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## Examining the Impact of STR Weekly RevPAR Announcements on Lodging Stock Returns

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## **Cover Page Footnote**

The authors would like to thank the College of Business at Iowa State University for providing support for the access through Wharton Research Data Services to the CRSP dataset and Eventus software.

## Examining the Impact of STR Weekly RevPAR Announcements on Lodging Stock Returns

### INTRODUCTION

The impact of revenue per available room per day (RevPAR) on lodging stocks has been thinly examined. As indicated by Chen, Koh, & Lee (2011), little has been done to empirically test the explanatory power of RevPAR on lodging stock performance. The purpose of this study was to determine whether the announcement of weekly RevPAR (revenue per available room) data by STR (formerly Smith Travel Research) published as the STR Weekly Hotel Review resulted in abnormal stock returns based on the analysis of weekly announcement data from 2004 to 2009. STR provides clients—including hotel operators, developers, financiers, analysts and suppliers to the hotel industry—access to hotel research regarding daily, weekly, and monthly performance data, forecasts, annual profitability, pipeline, and property census information. At approximately 12:00 PM on Wednesday of each week (except when data collection is delayed), STR reports RevPAR data for the prior week and running 28 days ending on Saturday for the entire United States, as well as by chain scale, location, and each of the individual top 25 markets in the United States. Although the actual RevPAR in dollars is reported, the data that are typically the focus of media stories and industry analyst research reports is the change in RevPAR for the current week compared to the same week in the prior year.

This information is widely followed by hotel companies, institutional investors, investment bank analysts, and the hospitality news media. Because this information is announced while the stock market is open, there is an opportunity to execute stock market trades based on this announcement, and the impact of the announcement can be determined on a post hoc basis by comparing the actual closing price for the stock to the projected closing price of the stock using event study methodology to determine whether or not the returns were abnormal. Researchers have long-studied information asymmetry and market reactions to unexpected and dramatic news events as well as trading on special information known only to insiders (DeBondt & Thaler, 1985; Jaffe, 1974). Nonetheless, these interrelated topics have not been explored in the lodging industry.

STR is the only collector and provider of RevPAR data on a national basis. STR currently tracks occupancy and average daily rate data from hotels representing over 5.7 million hotel rooms worldwide. Other leading organizations in the hospitality industry that report and forecast RevPAR data, such as other consulting firms and investment banks, rely on STR data for their historical data

and are keenly interested in the reporting of data each week. Examples of such firms in the hotel consulting sector include PricewaterhouseCoopers, Deloitte, Ernst & Young, McKinsey & Co., PKF Consulting, Hospitality Valuation Services, Cushman & Wakefield, and Jones Lang LaSalle. Financial and Wall Street firms that use STR data in their own publications include Citigroup, Goldman Sachs, Wells Fargo, JP Morgan, Bank of America, Deutsche Bank, and Standard & Poor's among others. STR's data is widely cited by virtually every national media outlet including CNN, CNBC, Fox Business News, Wall Street Journal, USA Today, and numerous local television, radio, and print media (Hood, 2011).

Because the data produced by STR are so robust and cover the entire U.S. lodging market, there could be an opportunity for market participants to make anticipatory trades based on their perceived knowledge of the weekly RevPAR announcement on a directional basis. Public and private companies that generate their own internal information regarding weekly RevPAR in advance of STR's weekly announcement, therefore, have access to information which may lead them to believe that they have advance knowledge of the direction and magnitude of the national weekly RevPAR announcement by STR. The purpose of this paper is to identify whether or not the weekly announcement of RevPAR has resulted in abnormal returns for lodging stocks.

## LITERATURE REVIEW

All businesses are created with the intention of generating revenue and making a profit. Due to the distinctive characteristics of specific types of businesses the methods, practices, and procedures that are taken to reach those financial goals may be unique and industry specific. RevPAR is a financial concept that is unique to the lodging sector. It is a simple reporting measure that hotel companies, owners, managers, investors, financial analysts, and other stakeholders use in the evaluation and comparison of financial performance among various size hotels.

RevPAR, a common performance metric in the hotel industry, may be calculated in two different ways. Based on the actual definition, room revenue for a given period is divided by number of rooms available in a given period. A true RevPAR includes as available rooms all guest rooms physically located within the hotel that are ever available for sale including rooms that are out of order or otherwise unavailable to be sold or rented:

$$(1) \quad \text{Room Revenue} / \text{Available Rooms} = \text{RevPAR}$$

Alternatively, RevPAR can be calculated mathematically by multiplying the occupancy percentage of a hotel (rooms occupied divided by rooms available) by the average daily room (ADR) rate:

$$(2) \quad \text{Occupancy Percentage} * \text{Average Daily Rate} = \text{RevPAR}$$

These two measures are mathematically equivalent.

The use of RevPAR as a key metric in measuring and anticipating lodging performance is well documented. A thorough search of the Thomson One product, Investext, which contains numerous stock analyst reports, was conducted in order to determine the importance of RevPAR as an investor metric. From January 1 to December 31, 2009, there were 1435 research reports on the lodging sector recorded by Investext. Of these, 145 of the reports contained the word RevPAR in the title and 682 contained the word RevPAR in the title or text. The reports catalogued included research published Morgan Stanley, JP Morgan, Wells Fargo, Oppenheimer, Societe General, and Wedbush. In addition, during this time period, quarterly forecasts of RevPAR were issued by STR, PricewaterhouseCoopers, and PKF Consulting.

Despite its prominence and use among hotel operators, operating companies, and investment firms, lodging researchers have not fully explored RevPAR information and its potential uses and abuses in lodging research. Elgonemy (2000) was the first to note that RevPAR is considered by stock analysts to be a key catalyst for price movement in lodging stocks. Gallagher and Mansour (2000) also noted the popularity of RevPAR for analyzing hotel financial performance, particularly for stock analysts. Their study utilized RevPAR as the sole measure of market performance.

Ismail, Dalbor, and Mills (2002) were among the first hospitality researchers to use RevPAR beyond the mere statistical reporting of property and market information, using RevPAR to compare the volatility of different lodging industry segments. They also noted that both Wall Street and the lodging industry consider RevPAR as the benchmark of industry performance, but identified that RevPAR is not a perfect proxy for market return.

Slattery (2002) identified RevPAR as being considered an effective measure of the balance between supply and demand by market participants such as hotel companies and the investment community. However, he identified significant gaps between RevPAR as a statistical concept and reported RevPAR

statistics. Specifically, Slattery found that bad actors can utilize practices designed to inflate reported RevPAR. Among these practices are the exclusion of rooms if the hotel is closed during low seasons, as well as exclusion of rooms being refurbished from the inventory, rooms used by employees, rooms used as frequent guest rewards, and complimentary rooms in casino hotels (Slattery, 2002). He also identified that if reported RevPAR is unreliable then its use in explaining underlying hotel supply and demand is inherently flawed. Finally, he noted that although some hotel researchers use RevPAR as a proxy for profit because of the typical relationship between low variable and high fixed costs in hotels, it is more appropriate to use metrics derived from gross operating profit if that data is available. RevPAR should be utilized only as a means of providing a common statement of rooms revenue.

Most recently, Chen, Koh, and Lee (2011) studied whether the stock market actually cares about RevPAR, using a case study of five large U.S. lodging chains and compared the explanatory power of RevPAR with more traditional performance measures (such as return on equity, return on assets, and earnings per share) on the performance of lodging firms. The study found that none of the four performance measures utilized explained significant variations in total shareholder return as reported on a quarterly basis. However, Chen et al. (2011) investigated RevPAR based on five lodging firms with limited scope. To understand how nationwide aggregated RevPAR affect overall lodging stocks, this study examined the relationship between the performance of U.S. lodging stocks and weekly RevPAR from a different angle with a different approach.

In the general business literature, Gallagher, Looi, & Pinnuck (2010) examined trade sequences of Australian fund managers to determine the source of fund managers' superior information and whether fund managers were collectors of private information or fast interpreters of public information. Their work defined "interpreters" as investors who had no private information but that processed publically-available news, finding evidence of trading patterns consistent with private information and short-term profiteering with regard to good but not bad-news earnings announcements.

In the general field of finance and investments, there is a somewhat limited body of knowledge that addresses firm behavior during potential and actual takeover activities. Much of this literature deals with the information content of the trading process overall and is generally considered to fall into the concept of market microstructure theory, which is derived from information economics and information asymmetry theory. The portion of the literature that is relevant to this paper is the information-based model that deals with informed

traders and uninformed traders. This theory implies that, over time, stock traders would experience a neutral market rate of return but for the fact that certain traders may have superior information (O'Hara, 1995). Therefore, this study also examined whether the investors of U.S. lodging stocks were able to take advantage of the weekly RevPAR announcement by analyzing the behavior of U.S. lodging stocks considering the announcement as a special event.

## HYPOTHESIS

The literature review did not identify any studies that were substantially similar to the present study. No literature was identified that utilized weekly RevPAR data, and no literature was identified that stated whether the announcement of RevPAR data has an impact on prices or abnormal returns of lodging stocks. There have been no event studies in the hospitality that utilize a RevPAR or that study a specific-industry benchmark announcement. It is acknowledged based on the literature review that RevPAR is widely used to report on the overall health of the industry and is followed by both industry practitioners and market participants.

Event study methodology is appropriate for measuring abnormal returns in stock prices based on announcements of varying types of information. The purpose of this study was to determine whether or not the announcement of weekly RevPAR information by STR has an impact on lodging stock prices and, if so, whether that information is directionally related to the announcements and if a model can be developed that is predictive of the direction and magnitude of the stock price movement. In consideration of these objectives, the following hypothesis was proposed:

H<sub>1</sub>: Abnormal price return (compared to the CRSP Value-Weighted Index) for all lodging stocks on the weekly RevPAR announcement date will be equal to zero.

## DATA AND METHODS

### *Data Collection*

A typical event study approach was used to determine whether the announcement of weekly RevPAR data by STR resulted in abnormal returns for lodging stocks for the dates on which weekly RevPAR statistics are announced. This study examined the daily abnormal return characteristics for all lodging stocks (SIC Code 7010 – Hotels and Motels) that traded on the STR announcement date between January 1, 2004 and December 31, 2009. According to STR, of the 314

announcement dates in the study period there were 26 announcement dates that occurred on days of the week other than Wednesday due either to holidays or other delays in processing the data.

Stock market data were accessed through the Wharton Research Data Service, which provides access to the Center for Research in Security Prices (CRSP) data published by the University of Chicago<sup>1</sup>. CRSP is the primary database used for academic research on stock price and trading volume. Because of the importance of the market model in conducting event studies, the selection of the market analyzed is of significant importance. For studies in which the majority of the events being analyzed are found in a specific index, it is appropriate to use that index, often the Standard & Poors 500. However, when the events are related to stocks that are traded on a variety of stock exchanges, it is appropriate to utilize a broader index. CRSP calculates two indexes consisting of all stocks traded on the New York Stock Exchange, American Stock Exchange, and NASDAQ markets, one of which is equally weighted and one of which is value weighted with issues weighted by their market capitalization at the end of the previous period. Value-weighted indexes are generally preferable to use, as they represent a portfolio more likely to be held by investors and have generally been identified as having less bias than equal-weighted indexes (Canina, Michaely, Thaler, & Womack, 1998). The present study utilized the CRSP Value-Weighted index for the market model.

### *Event Study*

Event study is a statistical methodology that is used to measure the impact of an event on a firm's value. An event study is designed to identify the abnormal returns caused by the event being studied by adjusting for the return from the fluctuation of the market as a whole (Gilson & Black, 1995) and is often used to measure the impact of events such as mergers and acquisitions. Event studies utilizing a market model residual method with daily stock data are well documented (Brown & Warner, 1985).

There have been many articles written in which authors have discussed event study methodology in great detail, but for the purpose of brevity this section draws on the simple and clear work of Seiler (2004).

The following outlines the basic steps of event study analysis. Various authors number these steps differently, but all are included in most sources:

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1. Event definition: Determine an event of interest and the time period over which prices will be examined. This is commonly called the event window. It is important to be sure that the event window is broad enough to account for price effects that may have occurred before or after the market close on the announcement date.
2. Selection criteria: The criteria for selection should always be noted and justified. This can be by listed exchange or specific industry or industries. Data sample characteristics should be identified (such as market cap, industry representation, distribution of events over time) and potential selection biases should be noted.
3. Normal and abnormal returns: The impact of the event is determined through measuring an abnormal return. This return is the actual ex-post return of the security over the event window minus the normal return of the firm over the event window with the normal return being defined as the return had the event not taken place. The two common choices for modeling the normal return are the constant-mean-return model and the market model. The constant-mean-return model, which is less commonly used, assumes that the mean return of a security is constant through time, a somewhat erroneous assumption. The market return, although not perfect, assumes a stable relationship between the market return and the security return.
4. Estimation procedure: The estimation window is used to determine the normal performance model. It is preferable to use the period just prior to the event window as the estimation window but not include any portion of the event period itself so that the event itself does not influence the normal performance model estimates.
5. Testing procedure: Abnormal returns can be calculated once the normal performance model has been determined. Next, a framework for testing the abnormal returns is developed including the definition of the null hypothesis and how abnormal returns of the individual firms will be aggregated.
6. Empirical results: Presentation of the results should follow the formulation of the experimental design. It is considered helpful to present the diagnostics as well, and it is important to gauge whether or not the influence of a single or small number of firms may have influenced the overall results.
7. Interpretation and conclusions: The ultimate goal of an event study is that the empirical results will provide some insight regarding how the event affects security prices. Additional factors that might highlight

differences between explanations can and should be included at this point.

8.

Each security in the sample is regressed for a time series of returns against the yields from a market index using the equation:

$$(3) \quad R_t = \alpha + \beta RM_t + e_t,$$

Where:

$R_t$  denotes the return on the security for time period  $t$ ,  
 $RM_t$  denotes the return on a market index for period  $t$ , and  
 $e_t$  represents a firm-specific return (Lintner, 1965; Sharpe, 1963, 1964).

The estimated constant and coefficient obtained from the regression are then used to generate a time series of return predictions and, ultimately, a time series of excess returns, which are then divided by the prediction to compute the standardized excess return.

The data were analyzed using Eventus software (Cowan, 2010) in which parameters are estimated using a pre-event period sample with ordinary least squares (OLS) regression and the parameter estimates and the event period stock and market index returns are then used to estimate the abnormal returns. This study utilized an estimation period of 255 days ending 46 days prior to the event date for each stock. The resulting individual excess returns were then compared to the daily and cumulative abnormal returns using a Patell Z-score (Patell, 1976), which reports the statistical significance of the abnormal return relative to the period of interest. The Patell Z-score represents an aggregation across security-event dates by summing the individual  $t$ -statistics derived for each firm and dividing the sum by the square root of the sample size. This equation is expressed as:

$$(4) \quad |T_P| = \frac{1}{\sqrt{m}} \sum_{j=1}^m \frac{A_{j,0}}{\sqrt{\text{Var}(A_{j,0})}}$$

Other parametric and non-parametric tests can be performed as well.

Two critical assumptions of OLS regression are that the data are normally distributed and the observations are independent. Given that the daily stock data might violate these two assumptions, in addition to the Patell Z-test, a parametric, standardized abnormal return test that is most commonly used statistical test in

event studies (Patell, 1976), a rank test and a sign test were also conducted in order to provide non-parametric alternative tests to address the non-normality of distribution of the data (Campbell, Lo, & MacKinlay, 1997).

### *Non-Normality and Cross-sectional Dependence in the Data*

It is commonly believed that daily stock data are not normally distributed (Fama, 1965; Mandelbrot, 1963; Officer, 1972). Although Brown and Warner (1985) did not find that non-normality had any obvious impact on event study methodologies and that standard parametric tests for significance are well specified in samples with as few as five securities, many later researchers have challenged their assumptions. Therefore, care must be taken in analyzing event study results that assume that the data are normally distributed.

One of the commonly used approaches to addressing non-normality of the data is the sign test and the rank test (Campbell, Lo, & MacKinlay, 1997). Corrado (1989) discussed at length the rank test, finding that it is more powerful in detecting abnormal stock price changes than are typical parametric tests. In a rank test, each firm's abnormal return is ranked over the combined period, including the both the estimation and event windows, and then compared with the expected average rank under the null hypothesis of no abnormal return. Cowan (1992) expanded on this work, finding that, although the rank test performs better under conditions in which stocks are well traded, there is little variance in the event-date return, and the event window is short, the generalized sign test is the preferred test over event study windows of several days when a single stock is a significant outlier and when stocks in the analysis are thinly traded. The generalized sign test looks at the number of stocks with positive cumulative abnormal returns in the event window as compared to the expected number in the absence of abnormal performance based on the fraction of positive abnormal returns in the estimation period.

Cross-sectional dependence in the data is also common in stock returns data. Some of the returns used in an event study might be correlated to common macroeconomic or industry-specific activity or due to a single or clustered event date (Prabhala, 1997). Cross-sectional dependence can be an issue anytime that at least some of the returns are sampled from common time periods (Bernard, 1987). It tends to cause inflated test statistics (Lyon, Barber, & Tsai, 1999), particularly, when the event being analyzed occurs on the same date for all firms (such as a regulatory event or market shock). The challenge of cross-sectional dependence is exacerbated when a common event is tested in a single industry, as in this study (Strong, 1992).

Cross-sectional dependence in data has been extensively studied and a variety of results have been presented. Beaver (1968) found that researchers need to control for factors leading to varying announcement effects across firms. Brown and Warner (1980) suggested that cross-sectional dependence be addressed through a “crude adjustment” technique in which the standard deviation of the average residuals is estimated from the time series of the average abnormal returns over the estimation period. However, in their later work, Brown and Warner (1985) found that non-normality of daily and abnormal returns had no obvious impact on event study methodologies.

To address the issue of cross-sectional dependence in the data, Boehmer, Musumeci, and Poulsen (1991) proposed what is known as the standardized cross-sectional test or BMP test but as a hybrid of the Patell test and an ordinary cross-sectional test in which the average event-period residual is divided by its contemporaneous cross-sectional error. Although they found that event-date clustering did not affect their results, their test still relies on an assumption that security residuals are uncorrelated across firms. Lyon et al. (1999) discussed extensively the use of potential methods for eliminating some of the challenges of cross-sectional dependence along with other misspecifications of test statistics including new listing bias, rebalancing bias, skewness bias, and bad asset pricing models.

Based on the literature reviewed and the variety of statistical methods suggested, it is clear that there is not uniform agreement regarding a single best solution to address cross-sectional dependence in event studies. Therefore, this study also performed a number of different tests and compared results for future event studies of hospitality stocks. Two parametric tests performed to address this issue were standardized cross-sectional test and time series standard deviation test. Boehmer et al (1991) developed the standardized cross-sectional test, which compensates for possible variance increases on the event date by incorporating a cross-sectional variance adjustment. Time-series standard deviation test, also known as the crude dependence adjustment (CDA), was developed by Brown and Warner (1980, 1985), which computes the standard from the time series of portfolio mean abnormal returns during the estimation period.

Two nonparametric tests performed were the sign test and rank test. The generalized sign test, which looks at the number of stocks with positive cumulative abnormal returns in the event window as compared to the expected number in the absence of abnormal performance based on the fraction of positive abnormal returns in the estimation period (Cowan, 1992). By performing the rank

test, each firm's abnormal return is ranked over the combined period including the both the estimation and event windows and then compared with the expected average rank under the null hypothesis of no abnormal return (Corrado, 1989).

## FINDINGS

The research objective was to determine whether the announcement of weekly RevPAR data by STR published as the STR Weekly Hotel Review has a measurable impact on lodging stock performance.

The study identified very slightly abnormal average mean returns compared to the daily CRSP Value-Weighted index return of 0.01% on the announcement dates during the study period from January 1, 2004 to December 31, 2009. This average return was not statistically significant at the .05 level for any of the tests conducted, including the Patell, CDA, standardized cross-sectional, generalized sign, rank and calendar-time tests as noted in Table 1. Interestingly, for the day prior to the announcement date during the study period (typically Tuesdays), the mean abnormal return was 0.13%, and this average return was statistically significant at the .001 level for the Patell and standardized cross-sectional test and at the .01 level for the CDA test. This may indicate that trading occurs in the day prior to the RevPAR announcement date rather than on the day of the announcement date. Because the RevPAR announcement is typically made during the trading day, traders attempt to capture any projected arbitrage opportunity through trading on the day prior to the announcement. Table 1 highlights the results and statistical significance of each test statistic.

The findings appear to suggest that the announcement of the STR data did not have an impact on lodging stock performance. This is not particularly surprising given that there were 9,281 observations, which would tend to minimize any significant reaction. However, more robust methodology can and should be utilized to determine whether or not abnormal stock performance can be predicted based on weekly RevPAR data.

Table 1

*Daily Mean Abnormal Returns and Test Statistics for Weekly RevPAR Announcements*

Day	N	Mean abnormal return		Portfolio time-series		Sign positive: negative	Calendar Rank test Z	time t
		%	Patell Z	(CDA) t	StdCsect Z			
-1	9272	0.13	3.979***	2.882**	3.143***	4588:4684	1.000	1.595
0	9281	0.01	-0.311	0.110	-0.254	4473:4808	-0.931	-0.326
1	9278	-0.01	-0.343	-0.195	-0.277	4511:4767	-0.808	-0.432

\*\* $p < .01$ . \*\*\* $p < .001$ .

## DISCUSSION, CONCLUSIONS, AND FUTURE STUDY

The findings of this study suggest that weekly RevPAR announcements do not cause abnormal returns in U.S. lodging stocks and in turn further imply that the fluctuations of weekly RevPAR does not affect the overall performance of U.S. lodging stocks and investors are not able to use the RevPAR information to gain excess amount of returns. Although it was not specifically identified whether there were other trading days on which lodging stocks might exhibit abnormal returns, it was hypothesized that abnormal returns would likely occur only after the weekly RevPAR data had been announced. The possibility is recognized that certain market actors could have access to data from a variety of hotels that could provide them with significant insight to RevPAR for the prior week before the weekly RevPAR announcement is made by STR. Such market actors could include large-scale hotel owners and hotel management companies with geographically diverse portfolios as well as lodging stock analysts and institutional investors who may speak with these companies on a frequent basis. There would be nothing to prevent these investors from trading on this information in advance of the STR announcement of weekly RevPAR for the prior week.

This study contributes to the literature by providing empirical evidence on the relationship between weekly RevPAR announcement and possible abnormal returns of lodging stocks. The findings of this study further what Chen et al. (2011) have found in their study of five hotel chains by examining the

explanatory power of RevPAR from an investors' perspective using nationwide aggregated data. Instead of attempting to directly examine the relationship between RevPAR and lodging stocks, this study examined RevPAR's impact using weekly STR announcement as the proxy of RevPAR fluctuations. In addition, this study expanded the applications of Event Study technique by testing the impact of an exogenous event on a given day.

Unlike in many other event studies, the event being observed in this study was readily identifiable and RevPAR announcement dates were confirmed with STR. What is not known, however, is whether or not trading related to weekly RevPAR data would occur on the day of or on days prior to the announcement of weekly RevPAR for the prior week. This study clearly identified that abnormal stock returns are not apparent on the announcement date. However, it does appear that more significant abnormal returns occur on the day prior to the weekly RevPAR announcement date. This may be an area that can be studied by future researchers, however it is noted that even an average abnormal return of 0.14% as identified on the day prior to the weekly RevPAR announcement date may be too small to capture through traditional trading arbitrage. There is also an opportunity to study lodging stock trading on a day-of-the-week basis to identify whether there are observable trends as have been identified in the broader market by other researchers (French, 1980; Gibbons & Hess, 1981).

Another area that can be explored by future researchers is whether the results of this study are consistent within different years. This study looked at 6 full years, from 2003 through 2009. It is possible that some years or perhaps more extreme swings in RevPAR volatility may have provided greater trading opportunity. It is also possible that different firms may be more or less likely to react to weekly RevPAR announcements. This study contained 42 different lodging firms, and it is possible that larger, more heavily traded firms may have different abnormal returns related to weekly RevPAR announcements than do smaller and/or less heavily traded firms. This would also be an interesting topic that could be studied in future research.

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