with the utilities and the healthcare industries being significantly linked to abnormal stock returns in previous research. Research also concluded a definite relationship between industry and instability and again echoed the observations that this effect differs immensely by industry.

Contrary to the conclusions in prior studies, however, the results did not find a strongly significant relationship between the return abnormalities and the technological or oil and gas industries. This is because the prices of oil and prices of gas have shown to be non-stationary (Aminu, Minford, & Meenagh, 2018). The relationship between the proportion of foreign assets held by a firm and instability is also not a topic that has been widely researched. Although there is some indication of a link between these variables, the results are inconclusive as there are not enough significant results present. This is the same problem that Bin, Chen, & Chen (2005) faced, and the lack of prior research means that there cannot be many comparisons made.

6. Conclusion

The study established a link between political events and stock return abnormalities. The UK is a global financial centre with an efficient market. Thus, it will take a significant shock for any market reaction to occur, and any anticipated shock will not cause market volatility. The reaction was displayed on the day following the event, with the event day itself barely showing any abnormal reaction. The effect occurs most of the chosen events occurred late in the day and would therefore not be reflected in the stock returns for that day, and instead reflected in the following day's statistics. The Prime Minister's announcement generated no market reaction because investors have anticipated the event due to market efficiency. The most notable set of significant CARs was found over the wider intervals, while the smaller ones were somewhat less reactive. Generally, at least one industry consistently shows a significant reaction, the most noteworthy being the utilities, healthcare and basic materials industries. Also, the proportion of foreign assets and firm age variables are linked to the abnormalities in two of the events.

The consequences of the events in this study have significantly impacted the UK macroeconomy, as evident in the blue-chip companies of FTSE100. However, compared to other studies discussed when reviewing the prior literature were much weaker in magnitude. One reason for this can be attributed to the developed institutional structures of the UK, like many developed economies. As political instability in some other countries can have a more damaging effect on the lives of those living there due to the volatile nature of the events, it is realistic to assume that the results may not indicate abnormalities that are quite as significant as prior studies. The link between political instability and stock return abnormalities is essential to understand. When this relationship is fully understood, it will be easier for investors to make educated investment decisions during these periods of uncertainty.

The results from this study contribute to that of prior research, helping to confirm this relationship and suggesting potential factors that might also contribute. The significant link suggested between industry and abnormalities is one which should be investigated further, examining which industries exhibit this relationship most strongly. Due to the time and resources constraints with this research, the use of a larger, more diverse sample of data would have been difficult to analyse. A larger sample, however, would have given a better cross-section of companies and most likely helped to achieve more definitive results.

Data Availability Statement

The data that support the findings of this study are available on the Thomson Reuters Datastream at:
https://www.refinitiv.com/en/products/datastream-macroeconomic-analysis/
and on the London Stock Exchange
https://www.londonstockexchange.com/statistics/historic/historic.htm

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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