

Did American Depository Receipts from Britain Show Aggregate Abnormal Returns Different from Zero on the Brexit Referendum Announcement Day and on the Actual Brexit Referendum Day?

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— *Review of* —
**Integrative
Business &
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— *Research* —

ABSTRACT

Prior research documented that American Depository Receipts (ADRs) from the United Kingdom traded on New York Stock Exchange lost about 10% of their values during the event of Brexit referendum. Prior research however did not compare the impacts of the Brexit announcement day (February 22, 2016) and the Brexit referendum day (June 23, 2016) on British ADRs. The primary objective of this research is to quantify the abnormal returns of a portfolio consisting of 10 British ADRs on the Brexit announcement and referendum days. Using an event study method, our results show that the abnormal returns to this portfolio are significantly negative on the Brexit announcement day. However, the abnormal returns to the same portfolio are not significantly different from zero on the actual Brexit referendum day.

Keywords: American depository receipts; British ADRs; Brexit Referendum; Abnormal returns; Event study methodology.

Received 5 July 2019 | Revised 2 October 2019 | Accepted 8 November 2019.

1. INTRODUCTION

The effect of Brexit on the United Kingdom economy could become significant as opined by researchers (Bailey, Driffield, and Kispeter, 2019; McCombie and Spreafico, 2018). Early research indicated that on the Brexit referendum day, June 23, 2016, American Depository Receipts (ADRs) of companies from the United Kingdom traded on New York Stock Exchange (NYSE) lost 10 percent of their values (Schaub, 2017).

Previous research documented varying effects of significant political events on the abnormal returns to ADRs. For instance, Nandy and Sussan (2019) reported that Russian ADRs listed on NYSE did not show the existence of any abnormal returns to NYSE stocks during the 2016 U.S. Presidential election. On the other hand, Nandy *et al.* (2020) showed that the abnormal returns to Indian ADRs listed on NYSE and the underlying Indian equities listed on the Mumbai Stock Exchange were slightly affected on the announcement day of the 2014 Indian Parliamentary elections.

There is no prior research in the literature on the quantification of the abnormal returns of British companies' ADRs listed on NYSE on both the Brexit announcement day (February

22, 2016) and the Brexit referendum day (June 23, 2016) (HM Government, 2016). Utilizing the event study methodology, the primary objective of this study is therefore to determine whether these two important political events generated significant abnormal returns to a portfolio of 10 large British ADRs listed on NYSE.

There is a reason to believe that the events of the Brexit announcement day and the Brexit referendum day would impact the ADRs of British companies based on the uncertainty information hypothesis (Brown *et al.*, 1988) and on the findings from other studies that supported this hypothesis (Pantzalis *et al.*, 2000).

The remaining sections of the paper begin with a brief literature review in Section 2, which is followed by a detailed evaluation of the abnormal returns to 10 British companies' ADRs traded on NYSE in Section 3. Results of hypothesis testing for zero abnormal returns to 10 individual ADRs and a portfolio of the 10 ADRs on the Brexit announcement day and the Brexit referendum day are presented in Section 4, which is followed by discussions and conclusions in Section 5.

2. LITERATURE REVIEW

Event-Study Methodology

Fama *et al.* (1969), Fama (1970), and Fama (1991) proposed a methodology of event study. This methodology is based on the efficient market hypothesis which ensures that security prices fully reflect all available information. According to Fama (1991), an event study indicates that stock prices would adjust within a day of event announcement. Fama (1991) also reported that this quick adjustment of stock prices to an event announcement is consistent with market efficiency. Dania & Verma (2007) applied the event study methodology and reported that the returns to ADRs of Indian companies traded in the New York Stock Exchange were negative and statistically significant after terrorist acts in India. Corrado (2011) in a detailed review on event studies revealed that event-study methodology was originally developed to assist empirical research in finance and in accounting, but now widely applied in economics, history, law, management marketing, and political science.

Researchers in the past enunciated the effects of national elections on the performance of the stock markets around the world. Oehler *et al.* (2013) found that the victory of a Democratic presidential candidate resulted in negatively stock returns. Oehler *et al.* (2013) documented that the results were mixed for the victory of Republican candidates. Arora *et al.* (2015) estimated the Cumulative Average Abnormal Returns (CARR) in a 90-day period after the launching event of an electric vehicle by an Indian car manufacturer – Mahindra and Mahindra Limited – and found it to be statistically significant with a 9% return.

Repousis (2016) studied the impact of the 2000, 2004, and 2007 Greek elections on bank stocks but found no evidence of any impact. Repousis (2016) therefore concluded that the two major political parties were unable to manipulate the stock prices of Greek banks for political purposes. Ying *et al.* (2016) analyzed the returns of Malaysian stocks before and after elections in Malaysia from 2004 to 2013 and reported that both AAR (Average Abnormal Returns) and CARR within the 15-day window before and after the elections were statistically

significant. Ying *et al.* (2016) concluded that Malaysian stock market did not show any properties of the semi-strong form of efficiency on dissemination of news about the elections.

Nandy and Sussan (2019) reported that Russian ADRs listed on NYSE did not show any abnormal returns during the 2016 US Presidential election. However, Nandy *et al.* (2020) found that the statistically significant abnormal returns to Indian ADRs listed on NYSE and the underlying Indian equities listed on the Mumbai Stock Exchange were slightly different on the announcement day of the 2014 Indian Parliamentary elections.

Effect of Brexit referendum on UK stocks and UK economy

Schaub (2017) enunciated that on the day after the Brexit referendum, ADRs of companies from the United Kingdom lost 10% of their values. This was followed by a loss of 5% on the following day. Schaub (2017) defined the excess return of an ADR as the difference between the return to the ADR on the day after Brexit and the market return. Schaub (2017) considered the market return as the return to the S&P 500 index, the FTSE 100 index, or the change in foreign exchange. However, as documented by Corrado (2011) in his review paper on event study methodology, the abnormal return to a stock on a particular event day is determined by the difference between the actual return of the stock and the return of that same stock (and not the return of an index) as predicted by CAPM (Capital Asset Pricing Model) which is based on a market index such as the Dow Jones Industrial average. Schaub (2017) calculated excess returns to ADRs from Britain on top of certain index returns. Schaub's unorthodox method of calculating of excess returns to ADRs from Britain, which is different from the CAPM model, might have affected the results as documented in his study.

Andreea (2017) found that in the post Brexit window, the abnormal returns and cumulative abnormal returns to stocks of eleven financial institutions listed on the London Stock Exchange dropped significantly, which indicated a negative market impact in the short term. Andrea (2017) stated that a decrease in financial stability could have negative effects on the UK economy. Ramiaha, Pham, and Moosa (2017), using an event study methodology, reported that UK stocks in the banking and the travel and leisure sectors were negatively affected, which indicated a cumulative abnormal return of -15.37% for the banking sector during the period of June-July 2017 when the Brexit referendum was held. Ramiaha *et al.* (2017) noted that Brexit had a mixed effect on abnormal returns with apparent sector-by-sector variations.

Bouoiyour and Selmi (2018) showed that the prices of UK stocks decreased initially because of the uncertainty surrounding Brexit. However, with the gradual removal of this uncertainty, the stock prices would recoup most of the initial losses. Bouoiyour and Selmi (2018) analyzed UK stocks in seven sectors and found that the Brexit referendum had a significant negative effect on the valuation of UK companies. McCombie and Spreafico (2018) predicted that the Brexit referendum would result in the loss of GDP in UK and its regions, but not as severe as that predicted by Her Majesty's Treasury (HMT) and the Cambridge Centre for Business Research and the Economists for Brexit. McCombie and Spreafico (2018) reasoned that the estimates from HMT about the loss of GDP could have been overestimated,

despite it is very likely that there will be a fall in the output of the British economy because of Brexit.

Bailey *et al.* (2019) opined that foreign direct investment in the UK would be negatively impacted in several ways in the event of a 'hard Brexit' (i.e., Brexit without any formal agreement with European Union) due to the possible increase in tariff barriers. They also noted that 'softer' forms of Brexit (i.e., the one with potential agreements with European Union) would likely cause customs delays, and limits to the ability of businesses to relocate staff and coordinate 'servitization' activities. Bailey *et al.* (2019) predicted that further negative impacts could show in the form of currency depreciation and outward investment flows from advanced manufacturing, food technology and financial services.

3. METHOD

In this study, the event study method is used to determine the abnormal returns of ADRs of 10 British companies traded in the US Stock Exchanges on February 22, 2016, (when the Brexit referendum was announced by the then UK Prime Minister) and on June 26, 2016 (when the Brexit referendum was held). Daily ADR prices for one year prior to February 22, 2016, and for one year prior to June 26, 2016 (250 trading days in both cases) were obtained from <https://finance.yahoo.com/>. The following 10 ADRs from UK were studied because of the sheer sizes of their market capitalization: 1. Diageo plc (ticker: DEO, market capitalization: \$100.3 billion), 2. Vodafone Group Plc (ticker: VOD; market capitalization: \$42.8 billion), 3. British American Tobacco p.l.c. (ticker: BTI; market capitalization \$88.1 billion), 4. BT Group plc (ticker: BT; market capitalization: \$23.2 billion), 5. BP p.l.c. (ticker: BP, market capitalization: \$132.8 billion), 6. Carnival plc (ticker: CUK; market capitalization: \$31.5 billion), 7. Unilever PLC (ticker: UL; market capitalization: \$164 billion), 8. AstraZeneca PLC (ticker: AZN; market capitalization: \$105.6 billion), 9. Glaxo SmithKline plc (ticker: GSK; market capitalization: \$103.5 billion) and 10. HSBC Holdings plc (ticker HSBC; market capitalization: \$166.7 billion).

The return of ADR i on day t is calculated as follows:

$$R_{it} = (M_C - M_O) / M_O$$

where, R_{it} = Market return on day t for ADR i , M_O = Market opening price of ADR i on day t and M_C = Market closing price of ADR i on day t . The market model is used to evaluate the abnormal return on the day of the event as:

$$A_{oi} = R_{it} - (\alpha_i + \beta_i R_{mt}),$$

where, A_{oi} = abnormal return of ADR i , R_{mt} = return of the market index on day t . α_i and β are parameters obtained from the ordinary least squares regression between R_{it} and R_{mt} .

The market indexes selected for this study is the Dow Jones Industrial Average. The control period used for the linear regression contained n day ($n=250$) – beginning with $n + 5 = 255$ days prior to the event date and ending on 6 days before the event date (Corrado, 2011). A value of 250 was chosen for n to represent the number of trading days in a calendar year. Under

a null hypothesis of no abnormal performance, the event date abnormal return A_{oi} has an expected value of zero and a variance given as (Corrado, 2011):

$$\text{Var}(A_{oi}) = \sigma_e^2 [1 + (1/n) + \{(\text{RM}_o - \text{RM}_{av})^2 / \Sigma(\text{RM}_b - \text{RM}_{av})^2\}],$$

Here the summation (Σ) is carried out starting from $n + 5$ or 255 days prior to the event date and ending on 6 days before the event date. The definitions of the variables are given by:

$\text{Var}(A_{oi})$ is the variance of abnormal return A_{oi} of the i -th ADR.

σ_e denotes the standard error of the regression used to obtain the market model parameters α_i , and β_i .

RM_o indicates the market return on the event day

RM_{av} indicates the average of n market returns, starting with $n+5$ (255) days prior to the event day and ending on the 6th day before the event date,

RM_b indicates the market return on each day starting on $n+5$ (255th) days prior to the event day and ending on the 6th day before the event date.

Based on prior research findings, we believe that the abnormal returns (A_o) of the i -th ADR is differ from zero on the event day. More formally, we hypothesize that:

H_1 : Ceteris Paribus, A_{oi} is differ from zero.

The t -statistics for the i -th ADR is calculated as follows (Corrado, 2011):

$$t = A_{oi}/S_{A_{oi}} \text{ where } S_{A_{oi}} \text{ is the standard deviation of } A_{oi} = (\text{Var}(A_o))^{0.5}$$

Assuming security returns are normally distributed, the test statistic for a portfolio consisting of m equities is given as (Corrado, 2011):

$$T_P = \{1/(m^{0.5}) * \{\Sigma(A_{oi}/S_{A_{oi}})\}$$

This study considers 10 ADRs from UK, thus $m = 10$. The test statistic T_p follows a t -distribution with $n-2$ degrees of freedom (Corrado, 2011). The summation is carried out for the 10 ADRs.

4. RESULTS

Table 1: Hypothesis Tests on individual ADRs (on February 22, 2016)

ADR	Abnormal Return	t-statistic	p-value
DEO	-0.007	-1.098	0.273
VOD	0.002	0.220	0.826
BTI	-0.005	-0.707	0.480
BT	-0.002	-0.265	0.791
BP	-0.001	-0.053	0.958
CUK	0.019	1.625	0.105
UL	0.019	1.891	0.059

AZN	0.002	0.302	0.763
GSK	-0.005	-0.619	0.537
HSBC	-0.100	-17.794	0.000

Table 2: Hypothesis Tests on individual ADRs (on June 23, 2016)

Equity	Abnormal Return	t-statistic	p-value
DEO	-0.001	-0.055	0.956
VOD	-0.010	-1.329	0.185
BTI	-0.001	-0.169	0.866
BT	0.002	0.279	0.780
BP	-0.009	-0.722	0.471
CUK	-0.018	-1.493	0.137
UL	0.005	0.707	0.432
AZN	0.001	0.105	0.916
GSK	-0.005	-0.590	0.562
HSBC	0.011	1.650	0.100

Table 3: Hypothesis Tests on Portfolios of 10 ADRs

Date	Portfolio Abnormal Return	T_p – statistic	p-value
February 22, 2016	-0.097	-5.693	0.000
June 23, 2016	-0.025	-0.841	0.401

5. DISCUSSION

It is observed from Table 1 that the abnormal returns are negative to 5 ADRs and positive to the remaining 5 ADRs on the Brexit referendum announcement day - February 26, 2016. The *t*-statistics for the ADRs are shown in the second column. The corresponding *p*-values as shown in the third column are greater than 0.05, except for HSBC Bank – which is highlighted. The high *p*-values in column 3 indicate that the null hypothesis of zero abnormal returns on the Brexit referendum announcement day cannot be rejected for 9 of the 10 ADRs. However, for HSBC Bank the null hypothesis of zero abnormal returns can be rejected.

Table 2 reports the abnormal returns to the ADRs on the Brexit referendum day - June 23, 2016. The *t*-statistics for these ADRs are shown in the second column. The high *p*-values in the third column indicate that the null hypothesis of zero abnormal returns for 9 of the 10 ADRs on the Brexit referendum day cannot be rejected. However, for HSBC Bank the null hypothesis of zero abnormal return can be rejected at the 10% level of significance.

Table 3 reports the hypothesis test results for the portfolios of 10 ADRs from Britain. The total portfolio abnormal returns, corresponding T_p statistics, and the associated *p*-values

are reported in this table. It is observed from the very low p -value that the null hypothesis of zero abnormal returns to the portfolio can be rejected on Brexit referendum announcement day - February 22, 2016. However, the high p -value on the actual Brexit referendum day, June 23, 2016, indicates that the null hypothesis of zero abnormal returns cannot be rejected.

6. CONCLUSION

The results of this study show that out of the 10 ADRs from Britain considered in this study, only one (HSBC Bank) of them shows abnormal returns significantly different from zero on the Brexit referendum announcement day and the actual Brexit referendum day. The abnormal return to the HSBC ADR was -0.10 on the Brexit referendum announcement day, February 22, 2016; while on the actual Brexit referendum day, June 23, 2016, its abnormal return was 0.01. This may suggest that the market had anticipated positive results from the Brexit referendum and thus this ADR gained positive abnormal returns on the Brexit referendum day.

Our results also indicate that a portfolio of the 10 ADRs from Britain might have abnormal returns significantly different from zero on the day of announcement of the Brexit referendum – February 22, 2016. The overall results could have been influenced by the presence of the HSBC ADR in the portfolio. At the individual level, HSBC showed significantly negative abnormal returns on February 22, 2016. Our findings are consistent with those from Andreea (2017) and Ramiaha *et al.* (2017), who stated that UK financial stocks had significantly negative returns during Brexit. It seems that the uncertainty in the financial market created by the announcement of Brexit referendum affected the abnormal returns only to the HSBC ADR.

Our results also show that the portfolio of the 10 ADRs from Britain might have abnormal returns not significantly different from zero on the Brexit referendum day - June 23, 2016. This suggests that the news of the Brexit referendum did not significantly affect the returns to the portfolio on that day. This also implies the U.S. stock markets are efficient as the news about the Brexit referendum result disseminated well across the New York stock market. An alternative interpretation of the results could be that investors in ADRs from Britain already anticipated a positive result from the Brexit referendum before the announcement and thus the portfolio returns did not respond to the shock of the referendum result and thus the abnormal returns are not significantly different from zero.

The results presented in this paper on the abnormal returns to ADRs from Britain are different from those presented by Schaub (2017). Schaub (2017) reported significantly negative abnormal returns to ADRs from the UK on the Brexit referendum day. However, we did not find any significant abnormal returns on the same day for ADRs from Britain, except for HSBC. We hypothesize that this difference in findings is caused by the way in which Schaub (2017) calculated abnormal returns to an ADRs without using the CAPM model. Our results are more authentic and are consistent with the findings from other studies that applied the CAPM model in calculating the abnormal returns (e.g., Andreea, 2017; Ramiaha *et al.*, 2017).

Results of this study will be of interest to portfolio managers investing in ADRs from the U.K. We concluded that news about the Brexit referendum result were disseminated quickly in the New York stock markets and thus did not significantly influence the abnormal

returns to ADRs from the U.K. This finding may encourage portfolio managers to trade in ADRs from the U.K. with increased confidence.

ACKNOWLEDGEMENT

This research received funding in the form of a research grant from Office of Scholarship Support, School of Advanced Studies, University of Phoenix.

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