Into the Unknown: Impact of Coronavirus on UK hotel stock performance

Izadi, J., Foroudi, P. and Nazarian, A.

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INTO THE UNKNOWN: Impact of Coronavirus on UK hotel stock performance

Abstract

As the Coronavirus disease (COVID-19) spread in March 2020, it crashed economies across the world, including in the UK. This study investigates the impact of the COVID-19 pandemic outbreak on the stock return of publicly listed hotels in the UK. By employing the event-study approach, this study (i) scrutinizes the effect of the Coronavirus pandemic on UK hotel stock price changes, (ii) examines how the magnitude of the COVID-19 outbreak has affected stock price movements in the UK market place, and (iii) examines how COVID-19 has impacted the hotel industry via the reactions of the stock market. Our results show that listed hotels in the stock market experienced substantial negative cumulative abnormal returns. This article's findings could be useful for businesses to be better prepared for similar future pandemics.

Keywords: Coronavirus (COVID-19) pandemic; event study method; abnormal stock return; hotel industry

Introduction

The spread of the Coronavirus disease (COVID-19) had an unprecedented impact on the economics of hospitality and global tourism. Due to the pandemic, the hospitality, tourism, and travel sectors experienced a slowdown in economic activity and were 'facing collapse' as events across the world were cancelled or postponed (Guevara, 2020; Hoisington, 2020; Jiang and Wen, 2020; Wen et al., 2020). The full outcome was unknown as the final scale of the spread had not yet been determined. Social distancing, travel restriction policies and fear of COVID-19 also had huge impacts on the sector (Courtney, 2020). Given the uncertainty, 50 million jobs in the industry were at risk internationally.

The COVID-19 pandemic crisis is the third major shock to the global system in the 21 st century and its impact on the tourism and hospitality industry is tremendous (Zenker and Kock, 2020). During the pandemic period the hotels of many countries have mostly been shut down and, according to World Travel and Tourism Council (2020), nearly 75 million jobs are at immediate risk. Also, the pandemic has affected potential tourists' desire to travel and book accommodation (Zenker and Kock, 2020). There is a need for hotels to reconsider their current business performance and practices. They need to devise new and innovative strategies which can safeguard the health and safety of guests and employees. However, we expect that investors can be attracted to the hotel industry.

Based on the importance of the subject, it is essential to examine the impact of such an unexpected catastrophic economic event on the value of the industry. Previous studies have considered the seriousness of COVID-19 in the global market (Carnevale and Hatak, 2020; Sharma et al., 2020; Sheth, 2020; Sigala, 2020; Woodside, 2020), yet most of the studies are mainly theoretical and conceptual papers rather than articles on the response of the stock market or of stock investors. Thus, this research has employed an event study model (ESM) as the most effective method to look at financial market data to understand how the magnitude of the COVID-19 outbreak has affected the stock price movements in the UK market place and how it has affected the hotel industry via the stock market's reactions. By using the event study method, we focused on stock prices rather than revenue and profit (i.e. accounting measures) to examine the industry's value according to the fluctuations of trading activities in the stock market (McWilliams and Siegel, 1997; Nicolau, 2002). As the stock price responds promptly to a new event, ESM is the most efficient method to capture abnormal returns in the market value of the hotel industry shaped by the epidemic outbreak (Chen et al. 2007; Hsu and Jang,

2007; Lee and Connolly, 2010). Significant mean differences were not found in monthly stock returns either before or after adjusting for risk. The descriptive statistics are somewhat consistent across the accounting and market variance.

Our research suggests that financial analysts and investors anticipate hospitality stock prices to respond negatively to future pandemics and demand greater returns to offset further risks and no noteworthy abnormal returns. This article contributes to the growing research on the influence of the COVID-19 pandemic on hotel stock market reactions and prepares businesses for a similar infectious disease. The article pays attention to the stock volatility of small and large size hotels during the COVID-19 outbreak. As the pandemic crisis has had an unprecedented impact on the industry, our study advances theory and knowledge in the hospitality sector and supports the sector in becoming more efficient and having resilient recovery from disasters. With current trends in the hospitality industry, our study provides understanding for practitioners and academics to support management of the sector after the COVID-19 epidemic.

This article is structured as follows: firstly, we draw on extant research on the COVID-19 pandemic disease outbreak and its effects on the hotel industry, its features and risk reduction factors. We then describe the variables and data and illustrate panel regression models and examinations. We close with a conclusion and discussion with managerial implications.

2. Background and literature review

2.1. COVID-19 pandemic disease outbreaks and the hotel industry

Since the turn of the millennium, numerous pandemics have posed threats to both the health of societies as well as to the survival of many businesses, including hotels. The multiplicity of these occurrences stem from reasons such as urbanization, industrialization of food processing, growth in population mobility and development of global travel networks, which increase the transmission of pathogens, etc. (Gossling et al., 2020). Recently, the outbreak of Covid-19 reshaped many industries, and certain common patterns started to emerge in a wide range of industries, including hotels. According to a report published by the World Travel & Tourism Council, the spread of Covid-19 put fifty million jobs at serious risk, with the industry “already facing collapse” (Jian and Wen, 2020, p. 2). Along with the global scale of the disease, Covid-19 stands out from previous outbreaks in terms of its contagious power, which caused the World Health Organization (WHO) to call for strict social distancing to reduce person-to-

person transmission. This posed serious threats for the hotel industry with many more negative consequences arriving and little knowledge about appropriate measures to alleviate the economic loss. This most recent pandemic Covid-19 hit industries such as hospitality, tourism and hotels hard, have experienced severe revenue cuts in different parts of the world, ranging from 25% to 90% compared to the previous year. Furthermore, considering the continuation of travel and leisure restrictions globally, the situation is expected to be aggravated (Jian and Wen, 2020).

The outbreak of Covid-19 can be perceived as merely another scar on the face of the hotel industry during the past few decades. More specifically, even before the pandemic, the industry witnessed other contagious diseases, with more or less hostile effects on the overall performance of businesses. A study by Chen et al. (2007) shows that the SARS epidemic had the most serious impact on tourism and several other industries of the Taiwanese economy. During the SARS epidemic, the tourism industry, in comparison with the manufacturing, banking and retail trade industries, was damaged seriously. Their findings demonstrate that the tourism industry experienced approximately 29 percent decline, which is the most serious damage in terms of stock price. They used the event-study methodology (ESM) to examine the impact of the SARS outbreak on hotel stock performance in Taiwan. They used Abnormal Return which is the difference between expected return and actual return around the time of the event.

In addition to epidemics, hotels are also prone to foodborne diseases which affect other industries such as restaurants. A major reason for the re-occurrence of pandemics is industrialized food production patterns, highly favoured in tourism networks due to cost efficiency and access to global markets (Gossling et al., 2020). This, in turn, spreads animal diseases on a wider scale. In addition, Kim et al. (2020) refers to Salmonella Infantis, Avian flu, Swine flu (H1N1) and Bovine Spongiform Encephalopathy (BSE). Some of these diseases such as Avian flu may not infect humans, but due to fear of contamination from food to individuals, a sharp decrease in consumption and in travel behaviours may occur. Other diseases have been diagnosed as poisonous or lethal to human beings (Kim et al., 2020). Among the pandemics that have occurred, the following outbreaks have received scholarly attention.

Severe Acute Respiratory Syndrome (SARS) - In 2003, the industry was stricken with Severe Acute Respiratory Syndrome (SARS), whose symptoms resembled pneumonia. Although the disease was first diagnosed in Guangdong province in southern China in late 2002, it soon raised global concerns and the World Health Organization (WHO) warned about its outbreak a few months later, calling for the postponing of all travel except necessary travel. Indeed, the cancellation of trips, business meetings, conferences, and similar events and activities for fear of contagion, had serious consequences for the hospitality industry. In addition to China, infections were reported in Taiwan, Thailand, Singapore and Canada, reaching a total of 8,437 cases and 813 deaths. SARS was ultimately contained in July 2003 according to the WHO (Chen et al., 2007). The number of tourists arriving in Taiwan dropped dramatically during the SARS epidemic. Compared with the corresponding period a year earlier, during April and May 2003, the number of arrivals from abroad decreased by nearly 50 percent. Also, the occupancy rates of international tourist hotels decreased by approximately 40%.

Swine Flu (H1N1) - Diagnosed as a new and lethal form of influenza, the H1N1 disease emerged in 2009 in Mexico and in the USA. Travel advisories and health agencies warned against travel, with a subsequent decline in the number of flights and hotel cancellations (Rassy and Smith, 2013). Another reason for the great loss on shares of companies during the H1N1 pandemic was that it occurred in parallel with the global financial crisis, resulting in a sharper decrease in tourist expenditures. One of the countries most affected was Mexico, where the majority of incoming tourists were from the USA and Canada. These tourists were better able to sense the outbreak due to their proximity to Mexico, in comparison with similar outbreaks such as SARS and Avian flu (Rassy and Smith, 2013).

Middle East Respiratory Syndrome (Mers) and Ebola - Mers is a lethal respiratory disease which was first traced to Egypt in 2012. The disease is caused by a virus of the Corona family (Mers-Cov), with a considerable contagious power, and led to the infection of many people on their Haj pilgrimage. Ebola reached a fatality rate of 50% in its different phases, peaking in 2013-2014. Starting in the Congo, it was later transmitted to Sudan and West Africa until 2018/2019. Both outbreaks raised global awareness and concerns because both indicated that the world was not adequately prepared to face upcoming epidemics, highlighting the gaps and the need for further investment to prepare against such catastrophes (Gossling et al., 2020).

2.2. Hotel characteristics and risk reduction factors

Bharwani and Mathews (2012) define risk as “a probability or threat of a damage, injury, liability, loss, or other negative occurrences that is caused by external or internal vulnerabilities, and that may be neutralized through pre-emptive action” (p. 412). These scholars categorize the risks to which the hospitality sector is exposed as operating risks on the one hand and commercial and financial, strategic, and other external risks on the other hand. Operating risks (internal risks) include guests’ safety and health, employees’ safety and health, staff recruitment and retention and supply chain continuity, among others. As for external risks, reputation risk, changing customer preferences, regulatory and legal compliance, pandemics, and economic fluctuations are only some of the risk factors threatening the viability of hotels. They further state that external risks such as disease outbreaks, terrorist attacks and force majeure tend to be macro-environmental in nature, with direct or indirect impacts on the performance of businesses, although largely beyond the control of the businesses.

This study provides two key suggestions: (i) that the hospitality industry is built on trust from their customers by supporting and resourcing consumers’ self-protective behaviour and adoptive belief, and (ii) that the economic influence and the continuous uncertainty and transformation of the restaurant business needs the enhancement of localisation strategies, practices and performance.

With respect to pandemics, the tourism and hospitality industry often tends to perform poorly in protecting its interests in times of crisis and thus has to accept significant financial and economic losses. Recovery time after the impact often depends on the sensitivity of sanitary precautions in the target market and this is tightly tied to fears of the disease. It is also affected by media coverage of the outbreak, which can be excessive and exaggerated. In this respect, the results of the study by Kellogg-Brown and Smith (2008) revealed that the recovery phase may not actually be easy to reach, as was the case with the severe acute respiratory syndrome (SARS) outbreak (Rassy and Smith, 2013). Another issue that should be considered in times of crisis is days of cash on hand. InvestorWords defines cash on hand as “the funds immediately available to a business, as opposed to assets that must be sold to generate cash... It determines what financial hardships can be absorbed, without going into debt”. According to Didier et al. (2020), this metric is less than 90 days for hotels, resorts and cruise lines, which means that many of the businesses in this sector could only cover their operating expenses with cash held for a rather short period of time.

The recent research by Izzeldin et al. (2021) examined the impact of Covid-19 on business sectors stocks in G7 countries. They found strong evidence of change to a crisis regime in all G7 countries' business sectors. Their research shows that Consumer Services and Health Care were more affected by Covid-19 than other sectors. They also found that financial markets have a similar response to Covid- 19 as in the previous financial crises rather than previous pandemics. Referring to the heavy tolls imposed on a wide array of industries with the spread of COVID-19, Didier et al. (2020) argued that the outbreak led to an unprecedented collapse in the stock market. They further stated that the sudden nature of the shock as well as its huge scale and considerable duration gave rise to an economic recession and the fall of stock prices to nearly one third of their value in a very short period of time. This is not surprising considering the strict health protocols and lockdowns and increasing attention to social distancing imposed in different parts of the world, including in the UK. In support of this view, Gossling et al. (2020) refers to the closing of borders, suspension of flights, shut-down attractions, strict travel bans, cancelled accommodations, etc., that ultimately crashed the tourism and hotel industry in a period of a few weeks. Thus, it is hypothesized that:

H1: The abnormal returns of hotel firms mitigate the effect of COVID-19 disease outbreaks.
H2: The volatility of abnormal returns for small size listed hotels can be higher than big size hotels during COVID-19 disease outbreaks.

3. Data collection and methodology

3.1 Data collection

According to Sattistica (2020), due to the impact of the COVID-19 pandemic, the number of international tourist visits to the United Kingdom is expected to drop dramatically from a peak of 40.9 million overseas visits in 2019 to 16.9 million in 2020; the forecast indicating overseas visits to the UK falling by 59 percent compared with the previous year. COVID-19 had an enormous impact on the UK national economy, but the effect of it seen as a short-term occurrence.

For this study, we collected stock market data for UK industries from the Datastream database and FTS350. We used all the listed hotels firms on the London Stock Exchange. We collected the data for all four active hotels in the UK: Intercontinental Hotels Group, Whitbread Plc, PPHE Hotel Group Ltd and easyHotel Plc.

Like previous studies, e.g. Chen et al. (2007), we collected the price data for 246 days as trading for the time of valuation. The starting day is xx April 2019, and the end date is 19th March 2020. Then we considered the lockdown date on 19th March 2020 and t-1 as the days of trading before, and t2 as trading days after the event period. Our sample, comprising several observations for each company, is 256 and the total observations for all four companies is 1024. According to the London Stock Exchange, these four businesses are recognized as the largest hotel companies in the UK. Table 1 illustrates the detailed financial data for the four hotel companies.

Insert Table 1 here

According to the information provided in Table 1, we reclassified the four listed hotel companies into two groups of hotels; 'big size' and 'small size'. The small size includes hotels where their market cap is under £1000m, including easyHotels and PPHE (Park Plaza). The big size group includes the two other hotels. In Figure 1 and Figure 2, we provide the stock price volatility of both the small and big size groups. These figures demonstrate the stock price fluctuation for 12 months for hotels in the UK. Figure 1 shows the big size hotels in the UK having more consistent stock price changes than the small size hotels. Earlier research by MacKinlay (1997) records that, if an unexpected event happens, the relevant value for the companies will produce an anomalous return on shares, compared with the actual net expected (normal) return over the same period. The event study method is a technique that help us to measure such an abnormal return. In this study, we refer generally to listed hotel firms' stock prices.

The COVID-19 outbreak in the UK overwhelmed some business sectors of the economy with the hospitality and tourism industry being one of the industries seriously damaged over the COVID-19 period. Table 2 shows industrials as less affected by the Coronavirus while hotel companies experienced the most serious stock return decline (more than 29 per cent). The hotel business in the UK is part of the tourism industry. During the COVID-19 pandemic, the rate of hotel occupancy for all hotels dropped sharply, and the average of room prices also fell. Earlier research by Pine and McKercher (2004) shows that most hotel management employed a strategy of cost-reduction, including dropping operating hours on beverage and food services,

closing some floors, stopping all overtime payments or even asking employees to take unpaid leave during SARS epidemic in Hong Kong.

According to Table 1, major declines on stock prices and returns during the COVID-19 outbreak were made by the four listed hotel companies trading on the London Stock Exchange (LSE). The findings indicate hotel sharing costs expanded due to the risk of doing business during the COVID-19 crisis with the result suggesting that hotel firms are most likely to suffer a decline in tourists. The result also suggests that, in the future, potential stockholders will be expecting stock prices of hotel firms to respond negatively to a future pandemic outbreak and demand more returns to reimburse them for greater risk.

Insert Table 2 here

3.2. Methodology

3.1 Event study

In order to measure the effects of an economic event such as the spread of COVID-19 on the value of a firm, the ESM was used to measure the effect of the COVID-19 pandemic on the stock performance of UK hotels. According to the rationality of the stock market, using ESM demonstrates that the impact of an event will be reflected instantly in stock prices. Despite the direct measures which can take many months or even years of observing events, the use of ESM can be built using stock prices in a short period of time. In previous studies, ESM has been used for various corporate and economic events. In addition, there is previous research in tourism and hospitality studies by Chen and Bin in 2001, using the ESM method to investigate market returns in the USA to show the impact of events related to deregulation and casino regulation (Chen and Bin, 2001).

The current study employed ESM to examine the impact of COVID-19 pandemic outbreaks on hotel firms' value. Firstly, we estimated the stock returns of the UK hotel firms if the COVID-19 event had not occurred. This allowed us to inspect the influence of the COVID-19 pandemic on UK hotel stock performance. We used abnormal corporate returns (RA), which is the component designated for certain corporate events such as the COVID-19 event. The main concept of ESM is based on the current abnormal and expected market returns over the outbreak period.

If the cause of the event has good or great news attached, then a positive AR can be indicated. Otherwise, it shows that the market reacted to the event immediately, believing the firm's value will be increased in the near future. On the opposite side, if the firms get negative returns, then the market considers it as bad news and consequently the event (outbreak) will decrease the value of the business. On an event date, the mean and cumulative mean of abnormal returns will be computed to see the value expected from the event. After that, the importance of the cumulative mean of abnormal returns will be tested. We then investigated the result of abnormal returns if the result was not equal to zero, indicating that the effect of the event had a substantial effect on the firms' stock prices.

3.2 Event study method (ESM) and abnormal returns

We examined hotel stocks expected returns (ER) in order to calculate the ARs of hotel stocks, regressing the market returns (index) according to the market model (so-called MM), in contradiction of the hotel stock returns to test the market effects. A reimbursement was brought in to measure the abnormal returns (ARs) and cumulative abnormal returns (CARs) for companies' stocks. The study assessed the predicted return on the firms' stocks; the returns for hotel firms; market returns for the estimated period and the event window were collected from the Fame and Datastream database. We also used the FTS300 market index as market returns. The FTS300 market index measures a subset of the stock market, that assists investors to compare current price levels of stock with the past period prices such as the past day, month or year to calculate market performance. In this regard, the study by Bourke et al. (2020) shows no significant mean differences in monthly stock returns, either before or after adjusting for risk.

In this study, the hypotheses were structured in terms of the COVID-19 pandemic's impact on stock returns. These hypotheses reflected the fact that the first public announcement of the COVID-19 event was more positive than usual. We developed a research methodology to measure the abnormal returns. To evaluate the expected returns (ER) for hotel stocks, by using the market model (MM), we calculated the regression of the return on hotel stocks by considering the market index to address the overall market effects. According to the market model (see MacKinlay, 1997), we estimated the expected return regression as follows:

$$R_{j,i} = \alpha_j + \beta_j R_{m,t} + \varepsilon_{jt} \qquad (1)$$

where $R_{j,i}$ is the stock return of hotels firm j on day t and $R_{m,t}$ is identified as the market return on day t.

We computed the daily return as follows:

$$R_{j,i} = Ln(P_{j,i} / P_{j,i-1}) \times 100 \qquad (2)$$

$R_{j,i}$ is identified as the firms' stock return j. $P_{j,i}$ represents the closing stock price j on day t. The mean stock returns of all companies comprised the market returns (index) of the London Stock Exchange (LSE); the market index is a value-weighted index established based on the stock market; ε_{jt} is identified as a random error for stocks j on day t. We provided a timeline to show the timing sequence of the COVID-19 outbreak. We considered 10 days as the length of the assessment window to control the period characterised as t_0 to t_{15}. We considered the outbreak day as event day at time 0, and this is represented as the event window t_0. The length of the post event window is represented as t_{-15} to t_0. We defined the event day as a point in time when a hotel company received the government announcement to lock down and a significant market event occurs. The ongoing COVID-19 pandemic spread to the UK in late January 2020. The UK Government announced the UK lockdown on 23rd March 2020. We started on 19th March 2020 a few exchange days earlier than the actual event day (lockdown day). Choosing three days before lockdown day allowed us to examine and prevent leakage of data. Thus, we considered 19th March 2020 as the event date, as on this day a significant market event occurred. We also used the post event window to investigate the performance of hotel firms.

We used 246 days as trading for the time of valuation, starting from April, 2019 to 19th March 2020, and we considered a $(t_{-1,}\ t_2)$ as the window of the event period. We used $t_{-1,}$ as the days of trading before, and t_2 as trading days after the lockdown date on 19th March 2020. The number of observations for each company is 256 and the total observations for all four companies is 1024. Then we used Eq. (1) to estimate the coefficients from the regression to examine the estimated return of hotels over the period of the $(t_{-1,}\ t_2)$ event window.

Insert Figure 3 here

The abnormal returns in the window days were calculated according to Equation 3 and Equation 4 as follows:

$$AR_{j,i} = R_{j,t} - ER_{j,t} \quad (3)$$

And the expected return is as follows:

$$ER_{j,i} = \hat{\alpha}_j + \hat{\beta}_j R_{m,t} \quad (4)$$

We used OLS regression in Equation (4) to estimate the coefficients of α_j and β_j. In Equation 3, $R_{j,t}$ shows the abnormal returns of firms *j* on day *t*. In Equation 3, the abnormal return is decomposed into the components, the hotel firms' specific and market components. The market components reflect the market data (price close) which show the market price movements before and after the outbreak time. The firm-specific component is based on the fluctuations of the market price caused by a firm-specific COVID-19 outbreak event. We followed the previous research by Dodd and Warner (1983) and used the following equation to standardise the abnormal returns:

$$SAR_{j,t} = \frac{AR_{j,t}}{S_{j,t}} \quad (5)$$

So, $SAR_{j,t}$ is the is the standardised abnormal returns

$$S_{j,t} = \left(S_j^2 \left[1 + \frac{1}{T} + \frac{(R_{m,t} - \bar{R}_{m,t})^2}{\sum_{t=1}^{t} (R_{m,i} - \bar{R}_{m,t})^2} \right] \right)^{\frac{1}{2}} \quad (6)$$

and $S_{j,t}$ is the standard error (for abnormal returns) of stock *j* in outbreak event time *t*:

$$S_j^2 = \left[\sum_{t=1}^{t} (\varepsilon_{j,t} - U_j)^2 \right] / (t - 1) \quad (7)$$

In Equation (7), S_j^2 represents the residual value of stock *j*; *t* is identified as the trading days for assessing time; $R_{m,t}$ shows the return from the market price for day *t* of the outbreak period; $\bar{R}_m$ illustrates the average return from the market price throughout the assessment time; $R_{m,i}$ represents the return from the market price of day *i* for the estimated time. The residual values are shown as $\varepsilon_{j,t}$. In addition, *uj* is the average residual value during the assessment time.

After calculating standardised abnormal earnings, we then calculated the cumulative mean abnormal returns (CAR) over the window trading period [$-t_1$, t_2]. We aggregated the the standardised abnormal returns as follows:

$$CAR_j = \frac{1}{\sqrt{m}} \sum_{i=t_1}^{t} SAR_t \quad (8)$$

$$t\text{ - statistic} = \frac{1}{\sqrt{m}} \sum_{i=t_1}^{t} SAR_t \quad (9)$$

E(8) measures the reaction of stock returns over the window period of the COVID-19 outbreak. We needed to consider the t-statistics as used by early researchers, Campbell et al. (1997), which follows a standard normal distribution. We ran the assessment statistically over days *t* in the outbreak window period for stocks to check whether the CARs are significant (see Eq. 9). If the COVID-19 outbreak affected the abnormal returns of hotel stocks, then we expected the t-statistic to be considerably divergent from zero.

According to neoclassical finance theory, when new information arises such as the COVID-19 pandemic bad news, then it will impact quickly on the market value. On the opposite side when new information (news) arises, such as information regarding innovations organised by hotels in response to the COVID-19 pandemic, then it will impact on the market value. Any changes in market value of hotels occur once a new innovation is announced Nicolau and Santa-María (2013).

Given that, we consider the null hypothesis H0 against H1 as alternative hypothesis. So, our hypotheses are as follows:

H1: The abnormal returns of hotel firms mitigate the effect of COVID-19 disease outbreaks.

H2: The volatility of abnormal returns for small size listed hotels can be higher than big size hotels during COVID-19 disease outbreaks.

3.2 The estimated abnormal returns

Many previous studies have found that there needs to be an amendment, using the standardised abnormal returns, due to the presence of heteroscedasticity to assess the impact of a precise event on the prices of stocks (e.g., Akgiray, 1989; Corhay and Tourani Rad, 1994; Giaccoto and Ali, 1982). They indicate that Autoregressive Conditional Heteroskedastic (ARCH)

demonstrates the empirical features of the return series. In this study, we employed the ARCH model which was developed by Engle (1982) and the Bollerslev (1986) generalized ARCH model which is called the GARCH model. Previous studies have identified the importance of these models. For instance, Diebold et al. (1988) pointed out that the residual values, given by the standardised market model, display robust ARCH characteristics. Other research has further demonstrated an estimated model based on the market and in terms of GARCH procedures (Bera et al., 1988). Thus, in this study, we followed Engle (1982) and Bollerslev (1986), and used the standard model based on the GARCH procedure as a substitute model as follows:

$$R_{j,i} = \alpha_j + \beta_j R_{m,t} + \varepsilon_{jt} \qquad (10)$$

$$\varepsilon_{jt} | \Omega_{t-1} \sim N(0, h_{j,t}) \qquad (11)$$

$$h_{j,t} = C_j + \sum_{i=1}^{q} \lambda_{j,i} \varepsilon^2_{j,t-i} + \sum_{i=1}^{q} \gamma_{j,k} h^2_{j,t-k}$$

where $h_{j,t}$ shows the conditional errors variance; ε_{jt} is the information set (conditional) which is obtainable on day t-1, Ω_{t-1}; q is lags for ε_{jt} and p is lags for $h_{j,t}$; $\lambda_{j,i}$ and γ represents the sensitivity of $h_{j,t}$ to the lags of square ε_t and h_t itself. We provide Equation (10) as the average equation and Equation (12) as the variance equation.

To show the asymmetry characteristic of news effects on the market returns, Engle and Ng (1993) document that sometimes stock prices fall due to higher volatilities than the stock prices rise in the same industry. So, they contend that the GARCH model cannot efficiently describe the characteristic for such asymmetric news. Further to that study, Nelson (1991) provides an Exponential GARCH (EGARCH) model and Glosten et al. (1993) provide a Threshold GARCH (TGARCH) model in which they provide the techniques required for accounting. They show the variance for the EGARCH equation as follows:

$$\log h_{j,t} = \left[C_j + \sum_{i=1}^{q} \lambda_{j,i} \left(\left| \frac{\varepsilon_{j-i}}{h^{1/2}_{j,t-i}} \right| + \right) + \delta_{j,i} \frac{\varepsilon_{j-i}}{h^{1/2}_{j,t-i}} + \sum_{i=1}^{q} \gamma_{j,k} \ln(h_{j,t-k}) \right] \qquad (12)$$

The TGARCH (p,q) is the variance of equation *a* is as follows:

$$h_{j,t} = C_j + \sum_{i=1}^{q} \lambda_{j,i} \varepsilon^2_{j,t-i} + \delta_j \varepsilon^2_{j,t-1} D_{j,t-1} \sum_{i=1}^{q} \gamma_{j,k} h_{j,t-k.} \qquad (13)$$

In equation (12), δ is the effect of the asymmetric news on the variance (conditional) $h_{t.}$. The asymmetry arises when the δ is not equal to zero. In the TGARCH model, the asymmetry factor was used in presence of a dummy variable and shown in Equation 13 as *D*, equal to one when $\varepsilon_{t-i} \leq 0$, and equal to zero if not. It means that the impact on volatility would be different if there is good news, the return positive and, for bad news, the return would be negative. We used a similar methodology in this study to that of Chen et al. (2007) which investigated the epidemic of the SARS outbreak and show the impact of SARS on the price movements of Taiwanese hotels. They used the ESM method employing all three models above for publicly traded hotel firms.

3.3 Analysis and Discussion

According to Table 3, all industries in the UK were damaged by the COVID-19 outbreak. Consumer Services, including the tourism and hospitality industry, were seriously damaged throughout this period. Our research shows that hotel firms, part of the tourism industry, experienced a 29.68% reduction in stock prices in March 2020, the most serious damage in the month after the COVID-19 outbreak among listed firms on the London Stock Exchange (LSE).

There were dramatic losses of revenue in the hotel industry in the UK due to the COVID-19 outbreak. According to early research into pandemic responses by Pine and McKercher (2004), most hotel managements took strategies to reduce costs such as closing some floors and requesting staff to take leave without payment.

In this study, we examined the impact of the COVID-19 pandemic on UK hotel stock returns. The sample of four publicly listed hotel firms suffered a major reduction in stock prices during the COVID-19 outbreak period. In general, the results indicate that stock returns of hotel firms are riskier than the average of market risk over the COVID-19 outbreak; hotels are more susceptible than other industries to have a reduction in the number of customers.

Table 3 demonstrates the cumulative abnormal returns (CARs) for the ARCH and GARCH models for 9 industries plus hotels (a subsector) in the UK. The projected CARs over the 15-day period before the COVID-19 outbreak were not substantial for all industries. Accordingly, the outcome shows that the value of the CARs for hotels and the other sectors were not different

from zero without the COVID-19 outbreak impact, and no significant abnormal returns were witnessed before the outbreak. We considered the listed hotel firms' abnormal returns separate from the consumer services industry. As is shown in Table 3, the cumulative abnormal returns (CARs) during the window period (0, 15) for the market and GARCH models are completely significant, thus supporting Hypothesis 1 that abnormal returns of hotel firms mitigate the negative effect of the COVID-19 disease outbreak. The result demonstrates that the market and GARCH models were significant for all industries; this finding is consistent with that of hotel firms. According to our findings, in Panel A the coefficient of the market model and GARCH model shows the Cumulative abnormal returns (CARs) in the window period (-15, 0) as negative and not significant (-1.778, t-statistic = -0.560, p-value >0.05). In spite of the result during the window (-15, 0), we can see that after the outbreak for CARs within the window period (0, 15), the coefficient of the market model is statistically significant (-0.875, t-statistic = -2.770, p-value <0.001). Additionally, the coefficient of the GARCH model is significant as well (-8.291, t-statistic = -1.930, p-value <0.002), as is the GARCH model. Considering both panel A and panel B of Table 3, the CARs in the window period of the outbreak event (0, 15) for hotel firms are negative for all models and both market and GARCH models are significant. This result supports Hypothesis 1 that abnormal returns of hotel firms mitigate the negative impact of the COVID-19 disease outbreak.

Insert Table 3 here

In Table 4, we provide an estimation of CARs through the 30-day period after the COVID-19 outbreak. The hotel sector is statistically negative at the 5% level. These results indicate that the COVID-19 outbreak negatively affected the performance of UK hotel stocks. Our result indicates that stock prices reacted negatively after the COVID-19 outbreak. Moreover, the result shows that all industries were affected by the COVID-19 outbreak. It appears the impact of the COVID-19 outbreak was integrated into the deteriorating prices of hotel stocks. This was complemented by a quick fall in cash flow and revenue because of the huge decrease in the occupancy rate. The COVID-19 pandemic outbreak triggered investors to consider more risks and ask for more returns for their investment in UK hotels.

Insert Table 4 here

Panel B of Table 3 demonstrates that hotel stock prices immediately reacted after the COVID-19 outbreak date. The rest of the industries could also have reacted to negative market returns immediately. This shows that for the hotel industry the impact was rapidly integrated into falling stock prices. Due to the enormous decrease in the daily rate and tenancy, outbreak also made for a huge and rapid decline in the cash flow and revenue of UK hotels. Given that, this event put an excessive pressure on the stockholders.

We used financial market data and employed the ESM method to measure the effect of the specific event of the COVID-19 outbreak on the value of hotel firms by monitoring hotel stock prices during our specified window days of the pandemic. We measured the cumulative abnormal hotel returns for 15 days before the COVID-19 outbreak, then compared them with the results after the 15 days. Table 3 demonstates the estimated cumulative abnormal returns (CARs) during the 15 day period before the COVID-19 outbreak. The result shows that for the 15 trading days before the COVID-19 outbreak, the cumulative abnormal returns are not significant for all industries. Our results show that the value of the CARs for the hotels was not significant in the absence of the COVID-19 outbreak influence, which is similar for other industries. Otherwise, the result indicates that no significant abnormal returns were observed before the COVID-19 outbreak and after the event period, but there were abnormal returns after the UK lockdown date as shown in Table 4.

Firm size has been widely used in numerous empirical studies via asset pricing models as a factor of expected firms' stock returns. Previous studies (e.g., Banz, 1981; Reinganum, 1981; Keim, 1983) show a negative relationship between firm size (as market capitalization) and firms' stock returns. These studies demonstrate that the tendency of small firms' stocks are to make higher returns than large firms' stocks. These findings were mystifying because this relationship had not been envisaged by asset pricing theory, such as the CAPM. Given previous findings we expected that small firms would have more volatility of the abnormal returns.

To test Hypothesis 2 of this study, first, we divided hotels into small and big size hotels based on their market capitalisations. Hotels with market capitalisations of more than 1000(£m) are considered big-sized hotels and under this amount as small-sized hotels. We tested the volatility of the abnormal returns for small size listed hotels, comparing it with that for the big hotels. Our findings confirm that the abnormal return for small size hotels was higher than for the big size hotels during the COVID-19 outbreak. In Figure 4, the abnormal return pattern for all

small and big listed hotel firms in the UK is provided during the years 2019 and 2020. By looking at Easy Hotel and PPHE hotel as small size hotels, the changes in abnormal returns is sharper than for the big size hotels during the COVID-19 outbreak. The big size hotels Whitbread and IHG have a smoother volatility in the abnormal returns. It appears less likely that big hotels stockholders face a quick decline in their stock price in the short term after an outbreak. The big hotels' stock is therefore less risky than that of small hotels. This finding would help potential investors to consider extra care when intending to invest in the hotel sector.

Insert Figure 4

In Figure 5. the trend of abnormal returns for all four hotels is provided as one figure. As is shown, the most volatility of abnormal returns is related to the easyHotels and PPEH (small size) hotels. There is a big drop in abnormal returns for PPEH and Easy hotels during 9th to 12th March 2020. Similarly, the abnormal returns for both hotels drop sharply from 12th to 18th March, immediately before the lockdown date. At the same date, both big IHG and Whitbread hotels have smoother volatility in their abnormal returns.

Insert Figure 5

3.4 Conclusions and limitations

This study aimed to examine the market model parameters in the classical market model event research, adjusted for non-synchronous trading and changing and asymmetric volatility. This article has considered the modelling of the stock returns' volatility in the London Stock Exchange during COVID-19 outbreak. Our findings clearly show that a tragic event like the COVID-19 outbreak damps down the London Stock Exchange. As the COVID-19 outbreak produced an extensive global panic, we expected that the event would result in an unreasonable market response. According to the results of this study, considering stock price changes among different industries, stock prices of hotels had a quick reaction right after the COVID-19 outbreak. In the basic stock valuation model, the fluctuation on stock returns can reflect changes in expected cash flows and the perceived riskiness of a stock's cash flows. During the COVID-19 outbreak, falling sales revenue in tourist hotels impacted hotel stock prices and stock returns. This will impact on the investors' perceptions to consider changing the discount rate which will reduce the cash flow from operating activities.

Our findings show that hotel stocks' reaction during the COVID-19 outbreak was swift, which shows the stock performance may respond to disease outbreaks in a similar way in the future.

Our results also show there is a significant but not long lived impact on stock returns and volatilities. The COVID-19 outbreak also proved the insubstantiality of the hotel business in terms its resilience in the face of a pandemic and this can likely depress stock markets on the LSE. Our findings suggest to the directors and top managers of hotels that, if a similar pandemic like the COVID-19 outbreak happens in the near future, they need to minimise the risk of the outbreak's negative effect on the hotel's performance and stock volatilities. Moreover, the directors or top managers should reduce their uncertainty in the securities market, which would help them to withstand the confidence level of potential investors.

The result shows that, 15 days after COVID-19 outbreak, the cumulative abnormal returns (CARs) was negative for the stocks of all hotels in the UK. We also considered a 30 trading days window from the event date, showing a negative trend of cumulative abnormal returns after the 30 trading days of the COVID-19 outbreak strengthening when we compare it to the models of the 15 calibration trading days. The first case of infection with COVID-19 was diagnosed on 31st January 2020 in the UK. After that date, there were reports of more infected patients and deaths in the UK. These reports reinforced the devastating effect on UK hotel stock prices.

Prior research has focused on the economic impact of events on business travellers and fewer studies have focused on the reaction of stockholders or investors. A further study should focus on the influence of the pandemic on the performance of hotel firms. The main contribution of this particular study has been to highlight the impact of the COVID-19 outbreak on guest and tourist-related industries in order to investigate the magnitude of the impact on the reaction of hotel stock prices. Our study also analyses the influence of the COVID-19 outbreak on the stock prices of publicly listed hotels in the UK. The second contribution of this study is to show that small listed hotel companies have more volatility during COVID-19 outbreaks. Thus, it is important for top managers of small hotels to find a way to reduce the volatility of their stock if a new pandemic happens again in the future.

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Figure 1: The price volatility of ICH and Whitbread hotels

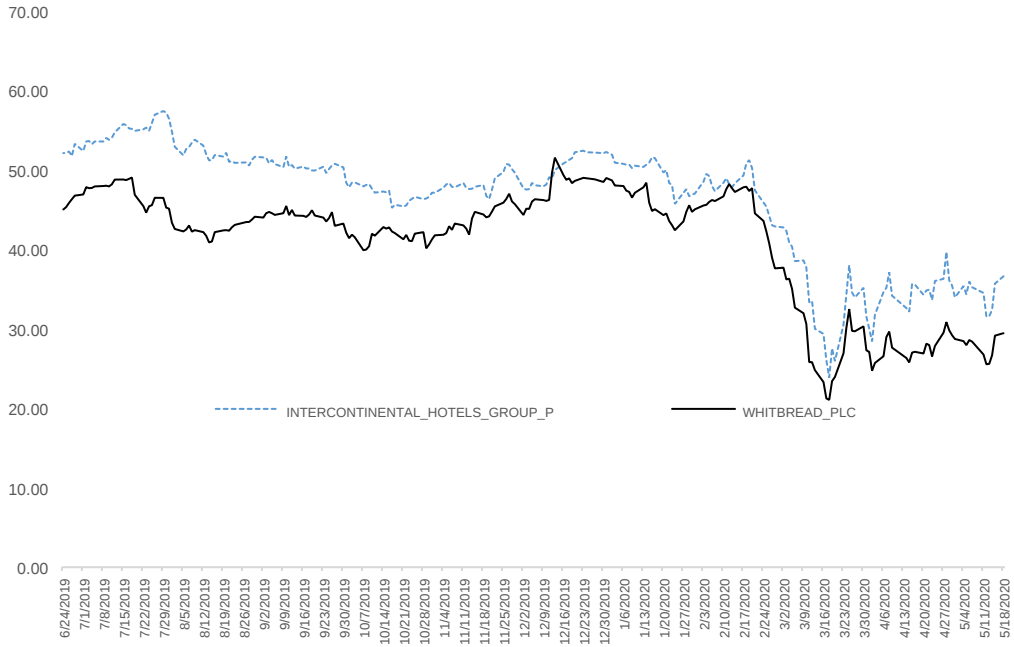

Figure 2: The stock price volatility of easyHotel and PPHE hotels

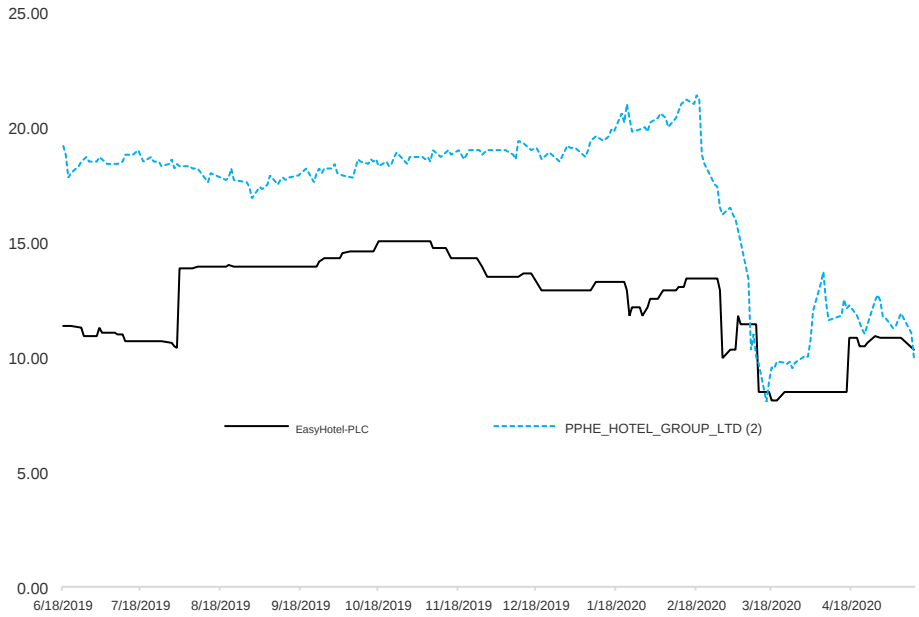

Figure 3. Event study structure for UK firm's stock returns with an estimation window period for the current study.

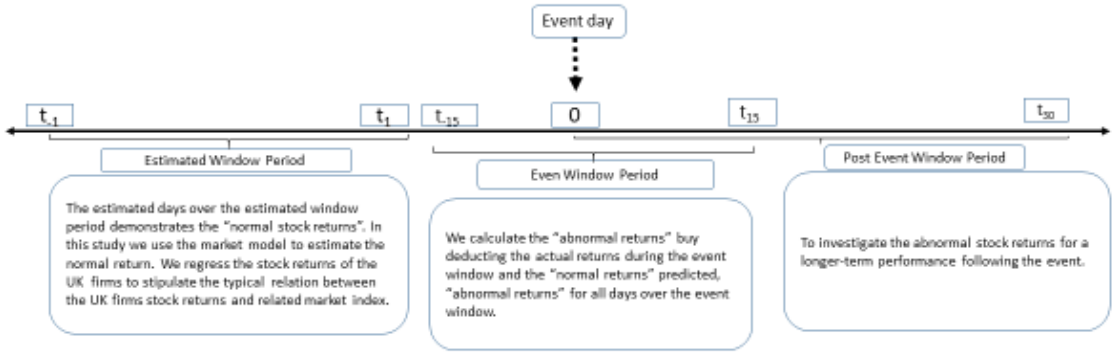

Figure 4: The abnormal return volatility in big and small size hotel firms (12 months)

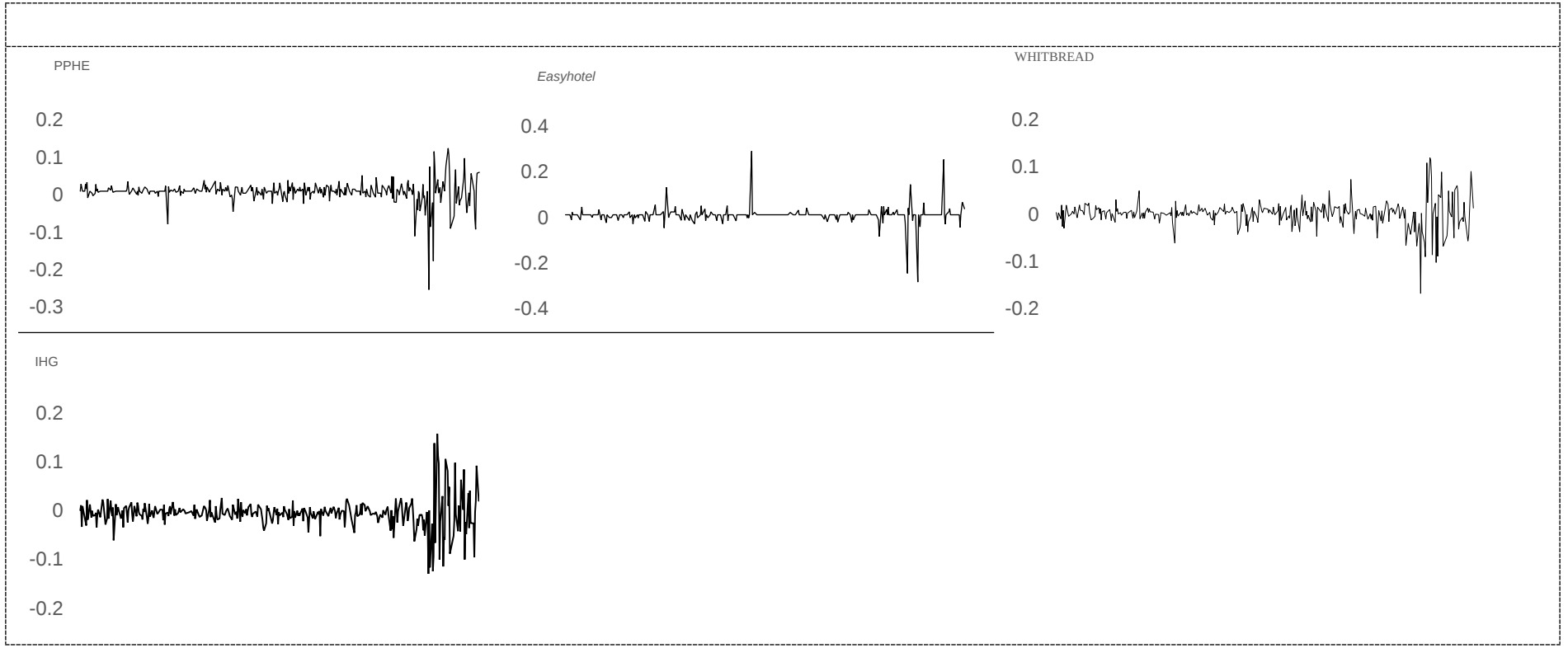

Figure 5: Abnormal returns for all four hotel companies

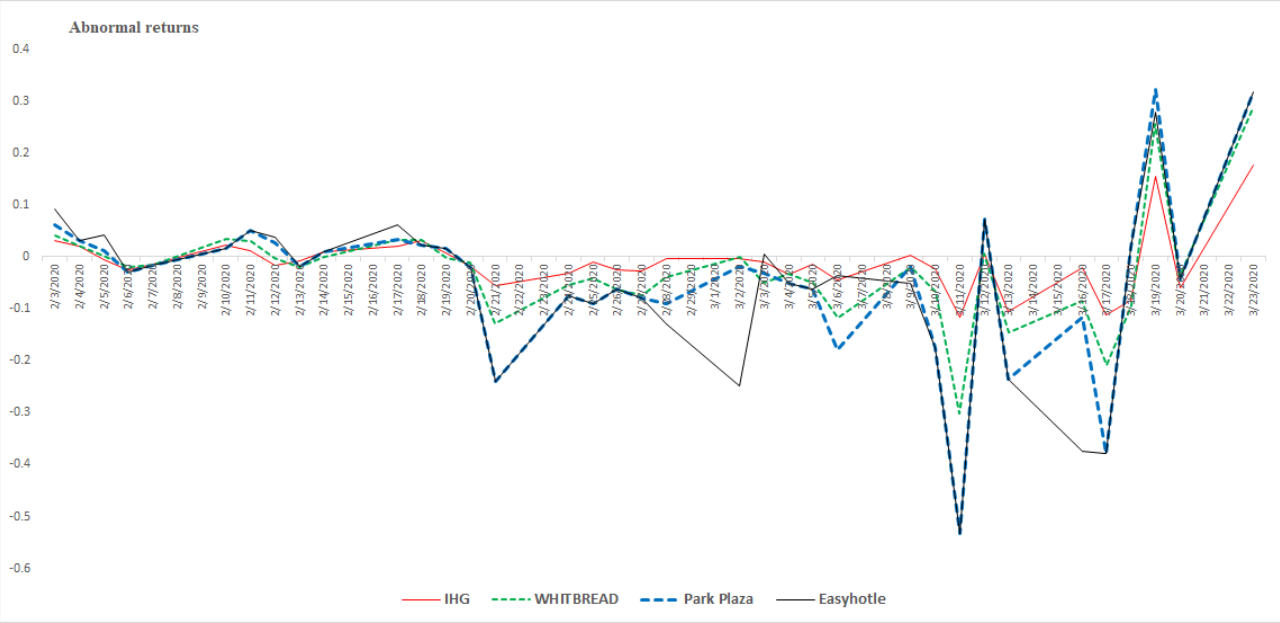

Table 1: Hotel listed firms on the London Stock Exchange (LSE)

Firms	*Symbol*	*Price per share (£)*	*Market Cap (m£)*	*Shares Out. (No.)*
Intercontinental Hotels Group	IHG	38.16	6,970	182,656,312
Whitbread Plc	WHITBREAD	23.13	3,112	134,554,833
PPHE Hotel Group Ltd	Park Plaza	11.8	501	42,459,340
easyHotel Plc	Easyhotel	0.74	120	157,533,494

Note: In Table 1, all information is as of 15th June 2020. All data collected from the Fame database.
All four hotels are listed in London Stock Exchange (LSE) and active in 2020.

Table 2: The impact of Covid- 19 outbreak on monthly stock prices for different industries for three months of 2020

Industry	*ICB code*	*Feb*	*Mar*	*Apr*
Oil & Gas	1	-8.89%	-19.88%	8.69%
Basic Materials	1000	-8.62%	-18.73%	7.84%
Industrials	2000	-8.61%	-15.32%	4.33%
Consumer Goods	3000	-8.60%	-18.02%	7.84%
Healthcare	4000	-8.45%	-18.95%	8.68%
Consumer Services	**5000**	**-8.74%**	**-17.86%**	**7.11%**
Telecommunications	6000	-8.82%	-20.71%	9.78%
Utilities	7000	-8.74%	-20.37%	9.55%
Financials	8000	-7.88%	-10.97%	0.00%
Technology	9000	-8.72%	-18.01%	7.69%
Hotels	5753	**-7.00%**	**-29.68%**	**14.77%**

Note: In Table 1, three-months stock returns (SR), calculated based on changes in monthly closing stock price (P), given as: SR = $(\frac{P}{P_{-1}})$-100, where P is the closing prices at the end of February, March, and April 2020, the closing price collected from Datastream database.

Table 3: The list of Cumulative abnormal returns (CAR) for different industries over the event window period

Oil & Gas		Basic Materials		Industrials		Consumer Goods		Healthcare	
Coeff.	***Z-Stat***	***Coeff.***	***Z-Stat***	***Coeff.***	***Z-Stat***	***Coeff.***	***Z-Stat***	***Coeff.***	***Z-Stat***

Panel A: Cumulative abnormal returns (CAR) during the event window period (-15, 0)

Market Model	0.013	0.080	-0.424***	-3.430	-0.733***	-2.990	-0.878*	-1.770	-0.276	-1.030
$ERCH_{(1,1)}$	-0.342	-1.57	-0.28	-1.14	-0.149	-0.68	-387**	-2.35	-290	-1.470
$GARCH_{(1,1)}$	9.367***	3.270	11.482***	5.43	8.680***	5.010	10.660***	3.150	9.115***	3.670
$TARCH_{(1,1)}$	6.636	1.690	4.900	1.720	10.037***	5.120	8.752***	2.600	7.223*	1.780

Panel B: Cumulative abnormal returns (CAR) during the event window period (0, 15)

Market Model	-0.154***	-2.65	-0.77***	-4.6	-0.659***	-4.72	-0.64**	-2.52	-0.495**	-2.73
$ERCH_{(1,1)}$	0.013	0.08	-0.358**	-2.54	-0.091	-0.76	-0.034	-0.19	-0.132	0.015
$GARCH_{(1,1)}$	13.04***	3.47	-11.16***	-4.73	9.038***	5.64	9.78***	3.4	11.55***	3.35
$TARCH_{(1,1)}$	-0.536	-0.17	5.266**	2.11	0.478	0.24	-0.58	-0.18	-0.035	-0.01
No. firms	37		61		143		56		45	

	Consumer Services		Utilities		Financials		Technology		Hotel	
	Coeff.	***Z-Stat***	***Coeff.***	***Z-Stat***	***Coeff.***	***Z-Stat***	***Coeff.***	***Z-Stat***	***Coeff.***	***Z-Stat***

Panel A: Cumulative abnormal returns (CAR) during the event window (-15, 0)

Market Model	-1.654***	-3.560	-2.144*	-1.750	-1.180***	-4.710	-0.360	-1.070	-1.778	-0.560
$ERCH_{(1,1)}$	-0.473**	-2.8	-393	-1.28	-0.348***	-4.5	-0.37*	-1.93	0.423	1.11
$GARCH_{(1,1)}$	6.191*	1.730	9.328*	1.810	3.635*	1.660	7.522*	1.670	0.873***	2.870
$TARCH_{(1,1)}$	14.899***	4.610	31.114	4.970	13.189***	8.410	9.992***	2.590	0.054	0.110

Panel B: Cumulative abnormal returns (CAR) during the event window period (0, 15)

Market Model	-0.142	-0.800	0.141	0.240	-0.981***	-7.090	-0.561***	-2.690	-0.875***	-2.770
$ERCH_{(1,1)}$	-0.305*	-1.550	-0.394	-1.010	-0.199**	-2.190	-0.014	-0.080	-0.429	-0.870
$GARCH_{(1,1)}$	-8.017**	-1.950	6.559	1.300	7.852***	8.330	10.887***	4.270	-8.291**	-1.930
$TARCH_{(1,1)}$	2.913	0.850	0.263	0.050	1.732	1.220	-0.440	-0.140	-0.919	-0.600
No. firms	71		8		286		63		4	

Note: The number of firm day observations included in bottom of Table. *Significance at the 10% level, **Significance at the 5% level and ****Significance at the 1% level.* The Cumulative abnormal returns (CARs) is the sum of all abnormal returns during the event period. CARs are usually computed over the short windows, even for some days. This is due to evidence indicating that calculating daily abnormal returns can create bias in the results.

Table 4: Cumulative abnormal returns (CAR) for different industries over the event window

	Oil & Gas		Basic Materials		Industrials		Consumer Goods		Healthcare	
	Coeff.	***Z-Stat***	***Coeff.***	***Z-Stat***	***Coeff.***	***Z-Stat***	***Coeff.***	***Z-Stat***	***Coeff.***	***Z-Stat***
Panel C: Cumulative abnormal returns (CAR) during the event window period (0,30)										
Market Model	-0.430***	-3.160	-215**	-1.950	-0.307***	-3.54	-0.313	-2.23	-0.12	-0.99
$ERCH_{(1,1)}$	-0.044	-0.33	-0.185	-0.82	-0.001	0	0.022	0.25	-0.242	-1.14
$GARCH_{(1,1)}$	-11.35	-3.04	-8.291	-1.05	-12.78***	-5.65	-1.224***	-4.02	-10.53**	-2.13
$TARCH_{(1,1)}$	-1.3	0.05	3.809	0.9	0.736	0.45	0.013	0.47	4.312	1.12
No. firms	37		61		143		56		45	

Panel C: Continue (0, 30)	Consumer Services		Utilities		Financials		Technology	Hotel	Hotel	
	Coeff.	***Z-Stat***	***Coeff.***	***Z-Stat***	***Coeff.***	***Z-Stat***	***Coeff.***	***Z-Stat***	***Coeff.***	***Z-Stat***
Market Model	0.038	0.39	1.11**	2.15	-0.305***	-3.86	-0.107	-0.71	-0.88	-1.29
$ERCH_{(1,1)}$	-0.01	-0.18	-0.103	-0.60	-0.335	-1.27	-0.008	-0.24	0.009	0.02
$GARCH_{(1,1)}$	15.47***	6.45	18.31***	3.97	16.96***	16.29	-16.23***	-5.69	1.118***	4.74
$TARCH_{(1,1)}$	-0.099	-0.09	1.281	0.55	0.39	0.82	0.441	0.56	0.162	0.33
No. firms	71		8		286		63		4	

Note: The number of firm day observations included in the bottom of the Table.
*Significance at the 10% level, **Significance at the 5% level and ****Significance at the 1% level.*