Event study approach: The case of Airbnb and hotel stocks

**Introduction**

Recent decades have seen the development of the peer-to-peer (P2P) economy in response to of various technological and sociological changes. The phrase “peer-to-peer” refers to an individual who rents an unused product to those who temporarily need it for a certain fee (Gupta et al 2019). Some researchers use the term “sharing economy”; however, this is not an accurate term as the product is not really “shared” (Dolnicar, 2021). The P2P economy has spread from accommodation to cars, fashion (Choi and He, 2019), and even electricity (Schneiders et al., 2022) and now has the potential to totally alter the economy. The most common example of the P2P economy remains the P2P accommodation market, specifically Airbnb (Gansky, 2010; Sundararajan, 2013). Airbnb links people who have vacant housing available with people (such as tourists) looking for temporary accommodations via digital markets (Botsman and Rogers, 2011; Zervas et al., 2017). Brian Chesky and Joe Gebbia founded Airbnb in 2008, and by 2021 had 12.7 million listings in 100,000 cities (Airbnb, n.d.). Airbnb now leases more rooms than the world’s three largest hotel companies combined. The company has a market value of $113 billion (Airbnb, n.d.).

Airbnb poses a potentially serious threat to the conventional hospitality industry because it offers significantly cheaper accommodations and more diversity than hotels (Dolnicar, 2019). Some researchers claim that Airbnb is a substitute for hotels. For example, Guttentag and Smith (2017) found that over 60 percent of Americans use Airbnb as a substitute for hotels. Similarly, Yang et al. (2021) found the two to be substitutes. They analyzed 466 estimates from 33 studies on the effect of Airbnb on hotel performance and found that the effect was negative, but small. Dogrua et al. (2020) researched ten major hotel markets in the United States between 2002 and 2018 and reported that ‏the increase in Airbnb supply between 2008 and 2017 had a negative effect on hotel revenues, average prices, and occupancy rates. Dogrub et al. (2020) found that in London, Paris, Sydney, and Tokyo an increase of 1 % in Airbnb listings decreased hotel revenue between 0.016% and 0.031%. Blal et al. (2018) found that in San Francisco overall hotel revenue per room was unrelated to the availability of Airbnb alternatives. In certain segments, however, it was affected by the average price of Airbnb accommodations. Conversely, other researchers have argued that Airbnb is a complementary product, for example Varmaet et al. (2016) who researched hotel employees and found that Airbnb and hotels address different types of guests. Likewise, Sainaghi and Baggio (2020) determined that on weeknights hotels usually serve business guests, whereas Airbnb houses leisure guests.

Besides the immediate effect Airbnb has had on the hospitality industry, for example a rise in tourist numbers (Gutiérrez et al., 2017)‏, it has had a wider effect on the economy (Levendis and Dicle, 2016; Negi and Tripathi, 2022). One example is its impact on rental and housing prices (Benitez-Aurioles and Tussyadiah, 2020; Barron et al., 2021). Findings indicate that Airbnb increases crime rates (Ke et al., 2021) as well as leading to neighborhood gentrification and overcrowding (van Holm, 2020; Gyodi, 2019). In the Balearic Islands it was found that Airbnb promotes environmental degradation (Martin et al., 2018). On the other hand, Airbnb has a positive effect on the hotel and restaurant employment market (Dogruc et al., 2020; Mao et al., 2018) and on the revues of local communities and authorities (Belarmino et al., 2021; Mao et al., 2018; Farmaki and Kaniadakis, 2020).

The positive effects of Airbnb on economic activities and local income, along with its negative effects such as disturbances in local communities and a decrease in hospitality income, have caused local municipalities and governments to consider how they should treat Airbnb. To this end, it is crucial to learn more about the effect of Airbnb on markets. This study uses the stock market to test the effect of Airbnb announcements on hotel stock values. The uniqueness of this study is that unlike most other research that deals with Airbnb, it does not focus on a specific area (Dann et al., 2019).

**Literature Review**

The efficient market theory (EMH) claims that share prices reflect all information known to the market. Investors who are looking for ways to profit look for information that is predictive of stock prices. Extensive research has therefore been performed on how different information published in various channels and modes affects stock prices. One common way to study the impact of news on markets is to use event study methodology. This method has been widely used in many areas including marketing (Sorescuet et al., 2017),‏ economics (Lee and Mas 2012), accounting (Jiang et al. 2015), health (Maneenop and Kotcharin, 2020), and tourism (Papakyriakou et al., 2019).

In the hospitality industry, the event study approach has been used by many researchers. For example, Che Ahmat et al. (2023) utilized it to test the impact of a minimum hospitality industry wage on the stock prices of hotel companies in Malaysia, finding that introducing a minimum wage or increasing it led to a decline in stock values. Bloom and Jackson (2016) found a negative effect comparing before and after CEO change in hotel companies. Likewise, Dorgou (2017) found that acquisition has a positive effect, its size depending on the financial constraints and organizational structure. Kim (2021) found that announcements regarding hotel mergers tend to have different effects on the offer bidder and the target.

Focusing specifically on Airbnb, Garcia-López et al. (2020) used several models including the event study model to test the effect of Airbnb in Barcelona on the city’s housing and rental prices. They found that since 2014, when Airbnb became an important player in Barcelona, housing and rental prices increased in neighborhoods where Airbnb was present compared to neighborhoods in which it was not. This result was also obtained by Bibler et al (2021) in Chicago and San Francisco; however, they also found that growth in Airbnb listings helps the individual economic situation. Similarly, Gonçalves (2020) focused on the ban of Airbnb in Lisbon. He found that there was a pickup in registry between the time the ban was announced and its implementation, and that buyers liked the option of being able to participate in the Airbnb market.

Studying the effect on funding on Airbnb and hotels at different business stages, Biancoa et al. (2022) found that the startup phase for traditional hotels had a declining effect on stock markets, while Airbnb at a similar stage had a positive effect. Looking at the connection between Airbnb and hotel companies, Biancob et al. (2022) used a sample of publicly traded hotel management companies and hotel real estate investment trusts in the United States before and after Airbnb was recognized as a competitor (2013–2014). Using the event study methodology, they found that after 2014 new products or services offered by Airbnb had a negative effect on markets. Focusing on this connection but extending it to Airbnb around the world, Teitler-Regev and Tavor (2022) tested how announcements on the Airbnb website effected stock values of hotel companies, finding a negative connection. In addition, they found that positive Airbnb announcements led to a decline in stock values, while announcements regarding families had a longer-term effect.

Based on these studies (Biancob et al. 2022; Kim, 2021; Teitler-Regev and Tavor, 2022) and several others, the consensus is that negative events have a negative effect on markets. Examples include cyberattacks (Arcuri, 2020), terrorist attacks (Markoulis and Neofytou, 2019), political uncertainties (Das et al., 2020), and COVID-19 (Clark et al., 2021; Sharma and Nicolau, 2020; Shin et al., 2021). Our first hypothesis is this:

Hypothesis 1: Airbnb announcements will have a negative effect on hotel stock prices.

In addition, identifying the location of the announcement might have different effects on hotel stock prices. For example, Viljoen (2016) studied the effect of news announcements on stocks with dual listings. The study determined that not only did the announcements affect stocks in the specific market, but they also had a spillover effect on the general market. Based on this paper, our second hypothesis is as follows:

Hypothesis 2: Airbnb announcements with an exact location will have a different effect on hotel stock prices than announcements with a general location.

This paper builds on work by Teitler-Regev and Tavor (2022), using more advanced statistical models in order to increase the robustness of the tests of the effect of Airbnb announcement on hotel stock prices.

Data and Empirical Strategy

Data

Studies have shown that the presence of Airbnb in a locality affects hotel companies in that area. Therefore, to test the effect of Airbnb on hotel company stocks, we collected data regarding stocks of hotel companies and the main stock index in ten different countries around the world where there had been Airbnb announcements, namely the United States, France, Australia, India, Japan, the United Kingdom, China, Germany, Thailand, and Spain. For each Airbnb announcement with an exact location, we collected data for the announcement day on hotel companies that might be affected. For announcements that did not have an exact location we considered all the companies in the sample. The data included 48 announcements relating to 145 stocks with an exact location and 132 announcements related to 969 stocks without an exact location. The data in this study are based on announcements posted on Airbnb from 2017 to 2019. Data on stock prices were collected form Yahoofinance.com and Investing.com. Appendix A includes the list of countries according to their stock indexes.

Empirical strategy

The event study approach was developed as a statistical approach to measuring how an economic event affects the market by utilizing abnormal returns (AR) (Luoma, 2011), specifically testing the efficient market theory (EMH) developed by Fama (1970) (see also Dashdondog, 2021).  The first research published on event study was carried out by Dolley (1933) in the early 1930s. In the late1960s research by Ball and Brown (1968) and Fama et al. (1969) introduced the methodology that is still in use today in much economics and finance research. However, several modifications have been made, specifically using daily data instead of monthly data and employing more sophisticated methods to estimate the abnormal returns (Brown and Warner, 1980, 1985; Campbell et al., 1997).

The conventional event study approach to measuring abnormal returns around a specific day is widely used, but is problematic in several ways, including that stock prices are not necessarily normally distributed (Kolari and Pynnönen, 2010), that there might be bias in the OLS estimations when non-synchronous trading is present (Dutta, 2014), and that increase in the variance might lead to misspecification of the model (Brown and Warner, 1980, 1985). Several researchers have suggested ways to deal with some of these problems, and other tests have been developed to increase accuracy and robustness. For example, Boehmer, Musumeci, and Poulsen (BMP) (1991) argued that the event-period returns needs to be standardized by the estimation-period standard deviation, and that the cross-sectional mean of the standardized returns should be divided by the cross-sectional standard deviation in order to create the test statistic. They assume that the event-induced variance is identical for all stocks. Brown and Warner (1980, 1985) demonstrated that when the event day is the same for several industries the use of the market model reduces abnormal return intercorrelation to close to zero. However, this is not the case when the stocks are from the same industry and thus over-rejection of the null hypothesis can be created. To handle this problem, Kolari and Pynnönen (2010) offered a variation of Patell’s standardized t-test, which assumes cross-section independence and controls the impact of large standard aberrations and even conscious changes in the variance of the returns (Hussain, 2020). Boehmer et al. (1991) used the cross-sectional variance while ignoring the estimation-period residual variance. Using maximum likelihood estimation (MLE) on stock return data, Ball and Torous (1988) simultaneously estimated event-period returns, the variance of these returns, and the probability of the event’s occurrence for any given day in the event window. The results suggest that the MLE method rejects the null hypothesis more often than the traditional Brown and Warner method; however, the null hypothesis is not rejected too often when it is true. The standardized residual test assumes that the residuals are not correlated and that the event-induced variance is insignificant. In this method, used by Brown and Warner (1985) and Boehmer et al. (1991), the event-period residuals are divided by their standard deviation, thus adjusting them to reflect the forecast error.

Nonparametric tests are well-specified and good at detecting a false null hypothesis of no abnormal return. Researchers including Corrado (1989), Corrado and Zivney (1992), Cowan (1992), Campbell and Wasley (1993, 1996), and Corrado and Truong (2008) used nonparametric sign and rank tests showing that those tests produce better specification and power than parametric tests. Zivney and Thompson (1989) adjusted the sign test to deal with skewness and performed risk adjustment. To handle the problem of event-induced variance Corrado (1989) offered a nonparametric rank test, which relaxes the assumption of normality and offers robustness results. This test applies for a one-day abnormal return, but Corrado claims that it can be used for multiple-day events if the estimation period is divided by interval according to the number of days in the cumulative abnormal returns (CARs). However, for longer time periods the number of observations becomes very small, weakening the model estimation. To avoid the same problem Cowan (1992) and Campbell and Wasley (1993) used the accumulative abnormal returns on Corrado’s rank. The shortcoming of this method is a loss of power in detecting abnormal returns, specifically when the event windows are long. To avoid this problem, Kolari and Pynnönen (2011) developed a generalized rank test that uses the generalized standardized abnormal returns to test both single and cumulative abnormal returns. The test they offer is robust to abnormal return serial correlation, event-induced volatility, and cross-sectional correlation of abnormal returns. One of the shortcomings of the sign test is the loss of information due to use of positive or negative signs. The Wilcoxon signed ranks test reflex this limitation as it not only tests observed values relative to the median but also considers their relative sizes (Zoungrana et al., 2021).

In our research, the day of the event refers to the day the announcements about Airbnb were posted and is defined as *t* = 0. If the event occurs on a non-trading day, the event day will be the first business day after the event. The time points *t* = T0+1,T0+2, …, T1 are the days of the estimates as related to the event day. During this period, we calculate the statistic values that are the basis for testing the event. Finally, *t* = T1+1, T1+2, …, 0, …, T2 are the days of the event window related to the event day.

Event study methodology has no uniform rule regarding the length of the event and estimation windows. Over the years, researchers have changed the length of the estimation and events according to their research needs(Alkhatib and Harasheh, 2018; Ball and Brown, 1968; Brown and Warner, 1985; Fama, Fisher, Jensen, and Roll, 1969; Palatnik et al., 2019; Teitler‐Regev and Tavor, 2022). In this study the event window is calculated during the days *t* ∈ [−330, −31] and is defined as *t* ∈ [−30, +30].

We used abnormal returns (ARs) and cumulative abnormal returns (CARs) to analyze the responses of hotel company stock returns to Airbnb announcements. We built a market model to describe the correlation of hotel company stock returns for event *i* on day *t*, (*Rit*), to the market return on that day (*Rmt*) under normal circumstances, meaning a situation when no significant unpredictable events occurred. The market return is represented by the return on the index of the stock that is tested:

1. *, t* [-330,-31], *I* = 1, 2, …., *N*.

The return (*Rit*) is characterized with weak white noise random variables with E[*Rit*] = *μi* and Var[*Rit*] = for all *t* and Cov[*Rit, Rih*] = 0 for all *t* ≠ *h*.

The normal return, *E(Rit|It)*, for information *I* on day *t* is based on ordinary least squares regression with the estimators and :

1. ,  *t* [−30,+30], *i* = 1, 2, …., *N*.

The abnormal return, *ARit,* representing the difference between the actual and normal returns for event *i* on day *t*, is then calculated:

1. , *t* [-30,+30], *i* = 1, 2, …., *N*.

The standardized abnormal return (*SAR*) is defined as

where*S(ARi*) is the standard deviation of the regression errors in forecasting the abnormal returns (see Campbell et al., 1997).

The cumulative abnormal return for event *i* on day *t* (*CARit*) tests the cumulative influence of an event over a period of time *t* [t1, t2] by summarizing the abnormal returns during this time:

1. , *t* [t1, t2].

The standardized cumulative abnormal return (*SCAR*) is defined as

where is the cumulative standard deviation of the regression errors in forecasting the abnormal returns.

In addition, we calculated the cumulative average abnormal return in the event window as follows:

1. .

In order to test the significance of the event window we used three parametric tests and three nonparametric tests. The first parametric test is the well-known ordinary t-test (ORDIN) (see Brown and Warner, 1985; Campbell et al., 1997), specified as follows:

1. .

This test has been widely used, for example in Teitler‐Regev and Tavor (2022), Luoma (2011), and Maneenop and Kotcharin (2020).

The second parametric test, Patell’s test, can overcome the weakness of the standard *t*-test for fluctuations caused by an event by standardizing the abnormal returns within the event window (see Patell, 1976):

where is the average of the standard deviations of the *CAR* values and *L*1 represents the number of days in the estimation window. This test was used by Luoma (2011), Drechsler et al. (2019), and Buigut and Kapar (2020).

The third parametric test uses the standardized cross-sectional approach and is also known as the Boehmer, Mucumeci, and Poulsen (BMP) test (see Boehmer et al., 1991):

where is the cross section of the standard deviations for the *SCAR* values. This test has been used by researchers including Luoma (2011), Tahir et al. (2020), and Allen (2021).

The first nonparametric test is the rank test. In order to implement this test, we assign the abnormal returns of each firm a rank (K) through the integrated time period (T) that includes both the estimation and event windows. The test compares the ranks during the event period for each firm, with the expected rank () (Corrado, 1989):

where is the average rank in the event window, *L*2 is the number of days in theevent window that are tested, and represent the ranked standard deviation for the integrated time period. This test was used by Luoma (2011), Hussain et al. (2011), and Pandey and Kumari (2021).

The second nonparametric test is the GRANK-Z test. We define the generalized standardized abnormal return (GSAR) following Kolari and Pynnonen (2011):

The de-meaned standardized abnormal ranks of the GSARit are given by

and the GRANK-Z test statistic is

where and are the average de-meaned standardized abnormal rank of the *GSARit* and the standard deviation of the average *Uit* respectively in the estimate window for event *i* on day *t*. This test was used by Dashdondog (2021) and Fotaki, Kourtis, and Markellos (2021).

The third nonparametric test is the Wilcoxon signed-ranks test (WSRT). This test considers that both the power and the sign of the abnormal returns are important (see Gibbons and Chakraborti, 2014; Wilcoxon, 1945) and is defined as follows:

where is the positive rank of the absolute value of the cumulative abnormal real exchange rate return. This test was recently used by Kirana and Sembel (2019), Zoungrana et al. (2021), and Isynuwardhana and Putri (2021).

**Empirical Results**

***Descriptive statistics***

Table 1 presents descriptive statistics for key market index yields of the 10 countries that were tested in this research, as well as the MSCI World index.

**Table 1**

Descriptive statistics of market indices

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Country | Index | *N* | Mean | Std. Dev. | Min. | Median | Max. |
| USA | S&P 500 | 798 | 0.052 | 0.799 | −4.100 | 0.050 | 4.960 |
| France | CAC 40 | 812 | 0.030 | 0.948 | −8.040 | 0.010 | 4.140 |
| Australia | S&P/ASX 200 | 803 | 0.030 | 0.721 | −3.200 | 0.070 | 3.340 |
| India | BSE Sensex 30 | 570 | 0.067 | 0.686 | −2.580 | 0.080 | 2.210 |
| Japan | Nikkei 225 | 807 | 0.033 | 1.202 | −7.920 | 0.050 | 7.160 |
| UK | FTSE 100 | 803 | 0.028 | 0.796 | −3.150 | 0.050 | 3.580 |
| China | Shanghai SE 50 | 771 | 0.056 | 1.115 | −5.330 | 0.050 | 6.280 |
| Germany | DAX | 803 | 0.028 | 0.987 | −6.820 | 0.060 | 3.510 |
| Thailand | SET 100 | 777 | 0.038 | 0.767 | −3.280 | 0.070 | 4.420 |
| Spain | IBEX 35 | 812 | 0.014 | 1.103 | −12.350 | 0.030 | 3.760 |
| World | MSCI World  | 827 | 0.040 | 0.665 | −4.900 | 0.050 | 3.090 |

Note: The values of the mean, standard deviation, minimum, median, and maximum are presented in the table as percentages. The indices presented are the leading indices in each country.

As can be seen from Table 1, the country with the highest average daily yield is India, with 0.067%. The country with the lowest average daily yield is Spain at 0.014%. The country with the most fluctuating index is Japan with 1.202% standard deviation, while India has the most solid yield with 0.6868%. Moreover, the yield of the world income is approximately in the middle at 0.04%; it has the lowest volatility at 0.665%.

***Effect of announcement with a general location vs. an exact location on hotel company share prices***

In this section we use our market model to estimate the effect of announcements on Airbnb on the returns on stocks of hotel companies for two types of announcements: 48 announcements with an exact location relating to 145 events for the hotel companies in the area, and 132 announcements with a general location including 969 events for the hotel companies in the area. Figure 1 describes the behavior of CAAe−30,+30 during the 61-day window around the day of the event for the two types of announcements from day (−30) before the announcement to day (+30) after the announcement. Panels A and B in Table 2 presents cumulative abnormal return results for announcements with general and exact locations, respectively.

The results appear in two types of windows. In the first type, four windows are presented around the day of the event: [−1,+1], [−3,+1][[1]](#footnote-1), [−5,+5], and [−10,+10]. In the second type, we investigated three pre-event windows, [−3,0], [−2,0], and [−1,0], the event day window [0,0], and three post-event windows [0,1], [0,2], and [0,3]. In column 2 we present the results for each window, in columns 3–5 the results of the three parametric tests (ORDIN, PATELL, and BMP) and in columns 6–8 the results of the three nonparametric tests (RANK, GRANK-Z, and WSRT).

**Table 2**

Cumulative abnormal return (CAR) for general and exact location

|  |
| --- |
| Panel A: General location |
| Daily time | CAR(%) | ORDIN | PATELL | BMP | RANK | GRANK-Z | WSRT |
| Event window surrounding the event day |
| CAR[−1,+1] |  0.019 |  0.174 | −0.999 | −0.913 |  0.427 |  0.565 |  0.461 |
| CAR[−3,+1] |  0.026 |  0.183 | −1.140 | −0.954 |  1.880\* |  1.078 | −1.247 |
| CAR[−5,+5] |  0.160 |  0.771 | −0.360 | −0.306 | −0.723 |  0.803 |  0.383 |
| CAR[−10,+10] |  0.116 |  0.405 | −1.855\* | −1.637 |  4.387\*\*\* |  1.974\* |  1.956\* |
| Pre−event and post−event window |
| CAR[−3,0] |  0.029 |  0.231 | −0.774 | −0.646 |  1.277 |  0.841 |  0.950 |
| CAR[−2,0] |  0.043 |  0.393 | −0.386 | −0.318 |  0.756 |  0.718 |  0.762 |
| CAR[−1,0] |  0.022 |  0.249 | −0.516 | −0.473 |  0.538 |  0.520 |  0.325 |
| CAR[0,0] |  0.033 |  0.524 |  0.365 |  0.372 | −0.270 | −0.275 | −0.896 |
| CAR[0,+1] |  0.030 |  0.334 | −0.450 | −0.436 | −0.361 | −0.038 | −0.518 |
| CAR[0,+2] | −0.030 | −0.268 | −1.471 | −1.414 |  0.343 |  0.442 |  0.231 |
| CAR[0,+3] |  0.094 |  0.747 |  0.404 |  0.372 | −2.369\*\* | −0.318 | −1.214 |
| Panel B: Exact location |
| Daily time | CAR(%) | ORDIN | PATELL | BMP | RANK | GRANK−Z | WSRT |
| Event window surrounding the event day |
| CAR[−1,+1] | −1.149 | −4.785\*\*\* |  −8.905\*\*\* | −2.325\*\* | 6.002\*\*\* | 2.222\*\* | 3.527\*\*\* |
| CAR[−3,+1] | −1.683 | −5.431\*\*\* | −10.156\*\*\* | −3.082\*\*\* | 8.519\*\*\* | 2.705\*\*\* | 4.067\*\*\* |
| CAR[−5,+5] | −1.268 | −2.759\*\*\* |  −5.242\*\*\* | −2.223\*\* | 6.527\*\*\* | 1.849\* | 2.716\*\*\* |
| CAR[−10,+10] | −1.525 | −2.401\*\* |  −4.482\*\*\* | −2.410\*\* | 7.724\*\*\* | 1.854\* | 2.797\*\*\* |
| Pre−event and post−event window |
| CAR[−3,0] | −1.449 | −5.227\*\*\* | −10.060\*\*\* | −3.051\*\*\* | 6.527\*\*\* | 2.530\*\* | 3.691\*\*\* |
| CAR[−2,0] | −1.219 | −5.079\*\*\* |  −9.539\*\*\* | −2.786\*\*\* | 4.511\*\*\* | 2.306\*\* | 3.470\*\*\* |
| CAR[−1,0] | −0.915 | −4.666\*\*\* |  −9.075\*\*\* | −2.259\*\* | 3.265\*\*\* | 2.019\*\* | 3.186\*\*\* |
| CAR[0,0] | −0.671 | −4.841\*\*\* |  −8.068\*\*\* | −5.178\*\*\* | 3.838\*\*\* | 3.314\*\*\* | 4.781\*\*\* |
| CAR[0,+1] | −0.905 | −4.618\*\*\* |  −7.536\*\*\* | −3.228\*\*\* | 3.845\*\*\* | 2.006\*\* | 2.929\*\*\* |
| CAR[0,+2] | −0.807 | −3.362\*\*\* |  −5.636\*\*\* | −2.907\*\*\* | 3.629\*\*\* | 1.759\* | 2.533\*\* |
| CAR[0,+3] | −0.884 | −3.189\*\*\* |  −5.333\*\*\* | −3.188\*\*\* | 4.239\*\*\* | 1.808\* | 2.590\*\*\* |

Note: Panel A and panel B present cumulative abnormal returns for general and exact location, respectively. The parametric tests in columns 3–5 include the t-statistics (displayed as ORDIN), the Patell test (displayed as PATELL), and the standardized cross-sectional approach (displayed as BMP). The nonparametric tests in columns 6–8 include the Corrado rank test (displayed as RANK), the generalized standardized abnormal return (displayed as GRANK-Z), and the Wilcoxon signed-rank test (displayed as WSRT). For p-values, \*, \*\*, and \*\*\* denote statistical significance at the 10%, 5%, and 1% levels respectively.

**Figure 1**

Cumulative average abnormal return (CAAR) behavior during the 61-day event window surrounding the event day for general and exact location



Note: The horizontal axis shows days relative to the event day *t* = 0. The dashed lines denote the 95% confidence intervals. The lines in black and gray indicate the CAAR−30,+30 for exact and general location respectively.

Panel A in Table 2 and Figure 1 show that generally, announcements published on the Airbnb website with a general location do not affect hotel company stock prices of hotel companies except for the [−10,+10] window, which shows an increase of CAR-10,+10 = 0.116. This window is significant for all the nonparametric tests as well as the PATELL parametric test. In addition, there is a significant difference according to the RANK tests in the [−3,+1] and [0,+3] windows. It can be assumed that investors seeing general announcements without an exact location do not change their investment strategy, and therefore the prices of hotel stocks do not change significantly.

The results presented in panel B present a different picture, with announcements with an exact location negatively affecting hotel stock prices in the area of the announcement; is negative for all types of windows tested. Analyzing the statistical tests shows that the most significant results are in the PATELL parametric tests and the RANK nonparametric tests. By window, the most significant results occur in the window [−3,+1] with CAR−3,+1= −1.683% and the mean absolute value test (MAVT) equal to 5.660. The pre- and post-event window analyses reveal that the most significant results occur in the window [−3,0] with CAR−3,0 = −1.449% (MAVT = 5.181), in the window [0,0] with CAR0,0 = −0.671% (MAVT = 5.003), and in the window [0,+1] with CAR0,+1 = −0.905% (MAVT = 4.027).

This result shows that most of the influence of announcements with exact location occur during the five days around the event window [−3,+1[. That is, investors with inside information can use this information to short-sell stocks of hotel companies three days before the announcements and close this position one day after the announcement for an excess profit of 1.683%.

To strengthen the significant results obtained for announcements with exact location we present two additional figures: Figures 2 and 3. Figure 2 shows the results of the parametric and nonparametric tests during the 21 days around the event day, beginning on the tenth day before the announcement was published and ending ten days after the announcement was published. The dashed horizontal lines denote statistical significance at the 5% level. The lines in black and gray indicate the results of the parametric and nonparametric tests respectively.

**Figure 2**

Parametric and nonparametric test results during 231 days around the event



Note: The horizontal axis shows the days relative to the event day *t* = 0. The dashed horizontal lines denote statistical significance at the 5% level. The lines in black and gray indicate the results of the parametric and nonparametric tests respectively.

Analyzing the figure, the trends in the parametric and nonparametric tests are generally opposite. The most volatile parametric and nonparametric tests are PATELL and WSRT respectively. Also, there are five days when the majority of the tests are statistically significant at 5% level: *t* = −10, −8, −6, −2, and 0. However, calculating the strongest effect of the event according to and significance statistics pinpoints the effect in the [−3,+1] window.

Figure 3 (below) describes the cumulative percentage of announcements with negative during the seven days around the event day, beginning three days before the announcement and ending three days after it, for announcements with general location (marked in gray) and exact location (marked in black). It can be seen in the figure that on average 51.5% of the announcements with general location and 62.1% of those with exact location have a negative during the test period. The result support the statistically significant benefit gained from in announcements with exact location in all the event windows, compared to the lack of change in announcements with general location in most of the event windows.

**Figure 3**

The cumulative percentage of announcements with a negative cumulative abnormal return (CAR) during the seven-day event window surrounding the event day for general and exact locations



Note: Columns in black and in gray indicate announcements with a negative cumulative abnormal return for exact and general locations, respectively.

**Robustness Checks**

This section describes tworobustness checks to provide corroborating evidence for the empirical results presented in the previous section. Results of the first robustness test are presented in Table 3; they compare investors’ attention in the short term to influence over the medium term. Panel A of the table present the results for the window [−10,+10] and panel B the results for [−3,+1].

**Table 3**

Cumulative abnormal return (CAR) behavior for general and exact locations in the short term

|  |  |  |  |
| --- | --- | --- | --- |
|   | Panel A: Event window [−10,+10] |   | Panel B: Event window [−3,+1] |
|  | General location |  | Exact location |  | General location |  | Exact location |
| Daily time | CAR(%) | ORDIN |   | CAR(%) | ORDIN |   | CAR(%) | ORDIN |   | CAR(%) | ORDIN |
| Event window surrounding the event day |
| CAR[−1,+1] |  0.012 |  0.112 |  | −1.143\*\*\* | −4.705 |  | 0.012 | 0.110 |  | −1.135\*\*\* | −4.626 |
| CAR[−3,+1] |  0.015 |  0.110 |  | −1.682\*\*\* | −5.363 |  | 0.015 | 0.107 |  | −1.674\*\*\* | −5.283 |
| CAR[−5,+5] |  0.132 |  0.641 |  | −1.288\*\*\* | −2.768 |  |  |  |  |  |  |
| CAR[−10,+10] |  0.058 |  0.203 |  | −1.579\*\* | −2.457 |  |  |  |  |  |  |
| Pre- and post-event windows |
| CAR[−3,0] |  0.018 |  0.142 |  | −1.450\*\*\* | −5.167 |  | 0.016 | 0.129 |  | −1.443\*\*\* | −5.092 |
| CAR[−2,0] |  0.035 |  0.323 |  | −1.218\*\*\* | −5.012 |  | 0.034 | 0.315 |  | −1.208\*\*\* | −4.924 |
| CAR[−1,0] |  0.014 |  0.164 |  | −0.911\*\*\* | −4.592 |  | 0.013 | 0.149 |  | −0.905\*\*\* | −4.514 |
| CAR[0,0] |  0.026 |  0.418 |  | −0.673\*\*\* | −4.795 |  | 0.025 | 0.402 |  | −0.670\*\*\* | −4.727 |
| CAR[0,+1] |  0.024 |  0.269 |  | −0.905\*\*\* | −4.561 |  | 0.024 | 0.270 |  | −0.901\*\*\* | −4.495 |
| CAR[0,+2] | −0.037 | −0.346 |  | −0.812\*\*\* | −3.342 |  |  |  |  |  |  |
| CAR[0,+3] |  0.079 |  0.638 |   | −0.897\*\*\* | −3.197 |   |   |   |   |   |   |

Note: Panels A and B represent the cumulative abnormal return in the [−10,+10] and [−3,+1] windows respectively. In each panel, the first two columns refer to CAR and *t*-statistics (displayed as ORDIN) of announcements with general location, and the last two columns refer to CAR and *t*-statistics (displayed as ORDIN) of announcements with exact location. For p-values, \*, \*\*, and \*\*\* denote statistical significance at the 10%, 5,% and 1% levels, respectively.

The results in Table 3 show in general that announcements with a general location published on Airbnb do not affect hotel stock prices, but announcements with specific location do influence stock price results in all window types. The robustness test also shows that the window with the highest significance is [−3,+1] with CAR−3,+1 = −1.682% (ORDIN = −5.363) and CAR−3,+1 = −1.674% (ORDIN = −5.283) in the [−10,+10] and [−3,+1] windows respectively.

The second robustness test, presented in Table 4, tests the effect of announcements published on Airbnb on hotel stock prices using two accepted models for calculating normal return: the index model (IM), presented in panel A, and mean adjusted returns (MAR), presented in panel B.

**Table 4**

Cumulative abnormal return (CAR) behavior according to the IM and MAR models for general and exact locations

|  |  |  |  |
| --- | --- | --- | --- |
|   | Panel A: Index Model (IM) |   | Panel B: Mean Adjusted Returns (MAR) |
|  | General location |  | Exact location |  | General location |  | Exact location |
| Daily time | CAR(%) | ORDIN |   | CAR(%) | ORDIN |   | CAR(%) | ORDIN |   | CAR(%) | ORDIN |
| Event window surrounding the event day |
| CAR[−1,+1] |  0.033 |  0.302 |  | −1.233\*\*\* | −5.047 |  | −0.049 | −0.329 |  | −0.770\*\* | −2.290 |
| CAR[−3,+1] |  0.041 |  0.293 |  | −1.746\*\*\* | −5.537 |  | −0.074 | −0.386 |  | −1.238\*\*\* | −2.853 |
| CAR[−5,+5] |  0.167 |  0.805 |  | −1.407\*\*\* | −3.007 |  | −0.075 | −0.263 |  | −0.577 | −0.896 |
| CAR[−10,+10] |  0.076 |  0.265 |  | −1.774\*\*\* | −2.745 |  | −0.068 | −0.174 |  | −0.543 | −0.611 |
| Pre- and post-event windows |
| CAR[−3,0] |  0.043 |  0.348 |  | −1.430\*\*\* | −5.069 |  | −0.112 | −0.650 |  | −1.138\*\*\* | −2.931 |
| CAR[−2,0] |  0.057 |  0.530 |  | −1.201\*\*\* | −4.915 |  | −0.056 | −0.377 |  | −0.968\*\*\* | −2.880 |
| CAR[−1,0] |  0.035 |  0.398 |  | −0.917\*\*\* | −4.596 |  | −0.086 | −0.710 |  | −0.670\*\* | −2.440 |
| CAR[0,0] |  0.047 |  0.753 |  | −0.681\*\*\* | −4.827 |  | −0.090 | −1.043 |  | −0.472\*\* | −2.432 |
| CAR[0,+1] |  0.045 |  0.504 |  | −0.997\*\*\* | −4.998 |  | −0.052 | −0.430 |  | −0.572\*\* | −2.085 |
| CAR[0,+2] | −0.003 | −0.032 |  | −0.965\*\*\* | −3.952 |  | −0.164 | −1.101 |  | −0.417 | −1.239 |
| CAR[0,+3] |  0.109 |  0.873 |   | −1.069\*\*\* | −3.790 |   | −0.090 | −0.522 |   | −0.350 | −0.900 |

Note: Panels A and B represent the cumulative abnormal return according to the index model (IM) and mean adjusted returns (MAR) respectively. In each panel, the first two columns refer to CAR and *t*-statistics (displayed as ORDIN) of announcements with general location, and the last two columns refer to CAR and *t*-statistics (displayed as ORDIN) of announcements with exact location. For p-values, \*, \*\*, and \*\*\* denote statistical significance at the 10%, 5%, and 1% levels, respectively.

This table also leads to the conclusion that generally, announcements with general location posted on the Airbnb site do not affect hotel stock prices. For announcements with an exact location an effect is seen on stock prices for all types of windows by the IM model, which considers the market return as a basis for calculating the normal return as in the market model. In the MAR model, most windows show an effect, but not all of them. A possible explanation is that this model does not include the market return in calculating the normal return, only the average of historical returns on each stock. The second robustness test again shows that the window with the highest significance for announcements with an exact location is [−3,+1], with CAR−3,+1 = −1746% (ORDIN = −5.537) and CAR−3,+1 = −1.238% (ORDIN = −2.853) according to IM and MAR respectively.

In summary, both robustness tests show similar results to the main test, namely that announcements with general location published on the Airbnb website do not affect hotel stock prices, while announcements with an exact location have a negative effect on hotel stock prices. This leads to two major conclusions. The first is that investors with inside information who are exposed to announcements with an exact location on Airbnb site can short-sell hotel stocks in the area addressed by an announcement three days before the announcement is posted and close the position one day after the announcement to make an excess profit. The second conclusion is that Airbnb provides a substitution to hotel services.

**Conclusions and Policy Implications**

The event study method is generally used to show that news and company announcements have an effect on stock markets. This paper uses the event study approach to measure the effect of announcements published on the Airbnb website on hotel stock prices. This research uses several parametric and nonparametric tests to increase the robustness of the results. The results of the various tests indicate that for announcements with general location there is no effect on stock prices, but that when an announcement has an exact location it negatively affects stock prices. These results hold with the parametric and nonparametric tests as well as the robustness tests. The results can help investors to develop an investment strategy and also strengthen the claim that Airbnb is a substitute to hotels. In addition, governments and local municipalities deciding whether to restrict Airbnb need to consider its negative effect on the hotels in the area.

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Appendix A

|  |
| --- |
| Location |
| North America |   | Europe |
| United States |   | France | United Kingdom | Germany | Spain |
| Company |
| Braemar Hotels & Resorts Inc. | Accor SA | Accor SA | Accor SA | Melia Hotels International SA |
| Choice Hotels International, Inc. | Pierre Et Vacances SA | Intercontinental Hotels Group PLC | Hilton Worldwide Holdings, Inc. | NH Hotel Group SA |
| City Holding Company | Intercontinental Hotels Group PLC | Orascom Development Holding Ltd |
| Hyatt Hotels Corporation | Malin Corporation PLC | Intercontinental Hotels Group PLC |
| Intercontinental Hotels Group PLC | Melia Hotels International SA | Pierre Et Vacances SA |
| Summit Hotel Properties, Inc. | Mid Wynd International Investment Trust PLC |
| Marriott International, Inc. |  |  |  |
| Pebblebrook Hotel Trust |  |  |  |
| Sunstone Hotel Investors, Inc. |  |  |  |
| Sotherly Hotels Inc. |  |  |  |
| Starwood Property Trust, Inc. |  |  |  |
| Xenia Hotels & Resorts, Inc. |  |  |  |
| Advisorshares Vice |  |  |  |
| Wynd Hotel & Banquet |  |  |  |
| Location |
| Australasia |   | Asia |
| Australia |   | India | Japan | China | Thailand |
| Company |
| Hotel Property Investment | Brigade Enterprises Ltd | Fujita Kanko Inc. | Great Eagle Holdings Ltd | MBK Hotel & Tourism (MBK PLC) |
|  |  | Eih Ltd | Imperial Hotel Ltd | Huangshan Tourism Development |
|  |  | Indian Hotel Company Ltd | Resorttrust, Inc. | Shangri-La Asia Ltd |
|  |  | Taj Gvk Hotels and Resorts Ltd | Royal Holdings Co., Ltd |  |
|  |  | BSE Sensex 30 | [Agora Hospitality Group](https://www.dorsett.com/en/agora-hospitality-group.html) |  |
|   |   |   | MBK Hotel & Tourism (MBK PLC) |   |

1. The event window with the strongest impact of posting announcements on Airbnb. [↑](#footnote-ref-1)