Applications of event study methodology to lodging stock performance

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Applications of event study methodology to lodging stock performance

by

Barry Andrew Nathan Bloom

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in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

Major: Hospitality Management

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ABSTRACT

This dissertation presents three studies applying event study methodology to lodging stock performance and exploring two primary research questions: (a) Is there abnormal stock performance for lodging stocks surrounding specified events that could indicate market inefficiencies that can be exploited by market actors, and, (b) Are there event study methodologies that are more or less robust for use in lodging stock event studies that should be considered in future research?

The literature review identifies and discusses the literature in four primary areas: (a) event study methodology; (b) issues identified with event studies conducted within a single industry, in this case the lodging industry (c) a review of hospitality stocks in general; and (d) a discussion of the extant lodging stock event study literature. The dissertation proposes revised procedures for addressing the methodological issues of non-normality and cross-sectional dependence in the data through the use of both parametric and nonparametric tests, and the three studies within this dissertation utilized these revised procedures.

The first paper, entitled “Parametric and Nonparametric Analysis of Abnormal Stock Return and Volume Activity for Lodging Stock Mergers from 2004 to 2007,” presents a study on the unprecedented number of hotel company mergers that took place between 2004 and 2007. The purpose of this study was to determine, using both parametric and nonparametric event study methodologies, whether there were abnormal stock returns or volume activity in the periods surrounding the merger announcement in the trading of 19 public hotel companies that were merged during this period. The study identified statistically significant abnormal returns only on the merger announcement date and statistically
significant volume activity only on the announcement date and thereafter, indicating that there was little prior knowledge of these transactions.

The second paper, entitled, “Abnormal Stock Return and Volume Activity Surrounding CEO Transition Announcements for Lodging Companies,” presents an investigation into whether or not there were abnormal stock market returns and volume activity for lodging stocks in the periods surrounding the announcement of Chief Executive Officer (CEO) transitions for these companies from 2003 to 2009. The study found that there were statistically significant negative abnormal returns in the periods prior to and after the announcement of a CEO transition. Statistically significant abnormal volume was identified in the period after the announcement of a CEO transition. This is the first study in the hospitality industry to investigate abnormal stock returns related to senior management transitions.

The third paper, entitled “The Impact of the Announcement of Weekly Lodging RevPAR on Lodging Stock Performance,” presents an investigation on whether or not there were abnormal stock market returns on the announcement date of weekly RevPAR data by the lodging industry research firm STR. The study found that there were not statistically significant abnormal returns on the weekly RevPAR announcement date (typically Wednesdays) for the period from 2004 to 2009. The study also developed a fixed effects regression model for predicting abnormal stock returns using weekly RevPAR, but the model was not found to be statistically significant.
CHAPTER 1. GENERAL INTRODUCTION

Although event study methodology for the analysis of stock market behavior has been in common use for over 40 years, application to the lodging industry has been relatively limited. Originally introduced by Fama, Fisher, Jensen and Roll (1969), their seminal work has been cited over 1,700 times according to Google Scholar. The primary use of event study methodology is to study security price behavior around specific events and security price reaction to such events (Binder, 1998). Much of the early event study work was focused on the examination of security price behavior in the context of earnings announcements, stock split announcement, accounting rule changes, and mergers and acquisitions events (Binder, 1998). More recently, studies have focused on industry-specific announcement events. The primary reasons for the use of event studies are (a) to test a null hypothesis that markets are efficient and incorporate all available information as identified in the efficient market hypothesis originally introduced by Fama (1970) and (b) to examine the impact of a specific event on shareholder wealth (Binder, 1998).

Event studies related to lodging stock events have become more prevalent in recent years. However, a review of many of these event studies indicates that these studies may not adequately addressed well-known issues and limitations in the use of certain statistical procedures in single-industry event studies including non-normality and cross-sectional dependence in the data being analyzed.

1.1 Dissertation Organization

This dissertation is organized in a manner that presents each of three papers in a complete and cohesive manner. Chapter 1 introduces the concept of event studies, discusses
historical research conducted on lodging stocks in general and event studies in particular, and introduces the overall research questions. Chapter 2 presents a review of the literature in four primary areas: (a) event study methodology; (b) issues identified with event studies conducted within a single industry, in this case the lodging industry; (c) a review of the literature on hospitality stocks in general; and (d) a discussion of the extant lodging stock event study literature. Also, Chapter 2 proposes revised procedures for addressing methodological issues in event studies conducted on lodging stocks; the three studies presented within this dissertation utilized these revised procedures. Chapters 3, 4, and 5 each consist of a self-contained paper prepared for publication in an academic journal. As such, each includes an introduction, literature review, hypotheses, methodology, results, conclusion, and limitations section.

Chapter 3 consists of a revised and updated version of a previously published paper entitled “Abnormal Stock Return and Volume Activity for Lodging Stock Mergers from 2004 to 2007” (Bloom, 2010a). Chapter 4 consists of a revised and updated version of a previously presented paper entitled *The Impact of CEO Transition Announcements on Lodging Stock Performance* (Bloom, 2010b), and Chapter 5 consists of a paper entitled “The Impact of the Announcement of Weekly Lodging RevPAR on Lodging Stock Performance.” Chapter 6 presents general conclusions from the three essays and identifies recommendations for future research on the topic of event studies conducted within the overall hospitality industry.

1.2 Lodging Stock Research

There is a comparatively small amount of research that has been conducted regarding lodging stocks and their historical performance. Much of the research that has been
published has taken the framework of existing finance studies applied to the hospitality industry. Although several recent articles have attempted to address lodging stocks in a broader context (Quan, Li, & Sehgal, 2002; Weinbaum, 2009), most of the studies have been focused on three subtopics as follows:

1. Risk as measured by Beta arriving at the conclusion that the Fama-French three-factor model (Fama & French, 1992) provides a better measure of risk than CAPM Beta (Madanoglu & Olsen, 2005; Madanoglu, Olsen, & Kwansa, 2005).

2. Study of hotel real estate investment trusts (REITs) and their unique structure and performance characteristics as compared to REITs in other real estate sectors (Gu & Kim, 2003; Kim, Gu, & Mattila, 2002; Kim, Mattila, & Gu, 2002).


It is important to review and understand the findings of these studies as a framework for the study of application of event studies to lodging stock events.

1.3 Lodging Stock Event Studies

Event studies related to lodging stocks typically have been limited to studies attempting to apply issues addressed in the general finance literature, including the areas of mergers and acquisitions, to lodging stocks (Bloom, 2010a; Canina, 2001; Kwansa, 1994; Oak & Andrew, 2006; Oak & Dalbor, 2009), initial public offerings (Canina, 1996; Canina & Gibson, 2003), and dividend announcements (Borde, Byrd, & Atkinson, 1999). Event studies focused on specific events also have been published more recently, such as the impact of SARS on Taiwanese hotel stocks (Chen, Jang, & Kim, 2007), the impact of hotel openings
on a single Spanish lodging stock (Nicolau, 2002), the impact of international acquisition announcements on U.S. lodging stocks (Oak & Dalbor, 2009), the impact of IT announcements on lodging stocks (Kim, Kim, & Hancer, 2009), and the impact of CEO transition announcements (Bloom, 2010b).

1.4 Overall Research Questions

In comparison to other discrete industries, the performance of lodging stocks has not been fully explored. The event studies conducted as part of this dissertation’s studies will be of benefit to academe by further highlighting the differentiation between the performance of lodging stocks and the overall stock market, which will further identify the complexity of the lodging industry. These studies will also be of benefit to a broad range of practitioners, including investors, research analysts, and company executives, who seek to better understand lodging stock performance and to profit from capitalizing on abnormal market activity. The specific questions explored are:

1. Is there abnormal stock performance for lodging stocks surrounding specified events that could indicate market inefficiencies that can be exploited by market actors?

2. Are there event study methodologies that are more or less robust for use in lodging stock event studies that should be considered in future research?

1.5 References


CHAPTER 2. REVIEW OF LITERATURE

2.1 Introduction

Any discussion of event studies should begin with a discussion regarding the general finance literature that addresses the efficiency of the stock market as event studies are designed to identify abnormality in stock performance which is, by definition, inefficiency. This discussion provides the backdrop for an introduction to and discussion of event study methodology and issues identified with event studies conducted within a single industry, in this case the lodging industry. Because of the single-industry focus, a review of the literature on hospitality stocks in general is appropriate. Finally, and as a means for leading directly to the research questions, a discussion of the extant lodging stock event study literature and methodology applied is included.

2.2 Overview of Finance Topics Related to Event Study Methodology

Although financial economics is an empirical field, like other social sciences it is nonexperimental and, therefore, relies on financial econometrics to provide models from which statistical results can be inferred. The statistical theory used to test financial models is related to the uncertainties on which the models are based, and this connection between the theoretical and empirical in some ways more closely aligns financial econometrics with the natural rather than the social sciences (J. Y. Campbell, Lo, & MacKinlay, 1997).

Financial academics have long-debated whether financial markets are truly efficient. Keown, Martin, Petty, and Scott (2008, p. 18) defined efficient markets as those “in which the values of all assets and securities at any instant in time fully reflect all available information” (p. 18). J. Y. Campbell et al. (1997) provided an interesting view on this
subject and discussed the relationship between efficient returns and randomness and that the
two are not diametrically opposed, as explained by the Law of Iterated Expectations.

J. Y. Campbell et al. (1997) took a view that, although the proof of the efficient
market hypothesis is empirically undecidable, they believe that the EMH should be viewed
through a lens of measuring relative efficiency rather than determining whether or not
markets can ever be perfectly efficient. This idea leads directly into the notion and purpose
of the conduct of event studies. This also raises the issue of whether or not financial asset
prices are predictable, giving rise to consistent efforts over time to “beat the market,” still as
controversial a topic today as it was when Thorp and Kassouf (1967) wrote their work on the
topic.

J. Y. Campbell et al. (1997) identified several different versions of the random walk
hypothesis and then applied them under varying tests. The first concept presented, the
martingale model, assumed that tomorrow’s price will be the same as today’s price or that the
price is equally likely to rise as it is to fall. The model in its stated form does not account for
risk. The other concepts presented, the random walk hypothesis with independently and
identically distributed (IID) increments, is considered the simplest but most restrictive of the
random walk hypotheses but does not correlate to historical market activity. Testing of this
hypothesis relies heavily on nonparametric tests.

The random walk hypothesis with independent but not identically distributed (INID)
increments is considered more relaxed than the IID hypothesis. Tests often filter rules that
identify stocks that are performing differently than the market. J. Y. Campbell et al. (1997)
commented that technical analysis is considered to be the “black sheep” of the academic
finance community while noting that it may become a more active research area in the future.
Finally, the random walk with uncorrelated increments is the most relaxed hypothesis of all, as it includes processes with dependent but uncorrelated increments, and that involves tests for autocorrelation. These tests all can be used to work with long-horizon event study returns.

J. Y. Campbell et al. (1997) provided a number of tests using autocorrelations, variance ratios for CRSP indexes, size-sorted portfolios, individual securities, cross-autocorrelations and lead-lag relations, and tests using long-horizon returns as examples, and generally they rejected the random walk hypotheses, finding that short-term term financial asset returns are somewhat predictable. They noted clearly that this does not imply a rejection of the efficient market hypothesis; rather, that some degree of predictability is necessary to reward risk taken by investors.

2.3 History and Background of Event Study Methodology

Although event study methodology for the analysis of stock market behavior has been in common use for over 40 years, application to the lodging industry has been relatively limited. Although Ball and Brown (1968) and Fama, Fisher, Jensen, and Roll (1969) are generally credited with the seminal work and popularity of this methodology to identify abnormal stock performance (Corrado, 2010), MacKinlay (1997) identified an early event study examining stock price reaction by Dolley (1933). The primary use of event study methodology is to study security price behavior around specific events and security price reaction to such events (Binder, 1998).

Much of the early event study work was focused on the examination of security price behavior in the context of earnings announcements, stock split announcements, accounting rule changes, and mergers and acquisitions events (Binder, 1998). More recently, studies
have focused on industry-specific announcement events. The primary reasons for the use of event studies are (a) to test a null hypothesis that markets are efficient and incorporate all available information, as identified in the efficient market hypothesis originally introduced by Fama (1970) and (b) to examine the impact of a specific event on shareholder wealth (Binder, 1998).

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 only on the most often-cited resources related to event study methodology, namely Binder (1998), J. Y. Campbell et al. (1997), Corrado (2010), Cowan (2007), and Kothari and Warner (2007). In addition, because of the clear writing style and step-by-step discussion of the methodology employed, this section will also draw on the 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:

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.

Event studies utilizing a market model residual method with daily stock data are well documented (Brown & Warner, 1985). The event study procedure typically used calculates abnormal returns for an event-time portfolio. Each security in the sample is regressed for a time series of daily returns against the yields from a market index using the equation:

\[ R_t = \alpha + \beta R_{M_t} + e_t, \]

where \( R_t \) denotes the return on the security for time period \( t \), \( R_{M_t} \) denotes the return on a market index for period \( t \), and \( e_t \) represents a firm-specific return (Lintner, 1965; Sharpe, 1963, 1964). Inherent in the market model is an assumption that \( e_t \) is unrelated to the overall market and has an expected value of zero. The estimates of the 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.

In the typical event study, stock market trading data is typically 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.\(^1\) 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

\(^{(1)}\) ©2009 CRSP®, Center for Research in Security Prices. Graduate School of Business, The University of Chicago (www.crsp.chicagogsb.edu). Used with permission. All rights reserved.
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 & Poor's 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, 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). Information regarding the specific events being reviewed in an event study is typically researched using a variety of sources including *The Wall Street Journal* and company websites, and event dates are typically confirmed in company 8-K filings with the Securities and Exchange Commission.

The dataset is often 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. The resulting individual excess returns are then typically 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:
Other parametric and non-parametric tests can be performed as well.

Although event studies most commonly are conducted using abnormal returns related to stock price, they can also be conducted using volume data. Abnormal trading volume is generally calculated using the log-transformed percentage of shares outstanding for each security as compared with an estimated market model abnormal trading volume (Ajinkya & Jain, 1989; Biktimirov, Cowan, & Jordan, 2004; Cready & Ramanan, 1991). As with price event studies, both parametric and nonparametric tests are indicated (C. Campbell & Wasley, 1996).

2.4 Issues in Event Study Methodology

There is a fairly robust body of literature that addresses the typical event study methodology, as outlined in Section 2.3, and discusses various issues with the basic event study methodology. Numerous studies have critiqued event study methodology and proposed new and/or different statistical analysis that can be performed to deal with these challenges. Many of these issues are related to problems with heteroskedasticity and dependence due to the abnormal returns being (a) correlated in event time, (b) having different variances across firms, (c) not being independent across time for individual firms, and (d) having greater variance during the event period than in surrounding periods (Binder, 1998).

Other issues in event study methodology, particularly those found in management research, include lack of adequate sample size, identification of outliers, length of the event
window, confounding effects, and adequate explanation of abnormal returns as issues that must be identified and addresses in competent event studies (McWilliams & Siegel, 1997).

2.4.1 Challenges of Non-Normality in the Data

One of the challenges in utilizing OLS regression for daily stock data is that there is an underlying assumption that the excess return data are normally distributed. Normal probability distribution can be defined as a plotted curve where (a) the curve is centered at the population mean, (b) the mean corresponds to the highest point on the normal curve, and (c) the normal curve is symmetrical around the population mean (Bowerman, O'Connell, & Koehler, 2005). The most commonly used statistical test in event studies, the Patell Z-test, a parametric, standardized abnormal return test, utilizes such an assumption (Patell, 1976).

However, it has long been recognized that daily stock data is not normally distributed (Fama, 1965; Mandelbrot, 1963; Officer, 1972), and as a result, care must be taken in analyzing event study results that assume that the data is normally distributed. Excess return data can be reviewed for normality either visually by plotting a histogram of the abnormal returns or preparing a normal probability (Q-Q) plot, and/or empirically tested using a test such as the Kolmogorov–Smirnov goodness-of-fit statistic or its various derivatives.

2.4.2 Potential Solutions to Address Non-Normality in the Data

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. As most daily stock data is likely to be non-normally distributed, this would likely be an issue in virtually all event studies and points to the potential speciousness of most event studies that are conducted using only parametric tests.
Although in some instances data could be transformed into a more normal distribution using squared or logarithmic methods, this is not typically done in event studies. Two researchers have suggested transformation methods that do not appear to have been widely adopted: (a) the transformation method suggested by Hall (1992), whereby one statistic is transformed into another with a virtually symmetric distribution, the normal approximation is applied to the new statistic, and then the data are inversely transformed to regain the original asymmetry and (b) the winsorization method suggested by Cowan and Sergeant (2001), which sets an outer limit on extreme observations, giving the most extreme observations a lower weight.

The most popular approach to addressing non-normality of the data can be provided by nonparametric tests, specifically the sign test and the rank test (J. Y. Campbell et al., 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 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 where 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.
There are few, if any, potential shortcomings to using nonparametric tests, particularly given that nonparametric tests are typically not used in isolation but rather in conjunction with parametric tests so that each can provide a check on the robustness of conclusions as compared to the other (J. Y. Campbell et al., 1997).

2.4.3 Challenges of Cross-Sectional Dependence in the Data

Another challenge in utilizing OLS regression for daily stock data is that there is an underlying assumption that the data are cross-sectionally independent. Again, the most commonly used test statistic in event studies, the Patell Z-test, a parametric, standardized abnormal return test, utilizes this assumption as well (Patell, 1976). Cross-sectional dependence is particularly likely when at least some of the returns used in an event study are correlated due to common macroeconomic or industry-specific activity or due to a single or clustered event date (Prabhala, 1997). Cross-sectional dependence inflates test statistics because the number of sample firms overstates the number of independent observations (Lyon, Barber, & Tsai, 1999). The most common cases for this issue occur when the event being analyzed occurs on the same date for all firms (such as a regulatory event or market shock), but it can be an issue anytime that at least some of the returns are sampled from common time periods (Bernard, 1987). The challenge of cross-sectional dependence is exacerbated when a common event is tested in a single industry (Strong, 1992).

Cross-sectional dependence can be tested using a variety of statistical measures, although the finance literature is sparse in identifying the precise procedures and measures for doing so. It appears from the literature that the tests are either so obvious (such as reviewing the covariance matrix from the regression) that they do not warrant mention or that the researchers that do account for cross-sectional dependence simply assume that it has
occurred. Bernard (1987) noted that, because abnormal returns serve as the dependent variable in most finance event studies, correlations can be used to identify the degree of bias. It is recommended that contemporaneous cross-sectional correlations in the residuals should be calculated using all time-series observations. Paired correlations should also be calculated among all firms, but no guidance regarding appropriate or inappropriate levels of correlation are noted in the paper.

De Hoyos and Sarafidis (2006) identified three specific techniques that can be used for testing for cross-sectional dependence in panel data with a large number of cross-sectional units and a small number of time series observations: Pesaran’s CD test, Friedman’s test, and Frees’s test.

2.4.4 Potential Solutions to Address Cross-Sectional Dependence in the Data

There is a significant body of literature that has developed around potential solutions to address cross-sectional dependence in the data with few conclusions regarding the best method or even whether cross-sectional dependence needs to be addressed at all. Beaver (1968) found that an increase in the cross-sectional dispersion of abnormal returns at the time of an event announcement implies that the announcement conveyed information and 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 and that the mean abnormal return in a cross-section of securities comes closer to normality as the number of securities in the sample is increased.

Further, they found that, in samples containing as few as five securities, parametric tests can be appropriate based on the probabilities of Type I error identified in their test samples. They also noted that dependence adjustment can potentially have a negative impact compared to procedures that assume independence. They did note, however, that if securities are from the same industry group, there could be a higher degree of cross-sectional dependence than in their randomly selected samples. Chandra, Moriarty and Willinger (1990) re-examined the work of Brown and Warner (1980, 1985) and found that they compared inconsistent test procedures and provided corrected results for their data, finding that there is no advantage to using tests that ignore cross-sectional dependence.

Chandra and Balachandran (1990) recommended using a generalized least squares (GLS) test as a solution if the return covariance matrix can be estimated accurately and the abnormal return generating model is known; however, these requirements are not met frequently. Armitage (1995) reviewed a broad variety of methods estimating abnormal returns and testing their significance. His conclusions clearly stated that when market model errors are cross-correlated, which can be the case only when events share the same calendar date and are from the same industry, that a portfolio time series method be utilized. Boehmer, Musumeci, and Poulsen (1991) proposed what is known as the standardized cross-sectional test or BMP test but is 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 two potential methods for eliminating some of the challenges of cross-sectional dependence along with other misspecification of test statistics including new listing bias, rebalancing bias, skewness bias, and bad asset pricing models. Their first recommended method employs a traditional abnormal return model but using a reference portfolio so that the population mean abnormal return is equal to zero. Tests are then conducted using a bootstrapped skewness-adjusted $t$-statistic or an empirically generated distribution of long-run abnormal returns from pseudoportfolios. Unfortunately, this method is particularly sensitive to the issues of cross-sectional dependence.

Their second recommended method utilizes the calculation of calendar-time portfolio abnormal returns, which may be either equally weighted or value weighted. In this method, calendar-time abnormal returns are calculated for sample firms and then a $t$-statistic is derived from the time-series of the monthly calendar-time portfolio abnormal returns. The advantage of this approach is that it eliminates the issue of cross-sectional dependence among sample firms. The disadvantage of this approach is that it provides an abnormal return measure that does not precisely measure the actual experience of investors over the specified time period.

Cowan and Sergeant (2001) proposed a new approach to address cross-sectional dependence by using a two groups difference of means test statistic rather than a paired difference test statistic, particularly in long-run studies (greater than 1 year) in order to compensate for cross-sectional dependence. A recent study by Gow, Ormazabal, and Taylor (2010) evaluated the methods used in accounting literature to correct for cross-sectional and time-series dependence, noting that there have been no previous studies that addressed both
of these issues simultaneously. Although they found that only a method that uses robust standard errors clustered by firm and time addresses both cross-sectional and time-series dependence, methods using (a) robust standard errors clustered by time, (b) a $Z^2$ statistic based on mean and standard error of cross section of $t$-statistics from time-series regressions, (c) a Fama-MacBeth $t$-statistic based on mean and standard error of time-series of coefficients from cross-sectional regressions, and (d) a Fama-MacBeth $t$-statistic with Newey-West correction were robust to cross-sectional dependence.

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. As a result, it is proposed below that a number of different tests be conducted and results compared for future event studies conducted with hospitality stocks.

### 2.5 U.S. Lodging Stock Performance

Literature and research on the performance of hotel stocks is a nascent field and has been focused primarily on the performance of (REITs). A REIT is an investment vehicle that invests primarily in income-producing real estate and is generally publicly owned and traded. In order for a company to qualify as a REIT in the U.S., it must comply with specific rules outlined in the Internal Revenue Code. These rules include: investing at least 75% of total assets in real estate; deriving at least 75% of gross income as rents from real property or interest from mortgages on real property; and distributing annually at least 90% of taxable income to shareholders in the form of dividends (National Association of Real Estate Investment Trusts, n.d.).
Although REITs were authorized based on 1960 federal legislation (Zietz, Sirmans, & Friday, 2003), hotel-specific REITs are a relatively new phenomenon—in 1993, there were only two hotel REITs with a total market capitalization of approximately $100 million (Jackson, 2009). The existing literature in this area has focused primarily on the identification of the risk features of hotel REITs and the performance of hotel REITs relative to REITs that focus on other property types. These studies have found that, generally, hotel REITs carry the highest market risk as compared to other REIT sectors; the predominant risk in hotel REITs is firm specific, unsystematic risk; and that the hotel REIT sector has generally underperformed office, industrial, residential and diversified REITs (Gu & Kim, 2003; H. Kim, Mattila, & Gu, 2002; H. Kim, Gu, & Mattila, 2002). Also unique to hotel REITs is that they are the only REIT sector to experience periodically collapsing bubbles, as measured by the momentum autoregressive threshold (MTAR) model and the residuals-augmented Dickey-Fuller (RADF) test (Payne & Waters, 2007).

As it relates to risk and performance for lodging stocks in general, there is a discrete, but limited body of existing literature. Lee and Upneja (2007) found that lodging stocks are considered to be undervalued relative to other stocks, in the general economy, the service economy, and the real estate economy, but they did not identify the factors that lead to undervaluation of lodging stocks. Lee (2008) continued this work with an examination of various financial risk measures for lodging firms, including beta, earnings variability, bankruptcy probability, debt-to-equity ratio, and book-to-market ratio, and identifying four distinct risk groups through factor analysis. Lee found that strategic and stock performance risk factors better represent a lodging firm’s financial risk than do bankruptcy and firm performance risk factors.
There is also a comparatively small amount of literature regarding restaurant stock performance, much of which has been conducted by the same researchers and which is also very recent. H. Kim and Gu (2003) utilized Sharpe Index, Treynor Index, and Jensen Index analysis to compare the performance across restaurant sectors from 1996 to 2000, finding that the stocks of companies in the fast-food segment outperformed companies in the full-service and economy/buffet segments but that their performance was inferior to the overall stock market. Mao and Gu (2007) furthered this work by examining casino, restaurant, and hotel stocks through a similar analysis from 2000 to 2003 in an effort to capture the risk and return characteristics during an industry downturn.

Corgel (2008) noted that many consider there to be an inherent conflict in public ownership of real estate, which by its very nature, is a long-term investment that should not be judged by quarterly earnings. This conflict helped to make hotel companies and hotel REITs likely targets for private equity firms, particularly when coupled with generally positive industry supply and demand considerations and private equity firms’ belief that there were inherent inefficiencies in the industry’s structure that traditional hotel operators and real estate executives might not have considered (Corgel, 2008). The public-to-private transactions in the U.S. hotel market followed closely on the heels of a significant wave of public-to-private transactions for lodging companies in the United Kingdom (Wallace, 2004). Although some previous literature has questioned the link between publicly traded real estate firms and real estate pricing, the public markets serve as a daily proxy for commercial real estate values (Corgel, 1997; Gyourko & Keim, 1992).

Oak and Andrew (2006) applied these market microstructure theories to address the issue of whether or not there was informed trading prior to acquisitions in the hospitality
industry. Their study applied a market microstructure framework and was the first to address “the process of informed trading around hospitality corporate events despite the importance of information asymmetry in the financial markets” (Oak & Andrew, 2006, p. 572). The study found that market makers vary their behavior in an attempt to avoid trading against informed traders by reducing ask depths in order to protect their trading positions. Careful attention was paid to the method of payment used for the acquisition, i.e., stock, cash, or mixed. Their study took a very long view and examined all acquisitions in the hospitality industry between 1983 and 1999, and they provided evidence that informed traders use information asymmetry in the period surrounding corporate acquisitions. However, the authors noted that it remains unclear whether different type of informed traders (generally insiders and outsiders such as financial analysts or arbitrageurs) behave differently around hospitality corporate information events and called for future study in this area.

2.6 U.S. Lodging Stock Event Studies

Although event studies applied to hospitality stocks in general and lodging stocks in particular have been performed since 1994, there has been a rapid proliferation of such studies since 2009 as financial hospitality research has continued to track applied trends in the general finance field. Individual discussion of the purpose, methodology, and results of each event study conducted on lodging stocks in the United States is discussed herein followed by a brief discussion of event studies conducted on lodging stocks in non-U.S. markets.

2.6.1 Kwansa, 1994

The first published evidence of event study methodology applied in the hospitality industry was in 1994 (Kwansa, 1994), although an earlier study by Andrew presented at a
hospitality educator’s symposium in 1988 is referenced. This study examined shareholder wealth created by mergers and acquisitions in the lodging industry and studied acquisitions of 18 target firms listed on public U.S. stock exchanges from 1981 to 1988. The event study methodology utilized is fairly rudimentary. Although the specific market is not defined within the study, a risk-adjusted return is constructed for each stock for each day of –30 to +30 event window using an estimation period of 150 trading days starting at –200 and ending at –51. Abnormal returns were calculated and averaged, and cumulative abnormal returns were calculated. Each event day was tested against an expected abnormal return of zero using a typical \( t \)-test.

The study found statistically significant abnormal returns in the 61-day event window to be 31.5% with persistent positive returns beginning at day –8. Abnormal returns for days –2, –1, 0, and +1 were 3.82, 9.73, 5.78, and 5.49%, respectively. These results likely indicate either significant potential information leakage leading up to the announcement date or incorrect assumptions regarding the event announcement date.

### 2.6.2 Borde, Byrd, and Atkinson, 1999

In an application of another classic event study in the general finance literature, Borde, Byrd, and Atkinson (1999) studied stock price reaction to dividend increases in both the hotel and restaurant industries. Their study observed dividend increases in hotel and restaurant stocks traded on the NYSE, AMEX, and OTC markets from 1979 through 1994 with a resulting sample of 12 firms, 4 in the lodging sector and 8 in the restaurant sector. Firms with multiple dividend increases during the period were assessed multiple times, but not more frequently than once per year resulting in 31 observations. Again, the specific market is not defined within the study, but a –5 to +5 event window using an estimation
period of 120 trading days starting at –150 and ending at –30 was utilized. Abnormal returns were calculated and averaged, and cumulative abnormal returns were calculated. Each event day was tested against an expected abnormal return of zero using a z-statistic.

The study found statistically significant abnormal returns at the .05 level on day +1 of 0.94% and a statistically significant cumulative abnormal return at the 0.5 level on day 0 and day +1 of 1.4%, although day 0 was not statistically significant by itself. The authors also indicated the results of a generalized sign test in which they reported the percentage of positive abnormal returns for each event day, the positive percentage being 54.8% on both day 0 and day +1, but did not report on whether or not it was statistically significant. The authors also conducted a cross-sectional analysis using firm size, stock exchange, relative size of the dividend increase, and type of firm but found no statistical significance for these factors other than the size of the dividend increase. It is noted that this study may have been unduly influenced by very few firms who may have reported more than one dividend increase during the study period. The study provided no information regarding potential non-normality or cross-sectional dependence in the data.

2.6.3 Canina, 2001

Canina (2001) also studied mergers and acquisitions in the lodging industry using event study methodology, citing Kwansa’s 1994 study and attempting to determine whether the financial market views consolidation as value enhancing in the lodging industry. Canina extended the Kwansa sample through 1999, looked at both acquiring firms as well as target firms, and analyzed mergers and tender offers separately. The study observed mergers in hotel and restaurant stocks traded on the NYSE, AMEX, and NASDAQ markets from 1981 through 1999, but the total number of firms sampled was not reported. Rather than utilizing
a market model to determine abnormal returns, the study utilized a less sophisticated mean return model based on an estimation period starting at day $-111$ and ending at day $-11$. The event window was from day $-2$ to day $+1$. Each event day was tested against an expected abnormal return of zero using a simple $t$-statistic.

Target firms were found to have statistically significant returns at the .01 level for days $-1$, $0$, and $+1$ of $0.7$, $8.9$, and $1.3\%$, respectively, and acquirer firms were found to have statistically significant returns at the .01 level for days $-1$, $0$, and $+1$ of $0.1$, $1.3$, and $-0.2\%$, respectively. The study also found that returns for target firms acquired by tender offers were much greater than for mergers ($14.1\%$ versus $5.6\%$). This author did not report the number of events included and did not discuss potential non-normality or cross-sectional dependence in the data. These issues are often compounded when utilizing a mean return method, as there can be significant event clustering and market trending issues. Although this method can work when the firms have event dates that are spread far apart and the returns on the stocks are relatively stable, these issues cannot be identified from the study as written (Seiler, 2004).

2.6.4 Sheel and Zhong, 2005

Although there is no reference to Borde et al. (1999), the Sheel and Zhong (2005) study explored the relevance of cash dividend announcements in lodging and restaurant firms and abnormal returns surrounding their announcement dates. The study observed dividend increases in hotel and restaurant stocks traded on the NYSE, AMEX, and OTC markets from 1994 through 2002 with a resulting sample of 22 firms, 7 in the lodging sector and 15 in the restaurant sector. The study contained 347 cash dividend announcements of which 47 were dividend increases, 14 were dividend decreases, and 286 were unchanged dividend
announcements. The specific market for the market model was not defined within the study. An event window from –5 to +4 was utilized, however the estimation window was not reported.

The study found that the cumulative abnormal return in the event window for dividend announcement increases was 1.1% and was statistically significant at the .01 level using a standard $t$-test. It is important to note that it is unclear from the text of the study and the accompanying table whether there were 22 firm observations, 347 total observations, or 47 dividend increase observations. The study also found that there was a statistically significant difference at the .05 level for abnormal returns for lodging stock dividend increase announcements, which were in excess of restaurant stock dividend increase announcements by 1.8%. Finally, the study found that there was a statistically significant difference at the .001 level for abnormal returns for unchanged lodging stock dividend increase announcements, which was in excess of unchanged restaurant stock dividend increase announcements. This 3.2% excess implies negative cumulative abnormal returns over the event window for unchanged restaurant stock dividend increases. Although the authors did note that Shapiro-Wilk tests for normality were conducted without issue, they did not report on potential cross-sectional dependence in the data.

As a time has progressed, event studies in the hospitality literature have begun to address various additional announcements, which have been typically discussed in the general finance literature. In some cases such as this, the “events” may be considered to be of limited practical value to the lodging investment community as they may not be particularly relevant to the short- or long-term viability of a lodging stock investment or may be predicated on announcements that may not have practical implications. Further, the
continued use of simple parametric tests that do not address non-normality of the data and/or cross-sectional dependence may result in study findings that may be inconclusive in the best case and erroneous in the worst case.

2.6.5 S. H. Kim, Kim, and Hancer, 2009

S. H. Kim, Kim, and Hancer (2009) is a typical example of the type of study discussed previously. It dealt with an event that has been addressed in the general finance literature within the hospitality context but did not particularly identify why, in this case, the study of information technology (IT) investment announcements would be expected to result in abnormal returns for hospitality stocks in general and lodging stocks in particular. This study, however, did provide a fair amount of information regarding the methodology utilized, which makes it somewhat easier to analyze than previously referenced studies. This study included announced investments in information technology for hotel, casino and restaurant stocks traded on the NYSE, AMEX, and NASDAQ markets from 1990 through 2005 with a resulting sample of 42 announcements, 21 in the lodging/casino sector and 21 in the restaurant sector. The study did not identify whether multiple announcements for a given firm were included or not.

The use of the S&P 500 as the market model is clearly identified as is an estimation window of 151 trading days from –201 to –1 and an event window from –1 to +1. The results of the study as stated are very unclear as the study reported abnormal returns for each day of the event window that do not equal the results indicated as the cumulative abnormal return. In any case, the study did not find statistical significance for any of the three event window days for either the lodging/casino group or the restaurant group. Unfortunately, further analysis of the results is not possible due to the conflicting data contained in the
study’s tables and not discussed in the text. The authors did not discuss issues on non-normality or cross-sectional dependence in the data and utilized a standard t-test to determine statistical significance.

2.6.6 Graf, 2009

Lodging companies have a variety of means for entry into their various nondomestic markets. Graf (2009) explored stock market reactions to these various choices, including franchising, management agreements, joint ventures, and whole ownership, using event study methodology but notably did not include net lease arrangements, which are common outside the United States. This study observed 133 entrance announcements made by lodging companies traded on the NYSE, AMEX, and NASDAQ markets from 2003 through 2006. The author provided easily identifiable methodology, using OLS regressions for an estimation period of 200 trading days from –210 to –10 and an event window from 0 to +1. This study utilized the value-weighted index of the NYSE, AMEX, and NASDAQ markets (presumably the CRSP value-weighted index). Most notably, this study addressed issues of non-normality in the data through the use of a generalized sign test as well as an adjusted version of the Patell Z-test, which accounts for cross-sectional dependence.

With all announcement events considered, the study found an average cumulative abnormal return of 0.27% at a .05 statistical significance level using a Patell Z-test, but this was not confirmed at a statistically significant level using a generalized sign test. The study went on to further test cumulative abnormal returns using the Patell Z-test based on the development status of the country and whether the announcement was for a franchise, management agreement, or equity involvement of some type. Although the study found statistical significance for a number of these categories, sample sizes were as low as four
observations, making the conclusions of the study somewhat specious. Although methodologically sound, this study did not provide the companies included in the study. However, it is unlikely that the announcement of an individual property to be built sometime in the future for multi-thousand hotel companies would have an important or material impact on its stock price.

2.6.7 Oak and Dalbor, 2009

Originally presented at a conference at approximately the same time Graf’s (2009) study was published, Oak and Dalbor’s (2009) study attempted to measure the impact of international acquisition announcements on the returns of acquiring U.S. lodging firms. This study utilized 21 acquisitions of foreign hotel firms from 1986 to 2004. The authors noted that 10 of the transactions were by a single company. The authors provided easily identifiable methodology, using OLS regressions for an estimation period of 209 trading days, from –255 to –46, and an event window from –30 to +30. They utilized the equally weighted CRSP index as a proxy for the market, although this is not well indicated for studies of this type due to rebalancing issues. The study did not appear to test for non-normality, but assumed that the data were non-normal and appropriately used the nonparametric rank test as a test statistic.

The study found a statistically significant cumulative abnormal return at the .05 level for the event window –1 to 0 of 0.53%. However, over the –30 to +30 event window it identified 7 days with returns that were statistically significant at the .05 level and 1 day (-5) with statistical significance at the .01 level. This study is challenged by the small data sample spread out over many years with a large number of transactions involving a single acquirer.
2.6.8 Koh and Lee, 2010

In this study, Koh and Lee (2010) investigated announcements of strategic alliances by U.S. lodging firms, but the study is challenged by the lack of definition of what truly constitutes a strategic alliance. The authors cited and used similar methodology to Graf (2009): an estimation window of –210 to –10, an event window of –1 to +1, and an NYSE/AMEX/NASDAQ value-weighted index in the market model. For the years 2000 to 2008, the study identified 248 observations from 14 publicly traded lodging companies. The strategic alliance announcements were categorized by the specific type of arrangement (with some announcements being included in multiple categories).

Unlike Graf (2009), simple t-tests were performed on each abnormal return and the cumulative abnormal return except where there were very small sample sizes (<11), in which case the Wilcoxon Signed Rank test was used. Little to no statistical significance was found on any of the event days or on a cumulative basis. It is likely that the study was challenged by a large number of events, most of which would not be considered significant enough to move the stock price. The authors noted that the three largest publicly traded lodging stocks during the study period (Hilton, Marriott, and Starwood) each make in excess of 6 strategic alliance announcements per year.

2.6.9 Lee and Connolly, 2010

Presumably published at approximately the same time as S. H. Kim et al. (2009), this study by Lee and Connolly (2010) also investigated the impact of IT news on hospitality firm value using event study methodology. Ultimately, the authors found that there is no significant impact on lodging stock returns, but credit this finding to the IT paradox theory that IT investment is not rewarded rather than the issue that IT announcements may not be
financially meaningful to announcing firms on an immediate basis. This study included announced investments in IT for hotel, casino, and restaurant stocks traded on the NYSE, AMEX, and NASDAQ markets from 1995 through 2006 with a resulting sample of 230 announcements, which were then grouped into 22 different categories ranging in size from 1 to 79 announcements each. The study indicated that multiple announcements for a given firm were included, but if two events occurred within 10 business days of each other, the latter event was eliminated.

The use of the S&P 500 as the market model is clearly noted as is an estimation window of 200 trading days from –210 to –10 and an event window from –10 to +10. The study utilized simple $t$-tests to determine statistical significance, and no reference was made to potential issues of non-normality or cross-sectionality in the data. For the 94 lodging events analyzed, data were statistically significant at the .05 level on day +5 and at the .10 level on days –7 and +10. No statistical significance was found on any days for the 51 restaurant events or the 85 casino events. The authors concluded that the markets do not react to IT news stories of hospitality companies but somewhat speciously assumed that the market does not perceive IT investments to be value-added events.

2.7 Other Hospitality Industry Event Studies

In addition to the event studies conducted on lodging stocks, some of which also included the restaurant and/or casino industries, there are other areas of hospitality that have been explored, albeit to a lesser extent than lodging stocks. Atkinson, Byrd, and Porter (1998) studied the impact of option listings for casino and gaming stocks. Event studies on restaurant stocks have been absent from the literature with the exception of a recent study that examined abnormal returns in the acquisition of 27 publicly traded restaurant companies
between 1995 and 2004 (Madanoglu & Karadag, 2009; Madanoglu, Karadag, & Kwansa, 2010).

There also have been a number of studies conducted on lodging stocks in non-U.S. markets, some of which are relevant to this discussion. Most notably, Nicolau (2001) provided the first consideration of a nonparametric approach to event studies in the lodging industry. Although the topic of the study, in which he attempted to analyze the opening of single new hotels on an existing hotel chain, may have limited application or impact, the article is important from a methodological perspective. The paper, addressing the study conducted in Spain and citing numerous financial studies conducted in Spain, began by addressing issues of non-normality in the data and proposed using autoregressive conditional heteroskedasticity models that model the conditional variance of the returns as a means of addressing potential losses of efficiency in an OLS estimate. The author proposed using autoregressive conditional heteroskedastic (ARCH) and generalized autoregressive conditional heteroskedastic (GARCH) models as symmetric models and exponential general autoregressive conditional heteroskedastic (EGARCH) and threshold general autoregressive conditional heteroskedastic (TGARCH) as asymmetric models. The author also proposed using Theil’s nonparametric regression technique to deal with issues of non-normality in the data.

Unfortunately, the paper provided relatively limited information on what precisely was being studied. The data tested included information on 42 hotel opening announcements in Europe, Latin America, and Asia from 1997 until mid-1999. The author noted that a number of events were excluded when there were other announcements made on the same day as any other announcement. It is unclear whether the study analyzed a single company
or multiple companies, and no reference was made about on which stock exchange(s) the subject stocks are traded and what, if any, market model was used in the study. The nature of the opening announcements was also unclear; it is impossible to determine if these were projects that were to open sometime in the future or if these were the actual opening dates of these projects. The author found that GARCH provided the best fitting model as compared with OLS, ARCH, EGARCH, and TGARCH.

Abnormal returns using the GARCH estimates were found to be 1.6% on day 0 with statistical significance at the .01 level for the standardized cross-sectional test (Boehmer et al., 1991) and Corrado Rank Tests and at the .05 level for the generalized sign test. Abnormal returns using the Theil estimate were also found to be statistically significant at the .01 level for the standardized cross-sectional test and Corrado Rank Tests and at the .05 level for the generalized sign test. This is an important study as it pointed to a number of potential deficiencies in event studies conducted using lodging stocks, several of which can be applied to U.S. markets.

Other event studies conducted in non-U.S. markets include the study by Samitas and Kenourgios (2006), who conducted an event study on five hotel stocks traded on the Athens Stock Exchange from 1998 to late 2003 and looked at annual, semiannual, and quarterly financial results in an attempt to identify a relationship between this reporting and stock performance. Because the study utilized unspecified different estimation windows and event windows for each stock included, the results were difficult to analyze.

Chen, Jang, and Kim (2007) performed an event study to determine the impact of the SARS outbreak on Taiwanese hotel stocks. Using the Taiwan Stock Exchange Index as the market, 232 trading days were analyzed for 7 hotel stocks as compared to a variety of other
industries. In testing the OLS residuals, the authors found that the assumption of homoscedasticity had been violated and used GARCH, EGARCH, and TGARCH models. Using a standard \( t \)-test, the study found that the returns for hotel stocks during an event window from +1 to +20 were statistically significant at the .01 level both compared to the expected return as well as to the returns for a variety of other industries.

Tomlin (2009) investigated the impact of the announcement of smoking bans on the returns of tobacco and hospitality stocks in India, which initiated a national ban on the public smoking of tobacco in 2001. None of the Day 0 returns for the group of nine hospitality stocks on the event date were statistically significant due primarily to the large standard deviation of the daily returns in a large number of stocks in the estimation window. In an effort to minimize this impact, as well as the impact of very low trading volumes in certain stocks, the author created a number of weighted portfolios for testing and found modest statistically significant abnormal returns on the event date.

Nicolau and Sellers (2010) examined the impact of the announcement of quality awards on a single Spanish lodging firm as compared to the market return on the Spanish IBEX index. Using 24 events, they tested for abnormal returns using the standardized cross-sectional test (Boehmer et al., 1991) test as well as a GARCH model. The study found statistical significance at the .10 level using the GARCH model for a relatively small abnormal return of 0.42% on day 0.

### 2.8 Conclusions

Based on this literature review there is an opportunity to conduct event studies for lodging stocks in areas that extend extant studies or address areas that have not been explored in the hospitality industry. Due to the single industry focus and issues related to non-
normality and cross-sectional dependence in the data, these studies should apply both
parametric and nonparametric tests in order to fully validate any findings.

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CHAPTER 3. PARAMETRIC AND NON-PARAMETRIC ANALYSIS OF ABNORMAL STOCK RETURN AND VOLUME ACTIVITY FOR LODGING STOCK MERGERS FROM 2004 TO 2007

Modified from a paper published in the *International Journal of Revenue Management*

Barry A.N. Bloom

3.1 Abstract

An unprecedented number of hotel company mergers took place between 2004 and 2007. The purpose of this study was to determine whether there were abnormal stock returns or volume activity in the periods surrounding the merger announcement in the trading of 19 public hotel companies that were merged during this period using both parametric and nonparametric event study methodologies. The study identified statistically significant abnormal returns only on the merger announcement date indicating that there was little prior knowledge of these transactions and statistically significant volume activity only on the announcement date and thereafter.

3.2 Introduction

The period from 2004 to 2007 marked a series of watershed events in the hotel investment industry. During that period of time, over 20 publicly traded hotel companies were purchased, primarily by private equity firms, representing a total market value of over $90 billion (Corgel, 2008), as noted in Table 3.1. Although many of these companies were real estate investment trusts (REITs), a number of them were organized as traditional C corporations and had extensive operating, franchise, and brand operations in addition to real estate assets. The selected time period from 2004 to 2007 is important as there was only one hotel company merger that took place between 2000 and 2003 and none took place between 2007 and 2009.
Table 3.1

Hotel Company Merger Transactions 2004 to 2007

<table>
<thead>
<tr>
<th>Year</th>
<th>Company Name</th>
<th>Value</th>
<th>Ownership Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>Extended Stay America, Inc.</td>
<td>$2.0B</td>
<td>C-Corp</td>
</tr>
<tr>
<td>2004</td>
<td>Prime Hospitality Corp.</td>
<td>$790M</td>
<td>C-Corp</td>
</tr>
<tr>
<td>2004</td>
<td>Boca Resorts, Inc.</td>
<td>$1.1B</td>
<td>C-Corp</td>
</tr>
<tr>
<td>2005</td>
<td>Wyndham International, Inc.</td>
<td>$3.2B</td>
<td>C-Corp</td>
</tr>
<tr>
<td>2005</td>
<td>La Quinta Corp.</td>
<td>$3.4B</td>
<td>REIT</td>
</tr>
<tr>
<td>2005</td>
<td>John Q. Hammons Hotels, Inc.</td>
<td>N/A</td>
<td>C-Corp</td>
</tr>
<tr>
<td>2006</td>
<td>Fairmont Hotels &amp; Resorts, Inc.</td>
<td>$3.9B</td>
<td>C-Corp</td>
</tr>
<tr>
<td>2006</td>
<td>Meristar Hospitality Corp.</td>
<td>$2.6B</td>
<td>REIT</td>
</tr>
<tr>
<td>2006</td>
<td>Kerzner International Ltd.</td>
<td>$3.8B</td>
<td>C-Corp</td>
</tr>
<tr>
<td>2006</td>
<td>Boykin Lodging Co.</td>
<td>$416M</td>
<td>REIT</td>
</tr>
<tr>
<td>2006</td>
<td>Jameson Inns, Inc.</td>
<td>$371M</td>
<td>C-Corp</td>
</tr>
<tr>
<td>2006</td>
<td>Intrawest Corp.</td>
<td>$2.8B&lt;sup&gt;a&lt;/sup&gt;</td>
<td>C-Corp</td>
</tr>
<tr>
<td>2006</td>
<td>Four Seasons Hotels, Inc.</td>
<td>$3.4B</td>
<td>C-Corp</td>
</tr>
<tr>
<td>2007</td>
<td>CNL Hotels &amp; Resorts, Inc.</td>
<td>$6.6B&lt;sup&gt;a&lt;/sup&gt;</td>
<td>REIT</td>
</tr>
<tr>
<td>2007</td>
<td>Innkeepers USA Trust</td>
<td>$1.5B</td>
<td>REIT</td>
</tr>
<tr>
<td>2007</td>
<td>Highland Hospitality Corp.</td>
<td>$2.0B</td>
<td>REIT</td>
</tr>
<tr>
<td>2007</td>
<td>Eagle Hospitality Properties Trust, Inc.</td>
<td>$237M</td>
<td>REIT</td>
</tr>
<tr>
<td>2007</td>
<td>Crescent Real Estate Equities Co.</td>
<td>$6.5B</td>
<td>REIT</td>
</tr>
<tr>
<td>2007</td>
<td>Hilton Hotels Corp.</td>
<td>$26B</td>
<td>C-Corp</td>
</tr>
<tr>
<td>2007</td>
<td>Winston Hotels, Inc.</td>
<td>$690M</td>
<td>REIT</td>
</tr>
<tr>
<td>2007</td>
<td>Equity Inns, Inc.</td>
<td>$2.2B</td>
<td>REIT</td>
</tr>
</tbody>
</table>

<sup>a</sup>Company merged but stock data not included in analysis as CNL was a public, but nontraded company and Intrawest did not trade on a U.S. stock exchange.

There are a variety of reasons why this significant volume of transactions took place during this time period, including: (a) private equity funds had raised significant cash commitments for real estate investment, (b) publicly traded hotel companies were trading at significant discounts to the transaction values of privately owned hotels, (c) higher regulatory costs created by the Sarbanes-Oxley Act of 2002 were beginning to have an impact on public companies, (d) debt was available at historically inexpensive levels with the opportunity to significantly leverage capital structures, and (e) a variety of management agency issues
created incentives for management and boards of directors to seek buyers for their companies (Corgel, 2008).

Corgel (2008) noted that many consider that there is an inherent conflict in public ownership of real estate which, by its very nature, is a long-term investment that should not be judged by quarterly earnings. This conflict helped to make hotel companies and hotel REITs likely targets for private equity firms, particularly when coupled with generally positive industry supply and demand considerations and private equity firms’ belief that there were inherent inefficiencies in the industry’s structure that traditional hotel operators and real estate executives might not have considered (Corgel, 2008). Although not specifically studied in this paper, the public-to-private transactions in the U.S. hotel market followed closely on the heels of a significant wave of public-to-private transactions for lodging companies in the United Kingdom (Wallace, 2004).

This paper focuses on several inter-related topics surrounding these public-to-private merger transactions by attempting to answer the following general research questions: (a) Were there observable stock market behaviors that could provide an indication that the acquired companies were being pursued by potential purchasers? and (b) Was there abnormal trading behavior in these stocks before and/or after their public merger announcements as measured by abnormal stock return and volume activity relative to a market return? The research objective will be achieved through event study analysis of pre- and post-merger behavior of companies that merged on both a consolidated and day-by-day basis.

This study is of particular interest to practitioners including individual investors, company management, hedge funds, and hotel stock analysts who seek to understand the events of this unique period as well as to hospitality researchers who have studied various
aspects of lodging stocks and finance researchers and are interested in studying merger and acquisitions event studies in different industries. This paper will not attempt to address the ethics of insider trading or differentiate between true insider trading activity and other informed trading.

3.3 Literature Review

3.3.1 Overview

There are numerous topics and theoretical constructs that apply to this subject matter as it overlaps various research areas. As background, it is relevant to review hotels as real estate investments given that they are a unique form in real estate as they effectively act as both an operating business and a real estate investment. Although some previous literature has questioned the link between publicly traded real estate firms and real estate pricing, the public markets serve as a daily proxy for commercial real estate values (Corgel, 1997; Gyourko & Keim, 1992). Also relevant is the overall Real Estate Investment Trust (REIT) literature as REITs are a unique investment vehicle with their own body of knowledge. Of the 19 transactions reviewed as part of this study, over one half were REITs at the time of their merger transaction. Market microstructure theory is reviewed, as a number of its principles have been applied to merger events and insider trading. It is also important to review research conducted in the broader equity markets as it relates to merger announcements and the work conducted in trading that surrounds those and other similar events. This section concludes with an in-depth review of key literature from these topics as applied to the hotel-specific investment area.
3.3.2 Hotels as Real Estate Investments

There is an ongoing body of literature relating to hotels as real estate investments, although there are many areas that have yet to be explored. Much of the earliest work in this area came from a continual series of articles by Rushmore (1975, 1978, 1984) who was focused on developing appraisal models that could be applied to the unique operating business structure of the hotel industry as compared to the triple net lease model more common to other types of real estate. He later turned his attention to the importance of detailed market analysis as part of the property appraisal and wrote a number of books that furthered these concepts (Rushmore, 1986, 1992). Rushmore’s work served as the basis of the work done by Corgel and deRoos in the 1990s, who began to approach hotel valuation from a more academic perspective and began to look at empirical models for hotel pricing (Corgel & deRoos, 1992, 1994; deRoos & Rushmore, 1996; deRoos & Corgel, 1996).

General cyclic behavior of the hotel industry in the United States, which has significant relevance to the hotel investment market, has been conducted primarily by general real estate researchers, most notably the seminal work of Wheaton and his ongoing work with various colleagues (Wheaton, 2005; Wheaton & Rossoff, 1998; Wheaton, Totro, Sivitanides, & Southard, 1999).

The historical literature in this area was summarized by Corgel (2005) who identified that hotels constitute approximately 10% of all commercial real estate. He noted that hotel market cycles are common and consist of smooth and regular fluctuation around a well-founded equilibrium level and identified occupancy rates as being generally cyclical with +8 to −8 variances around that equilibrium (Corgel, 2005). It is noteworthy that a total range of 16% variation can have a dramatic impact on profitability due to the high fixed cost nature of
hotel operation and investment (Rushmore & Goldhoff, 1997). Corgel (2005) identified that average daily rate (ADR) in real dollar terms is also cyclical but with a long-term upward trend and that occupancy generally leads ADR in both upward and downward directions. Finally, he noted that hotel room demand generally lags the overall economy by two to three quarters and that hotel capitalization rates are generally counter-cyclical, rising when incomes decline and declining when incomes rise (Corgel, 2005). This has the curious effect of compounding the impact on hotel values and creating significant peaks and valleys in hotel valuation on a current basis.

3.3.3 Real Estate Investment Trusts and Lodging Stocks

Research on the performance of hotel stocks is a nascent field and has been focused primarily on the performance of REITs. A REIT is an investment vehicle that invests primarily in income producing real estate and is generally publicly owned and traded. In order for a company to qualify as a REIT in the U.S., it must comply with specific rules outlined in the Internal Revenue Code. These rules include: investing at least 75% of total assets in real estate; deriving at least 75% of gross income as rents from real property or interest from mortgages on real property; and distributing annually at least 90% of taxable income to shareholders in the form of dividends (National Association of Real Estate Investment Trusts, n.d.).

Although REITs were authorized based on 1960 federal legislation (Zietz, Sirmans, & Friday, 2003), hotel-specific REITs are a relatively new phenomenon. In 1993, there were only two hotel REITs with a total market capitalization of approximately $100 million (Jackson, 2009). The existing literature in this area has focused primarily on the identification of the risk features of hotel REITs and the performance of hotel REITs relative
to REITs that focus on other property types. These studies have generally found that hotel REITs carry the highest market risk as compared to other REIT sectors; that the predominant risk in hotel REITs is firm specific, unsystematic risk; and that the hotel REIT sector has generally underperformed office, industrial, residential and diversified REITs (Gu & Kim, 2003; H. Kim, Gu, & Mattila, 2002; H. Kim, Mattila, & Gu, 2002).

As it relates to lodging stocks in general, there is a discrete, but limited body of existing literature. Lee and Upneja (2007) found that lodging stocks are considered to be undervalued relative to other stocks in the general economy, the service economy, and the real estate economy, but they did not identify the factors that lead to undervaluation of lodging stocks. Also unique to hotel REITs is that they are the only REIT sector to experience periodically collapsing bubbles, as measured by the momentum autoregressive threshold (MTAR) model and the residuals-augmented Dickey-Fuller (RADF) test (Payne & Waters, 2007). This information is relevant to this study, as the large number of merger transactions relative to the total universe of lodging stocks could be considered to be indicative of a periodically collapsing bubble, particularly in light of the changing market conditions since the last merger of the study period occurred on October 24, 2007.

3.3.4 Market Microstructure Theory

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). This theory has led to the development of a series of models that can detect the probability of informed based trading (PIN) using a structural sequential trade model, and it has begun to be exploited around corporate merger and acquisition events (Aktas, deBodt, Declerck, & Van Oppens, 2007; Easley & O’Hara, 1987). There also have been studies that have focused exclusively on insider trading activity as it relates to company merger and acquisitions events. These studies generally found that there is a positive relationship between insider trading activity and potential merger and acquisition activity, although it is interesting to note that many of these utilize foreign stock markets for their analysis rather than U.S. markets (Aitken & Czernkowski, 1992; Cornell & Sirri, 1992; Fidrmuc, Georgen, & Renneboog, 2006; Jabbour, Jalilvand, & Switzer, 2000).

Oak and Andrew (2006) applied these theories to address the issue of whether or not there was informed trading prior to acquisitions in the hospitality industry. Their study applied a market microstructure framework and was the first to address “the process of informed trading around hospitality corporate events despite the importance of information asymmetry in the financial markets” (Oak & Andrew, 2006, p. 572). The study found that market makers vary their behavior in an attempt to avoid trading against informed traders by reducing ask depths in order to protect their trading positions. Careful attention was paid to the method of payment used for the acquisition, i.e., stock, cash, or mixed. Their study took a very long view and examined all acquisitions in the hospitality industry between 1983 and 1999, and they provided evidence that informed traders use information asymmetry in the period surrounding corporate acquisitions. However, the article noted that it remains unclear
whether different types of informed traders (generally insiders and outsiders such as financial analysts or arbitrageurs) behave differently around hospitality corporate information events and called for future study in this area.

3.3.5 Mergers and Acquisitions—Abnormal Stock Return and Trading Volume

There is a well-developed and long-established body of literature in the accounting and finance areas that relate to whether abnormal returns are derived in periods surrounding mergers and acquisitions activity. Dating back to 1981, Keown and Pinkerton conducted an empirical investigation of the potential relationship between merger announcements and insider trading activity. They relied on a number of studies from just before that time (Dodd & Ruback, 1977; Jarrell & Bradley, 1980) as well as continued work by the same seminal researchers in the periods that followed (Jarrell, Brickley, & Netter, 1988; Jensen & Ruback, 1983). Utilizing data for 125 trading days prior to the merger announcement date and 31 trading days on and after the trading date, daily abnormal returns were determined based on a comparison to the daily return of the Standard & Poors 500 index for 194 mergers that took place between 1975 and 1978 (Keown & Pinkerton, 1981). Their study found that the market reaction to intended mergers occurred before the first public announcement of an intended merger. Although moderately abnormal returns occurred throughout the analysis period, they became statistically significant in the 12 days prior to merger announcement and even more statistically significant in the 5 days prior to and including the day of the merger announcement (Keown & Pinkerton, 1981). Keown and Pinkerton (1981) also noted a dramatic increase in trading volume during this period. Further, they determined that these transactions were not highly correlated with disclosed insider purchases during this period,
leading to their conclusion that these mergers appeared to be common knowledge, albeit potentially illegal.

Jarrell and Poulsen (1989) furthered the work of Keown and Pinkerton (1981) to determine whether the abnormal returns achieved prior to merger announcements were, in fact, insider trading or related to market anticipation. In Jarrell and Poulsen’s (1989) study, they made certain adjustments to the takeover announcement date based on other publicly disseminated information including media publications of rumored merger or takeover conversations. Their work reviewed 172 tender offers from 1981 to 1985 and determined that approximately 40% of the eventual takeover premium was anticipated by abnormal returns prior to the announcement date. They found that news media was the strongest explanatory variable in explaining these premiums (Jarrell & Poulsen, 1989).

Keown, Pinkerton, and Bolster (1992) provided additional research in this area with work focused on the impact of trading volume on merger announcements and asymmetrical information. Earlier research conducted by others, notably Copeland (1976), Morse (1981), and Verrecchia (1981), had indicated that, in general, asymmetric information creates differences in belief, which lead to increased trading volume. Using a total of 178 stocks with merger announcement dates from 1975 through 1979 and utilizing data from 126 trading days prior to the announcement date and 31 trading days on or after the announcement date the Keown et al. (1992) study found that trading volume increased dramatically prior to the announcement of intended mergers or the first published rumor of a potential merger.

O. Kim and Verrecchia (1991) investigated the relationship between price and volume reactions to public merger announcements in an effort to bring together these topics,
which previously had been explored independently. Their primary finding was that trading volume is proportional to both absolute price change and the precision of traders’ beliefs and information. They noted that, although price can be considered as one measure of the average reaction to an event, volume is a measure of the sum of differences among traders’ reactions (O. Kim & Verrecchia, 1991). As such, although abnormal volume is considered to be a noisier indicator of information than abnormal price return, this does not make volume an inferior indicator of a potential merger transaction (O. Kim & Verrecchia, 1991).

Although there have been other descriptive studies, only three previous studies have focused specifically on mergers and acquisitions in the hospitality industry with quantitative data. The earliest study, conducted by Andrew in 1988 (as cited in Kwansa, 1994) studied hospitality firm mergers during the period between 1975 and 1986 to determine whether additional wealth accrued to shareholders of hospitality firms seeking to diversify through acquisition. The study found that target firms gained value during the 20 days prior to the public acquisition announcement (Andrew, 1988, as cited in Kwansa, 1994).

Kwansa (1994) studied takeover activity between 1980 and 1999 across a variety of industries in an effort to determine the additional wealth earned by shareholders of lodging companies acquired during that period. It is important to note that mergers and acquisitions during that time period were not driven by private equity funds and were more commonly true mergers of companies with other similar firms in an effort to extend market reach and minimize overall cost structures of the merged firm. Kwansa (1994) utilized event study (a.k.a. residual analysis) methodology in an effort to determine whether there were abnormal returns for mergers and acquisitions in the hospitality industry. The study covered 18 hotel and casino companies and reviewed the 30 days prior to and the 30 days (event period) after
each company’s merger announcement in order to determine if the returns on a daily basis significantly deviated from zero.

For the event period, abnormal return was not significantly different from zero for any of the days between day –30 and day –2, but noticeable increases occurred in the size of abnormal returns between days –2 and +1 (Kwansa, 1994). The total cumulate average abnormal return across the event period was 31.5% and was significantly different from zero at the .01 level of significance.

Canina (2001) conducted similar work and extended the analysis period through 1999. Again, most of the transactions that took place during that period of time were acquisitions by other public firms rather than privatization transactions by private equity funds. Canina’s study was focused on returns of both acquiring and target firms in the 2 days before the announcement date through 1 day after the announcement date and viewed mergers and tender offers as separate events. Abnormal returns on the day before the merger announcement were not significantly different than zero but were so on both the announcement day and the following day (Canina, 2001).

In summary, although the general topic has been explored in the broader finance literature, few studies specific to lodging firms have been conducted and no studies have tested the relationships of both price and volume. Further, no empirical work has been conducted on this specific period of hotel company mergers, which were significant in the context of the overall structure of the hotel capital markets. Those studies that have been conducted generally have found that there is not a statistically significant relationship between abnormal stock returns and zero in the period preceding merger announcements but
that there is a statistically significant relationship between abnormal stock returns and zero in the period following merger announcements.

3.3.6 Hypotheses

Based on the review of the literature and the research objectives of determining: (a) whether there were observable stock market behaviors that could provide an indication that these companies were being pursued by potential purchasers and (b) whether there was abnormal trading behavior in these stocks before and/or after their public merger announcements as measured by abnormal stock return and volume activity relative to a market return, the following hypotheses were proposed:

H₁: Daily abnormal price return (compared to the CRSP Value-Weighted market return) for companies that merged will be greater than zero for the period –20 to -1.

H₂: Daily abnormal price return (compared to the CRSP Value-Weighted market return) for companies that merged will be greater than zero for the day 0.

H₃: Daily abnormal price return (compared to the CRSP Value-Weighted market return) for companies that merged will be greater than zero for the period +1 to +20.

H₄: Daily abnormal log-transformed trading volume (compared to the CRPS Value-Weighted log-transformed volume index) for companies that merged will be greater than zero for the period –20 to +1.

H₅: Daily abnormal log-transformed trading volume (compared to the CRPS Value-Weighted log-transformed volume index) for companies that merged will be greater than zero for day 0.
H$_6$: Daily abnormal log-transformed trading volume (compared to the CRPS Value-Weighted log-transformed volume index) for companies that merged will be greater than zero for the period +1 to +20.

3.4 Research Methodology

3.4.1 Data Collection

A typical event study approach was used to determine whether the announcement of a merger resulted in abnormal returns for the periods prior to, surrounding, and after an announcement. This study examined the daily abnormal return and volume characteristics for hotel company and hotel REIT stocks that announced and consummated mergers between 2004 and 2007. This period was selected as 19 mergers took place during this time period as compared with only 1 hotel company merger that took place between 2000 and 2003 and none that took place between 2007 and 2010.

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. 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

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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, 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. Definitive Merger Proxy Statements (DEFM14A) were retrieved from the U.S. Securities and Exchange Commission (n.d.) for all merged companies and reviewed in order to determine the date of the official merger announcement.

3.4.2 Traditional Event Study Statistical Methods

Event studies utilizing a market model residual method with daily stock data are well documented (Brown & Warner, 1985). The event study procedure typically used calculates abnormal returns for an event-time portfolio. Each security in the sample is regressed for a time series of daily returns against the yields from a market index using the equation:

$$R_t = \alpha + \beta R_M t + e_t,$$

where $R_t$ denotes the return on the security for time period $t$, $R_M t$ denotes the return on a market index for period $t$, and $e_t$ represents a firm-specific return (Lintner, 1965; Sharpe, 1963, 1964). Inherent in the market model is an assumption that $e_t$ is unrelated to the overall market and has an expected value of zero. The estimates of the 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 are then typically 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:

$$Z_p = \frac{1}{\sqrt{m}} \sum_{i=1}^{m} \frac{A_{i,0}}{\sqrt{\text{Var}(A_{i,0})}}$$

One of the challenges in utilizing OLS regression for daily stock data is that there is an underlying assumption that the excess return data are normally distributed and cross-sectionally independent. The most commonly used statistical test in event studies, the Patell Z-test, a parametric, standardized abnormal return test, utilizes such an assumption (Patell, 1976).

### 3.4.3 Addressing the Issue of Non-Normality in the Data

It has long been recognized that daily stock data are not normally distributed (Fama, 1965; Mandelbrot, 1963; Officer, 1972) and, as a result, care must be taken in analyzing event study results that assume that the data are normally distributed. 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.

The most popular approach to addressing non-normality of the data can be provided by nonparametric tests, specifically the sign test and the rank test (J. Y. 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 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. There are few, if any, potential shortcomings to using nonparametric tests, particularly given that nonparametric tests are typically not used in isolation but, rather, in conjunction with parametric tests so that each can provide a check on the robustness of conclusions as compared to the other (J. Y. Campbell et al., 1997).

3.4.4 Addressing the Issue of Cross-Sectional Dependence in the Data

Another challenge in utilizing OLS regression for daily stock data is that there is an underlying assumption that the data are cross-sectionally independent. Again, the most
commonly used test statistic in event studies, the Patell Z-test, a parametric, standardized abnormal return test, utilizes this assumption as well (Patell, 1976). Cross-sectional dependence is particularly likely when at least some of the returns used in an event study are correlated due to common macroeconomic or industry-specific activity or due to a single or clustered event date (Prabhala, 1997). Cross-sectional dependence inflates test statistics because the number of sample firms overstates the number of independent observations (Lyon, Barber, & Tsai, 1999). The most common cases for this issue occur when the event being analyzed occurs on the same date for all firms (such as a regulatory event or market shock), but it can be an issue anytime that at least some of the returns are sampled from common time periods (Bernard, 1987). The challenge of cross-sectional dependence is exacerbated when a common event is tested in a single industry, as in this study (Strong, 1992).

There is a significant body of literature that has developed around potential solutions to address cross-sectional dependence in the data with few conclusions regarding the best method or even whether cross-sectional dependence needs to be addressed at all. Beaver (1968) found that an increase in the cross-sectional dispersion of abnormal returns at the time of an event announcement implies that the announcement conveyed information and 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 and that the mean
abnormal return in a cross-section of securities comes closer to normality as the number of
securities in the sample is increased.

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. Their recommended method utilizes the calculation of calendar-time
portfolio abnormal returns, which may be either equally weighted or value weighted. In this
method, calendar-time abnormal returns are calculated for sample firms and then a t-statistic
is derived from the time-series of the monthly calendar-time portfolio abnormal returns. The
advantage of this approach is that it eliminates the issue of cross-sectional dependence
among sample firms. The disadvantage of this approach is that it provides an abnormal
return measure that does not precisely measure the actual experience of investors over the
specified time period.

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. As a result, it is proposed below that a number of
different tests be conducted and results compared for future event studies conducted with hospitality stocks.

### 3.4.5 Additional Statistical Methods Applied

In addition to the commonly used Patell test, the present study also performed two additional parametric tests. The first additional parametric test is a standardized cross-sectional test developed by Boehmer et al. (1991). This test compensates for possible variance increases on the event date itself by incorporating a cross-sectional variance adjustment. The second additional parametric test applied in this study is a time-series standard deviation test also known as the crude dependence adjustment (CDA) indicated by Brown and Warner (1980, 1985). This test computes the standard from the time series of portfolio mean abnormal returns during the estimation period.

Two nonparametric tests were also performed on the data. The first nonparametric test is 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). The second nonparametric test is the rank test, in which 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).

Although event studies are most commonly conducted using abnormal returns related to stock price, they can also be conducted using volume data. Abnormal trading volume is generally calculated using the log-transformed percentage of shares outstanding for each security as compared with an estimated market model abnormal trading volume (Ajinkya &
Jain, 1989; Biktimirov, Cowan, & Jordan, 2004; Cready & Ramanan, 1991). As with price event studies, both parametric and nonparametric tests are indicated and the same tests utilized for abnormal price returns were used for the abnormal volume returns (C. Campbell & Wasley, 1996).

3.5 Study Results and Data Analysis

The research objectives were to determine (a) whether there were observable stock market behaviors that could provide an indication that these companies were being pursued by potential purchasers and (b) whether there was abnormal trading behavior in these stocks before and/or after their public merger announcements as measured by abnormal stock return and volume activity relative to a market return. The results of each hypothesis proposed follow.

3.5.1 Hypothesis 1

A summary of the test results for each daily return is found in Table 3.2. The study identified a cumulative abnormal price return (compared to the CRSP Value-Weighted index) for days –20 to –1 of –0.35%; however this return was not statistically significant for any of the tests conducted (Table 3.3). No single premerger announcement trading day identified any strong relationship across all firm announcements.

This finding is important as the earliest hospitality research on merger abnormal returns identified abnormal returns in periods prior to the merger announcement (Kwansa, 1994), whereas later research did not (Canina, 2001). It is likely that, as markets have become more efficient and insider trading has become easier to track, any trades based on material nonpublic information would have occurred significantly prior to the announcement date (Boehmer & Kelley, 2009).
Table 3.2

*Daily Mean Abnormal Returns and Test Statistics Surrounding Merger Announcements (N = 19)*

<table>
<thead>
<tr>
<th>Day</th>
<th>Mean abnormal return</th>
<th>Patell Z</th>
<th>Portfolio time–series (CDA) t</th>
<th>StdCsect Z</th>
<th>Sign positive: negative a</th>
<th>Rank test</th>
<th>Calendar time t</th>
</tr>
</thead>
<tbody>
<tr>
<td>−20</td>
<td>−0.37</td>
<td>−0.684</td>
<td>−0.912</td>
<td>−0.860</td>
<td>7:12</td>
<td>−1.148</td>
<td>−0.863</td>
</tr>
<tr>
<td>−19</td>
<td>−0.20</td>
<td>−0.436</td>
<td>−0.483</td>
<td>−0.812</td>
<td>7:12</td>
<td>−0.604</td>
<td>−0.782</td>
</tr>
<tr>
<td>−18</td>
<td>−0.72</td>
<td>−1.800*</td>
<td>−1.770*</td>
<td>−2.112*</td>
<td>6:13</td>
<td>−1.848*</td>
<td>−2.050*</td>
</tr>
<tr>
<td>−17</td>
<td>0.71</td>
<td>2.020*</td>
<td>1.733*</td>
<td>1.657*</td>
<td>10:9</td>
<td>1.117</td>
<td>1.654</td>
</tr>
<tr>
<td>−16</td>
<td>−0.34</td>
<td>−0.679</td>
<td>−0.841</td>
<td>−0.670</td>
<td>8:11</td>
<td>−0.509</td>
<td>−0.603</td>
</tr>
<tr>
<td>−15</td>
<td>0.43</td>
<td>1.468</td>
<td>1.057</td>
<td>1.560</td>
<td>12:07</td>
<td>1.177</td>
<td>1.760*</td>
</tr>
<tr>
<td>−14</td>
<td>0.37</td>
<td>0.602</td>
<td>0.900</td>
<td>0.392</td>
<td>5:14&lt;</td>
<td>−0.748</td>
<td>0.454</td>
</tr>
<tr>
<td>−13</td>
<td>−0.32</td>
<td>−1.229</td>
<td>−0.783</td>
<td>−1.840*</td>
<td>6:13</td>
<td>−1.375</td>
<td>−1.959*</td>
</tr>
<tr>
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<td>−0.31</td>
<td>−0.300</td>
<td>−0.762</td>
<td>−0.185</td>
<td>5:14&lt;</td>
<td>−1.591</td>
<td>−0.125</td>
</tr>
<tr>
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<td>0.847</td>
<td>0.478</td>
<td>0.867</td>
<td>9:10</td>
<td>0.244</td>
<td>0.947</td>
</tr>
<tr>
<td>−10</td>
<td>0.22</td>
<td>0.745</td>
<td>0.530</td>
<td>1.372†</td>
<td>12:7</td>
<td>0.887</td>
<td>1.432</td>
</tr>
<tr>
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<td>−0.255</td>
<td>−0.103</td>
<td>−0.270</td>
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<td>−0.638</td>
<td>−0.283</td>
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<tr>
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<td>−0.215</td>
<td>−0.368</td>
<td>−0.224</td>
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<td>−0.347</td>
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<td>−1.249</td>
</tr>
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<td>−0.945</td>
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<td>−1.182</td>
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<tr>
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<td>1.087</td>
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<td>1.165</td>
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<td>−0.897</td>
<td>−0.760</td>
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<td>−1.159</td>
<td>−1.701</td>
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<td>0.631</td>
<td>0.603</td>
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<td>0.529</td>
</tr>
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<td>−0.359</td>
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<td>−0.622</td>
<td>−1.169</td>
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<tr>
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<td>0.55</td>
<td>1.858*</td>
<td>1.359</td>
<td>1.511</td>
<td>10:9</td>
<td>1.002</td>
<td>1.529</td>
</tr>
<tr>
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<td>15.77</td>
<td>42.302***</td>
<td>38.665***</td>
<td>5.835***</td>
<td>19:0&gt;&gt;&gt;</td>
<td>6.480***</td>
<td>5.667***</td>
</tr>
<tr>
<td>+1</td>
<td>−0.02</td>
<td>0.082</td>
<td>−0.046</td>
<td>0.140</td>
<td>9:10</td>
<td>0.019</td>
<td>0.098</td>
</tr>
<tr>
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<td>−0.22</td>
<td>−0.646</td>
<td>−0.535</td>
<td>−1.253</td>
<td>6:13</td>
<td>−0.856</td>
<td>−1.255</td>
</tr>
<tr>
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<td>−0.03</td>
<td>0.096</td>
<td>−0.066</td>
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<td>9:10</td>
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<td>0.329</td>
</tr>
<tr>
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<td>−0.891</td>
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<td>−1.368</td>
<td>−2.340*</td>
</tr>
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<td>0.147</td>
<td>0.359</td>
<td>0.313</td>
<td>9:10</td>
<td>0.530</td>
<td>0.135</td>
</tr>
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<td>−0.855</td>
<td>−0.743</td>
<td>−2.088*</td>
<td>6:13</td>
<td>−1.132</td>
<td>−1.999*</td>
</tr>
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<td>−0.31</td>
<td>−0.887</td>
<td>−0.750</td>
<td>−2.523***</td>
<td>6:13</td>
<td>−1.209</td>
<td>−2.340*</td>
</tr>
<tr>
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<td>−0.080</td>
<td>0.069</td>
<td>−0.229</td>
<td>9:10</td>
<td>0.082</td>
<td>−0.242</td>
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<td>0.404</td>
<td>0.584</td>
<td>8:11</td>
<td>0.298</td>
<td>0.292</td>
</tr>
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<td>−0.06</td>
<td>−0.084</td>
<td>−0.144</td>
<td>−0.157</td>
<td>8:11</td>
<td>−0.127</td>
<td>−0.179</td>
</tr>
<tr>
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<td>−0.046</td>
<td>0.151</td>
<td>−0.116</td>
<td>10:9</td>
<td>−0.010</td>
<td>−0.264</td>
</tr>
<tr>
<td>+12</td>
<td>−0.05</td>
<td>−0.100</td>
<td>−0.116</td>
<td>−0.182</td>
<td>8:11</td>
<td>−0.186</td>
<td>−0.208</td>
</tr>
<tr>
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<td>−0.23</td>
<td>−0.641</td>
<td>−0.553</td>
<td>−1.545</td>
<td>7:12</td>
<td>−0.934</td>
<td>−1.509</td>
</tr>
<tr>
<td>+14</td>
<td>0.00</td>
<td>−0.266</td>
<td>0.005</td>
<td>−0.485</td>
<td>9:10</td>
<td>−0.073</td>
<td>−0.688</td>
</tr>
<tr>
<td>+15</td>
<td>−0.04</td>
<td>−0.216</td>
<td>−0.094</td>
<td>−0.488</td>
<td>9:10</td>
<td>−0.359</td>
<td>−0.613</td>
</tr>
<tr>
<td>+16</td>
<td>−0.20</td>
<td>−0.527</td>
<td>−0.495</td>
<td>−1.063</td>
<td>6:13</td>
<td>−1.040</td>
<td>−0.999</td>
</tr>
<tr>
<td>+17</td>
<td>−0.50</td>
<td>−0.872</td>
<td>−1.235</td>
<td>−1.608</td>
<td>7:12</td>
<td>−1.123</td>
<td>−1.365</td>
</tr>
<tr>
<td>+18</td>
<td>0.06</td>
<td>0.321</td>
<td>0.140</td>
<td>0.842</td>
<td>10:9</td>
<td>0.464</td>
<td>0.892</td>
</tr>
<tr>
<td>+19</td>
<td>0.05</td>
<td>−0.199</td>
<td>0.131</td>
<td>−0.369</td>
<td>7:12</td>
<td>−0.293</td>
<td>−0.579</td>
</tr>
<tr>
<td>+20</td>
<td>0.02</td>
<td>0.259</td>
<td>0.061</td>
<td>0.551</td>
<td>8:11</td>
<td>0.233</td>
<td>0.560</td>
</tr>
</tbody>
</table>

* < or > denotes p < .05; >>> denotes p < .001, where the direction of the symbols designates the direction of the test.

*p < .05. **p < .01. ***p < .001.
Table 3.3

*Mean Cumulative Abnormal Returns and Test Statistics Surrounding Merger Announcements (N = 19)*

<table>
<thead>
<tr>
<th>Day</th>
<th>Mean Precision weighted CAAR</th>
<th>Mean CT portfolio cumulative CAAR</th>
<th>Patell Z</th>
<th>StdCsect t</th>
<th>Sign positive: negative</th>
<th>Rank test Z</th>
<th>Calendar time t</th>
</tr>
</thead>
<tbody>
<tr>
<td>–0.35</td>
<td>0.27</td>
<td>–0.04</td>
<td>0.151</td>
<td>–0.193</td>
<td>0.238</td>
<td>11:8</td>
<td>–1.539</td>
</tr>
<tr>
<td>15.77</td>
<td>16.94</td>
<td>15.47</td>
<td>42.470***</td>
<td>38.665***</td>
<td>5.835***</td>
<td>19:0</td>
<td>6.480***</td>
</tr>
<tr>
<td>–1.77</td>
<td>–2.12</td>
<td>–2.07</td>
<td>–1.191</td>
<td>–0.972</td>
<td>–2.836**</td>
<td>5:14&lt;</td>
<td>–1.532</td>
</tr>
<tr>
<td>16.30</td>
<td>17.11</td>
<td>16.02</td>
<td>25.644***</td>
<td>23.082***</td>
<td>5.712***</td>
<td>19:0</td>
<td>4.331***</td>
</tr>
</tbody>
</table>

*a < denotes p < .05; >>> denotes p < .001, where the direction of the symbols designates the direction of the test.

**p < .01. ***p < .001.

3.5.2 Hypothesis 2

As hypothesized, abnormal price return (compared to the CRSP Value-Weighted index) was significantly greater than zero on the merger announcement date (day 0). On average, the abnormal return for each stock in the dataset was 15.8%, indicating strong merger premiums proposed for each of the impacted companies. These returns were statistically significant at the .001 level for all tests conducted, including the Patell, CDA, standardized cross-sectional, generalized sign, rank, and calendar-time tests as noted in Table 3.3. This finding is fairly typical in merger and acquisition studies as the market typically bids the price of a stock involved in a merger announcement up to the announced takeover price. It is important to note that the returns were statistically significant across all tests, with nonparametric tests confirming the findings of the parametric tests.

3.5.3 Hypothesis 3

A summary of the test results for each daily return is found in Table 3.2; no single postmerger announcement trading day identified any strong relationship across all firm announcements. The study identified a cumulative abnormal price return (compared to the
CRSP Value-Weighted index) of –1.77% for days +1 to +20; however this return was found to be statistically significant only at the .01 level for the standardized cross-sectional test and calendar time test. A negative cumulative abnormal price return in the period following merger and acquisition announcements typically indicates that several stocks were overbid on the original merger announcement date in the hopes that a higher bid would ultimately result and prevail.

### 3.5.4 Hypothesis 4

A summary of test results for each daily return is found in Table 3.4. It is noted that abnormal relative volume is positive for each trading day from days -18 to -7 and then is mostly negative from days -6 to -1. The study identified cumulative abnormal volume (compared to the CRSP Value-Weighted index) of 845%, representing a daily average of 42%, for days -20 to -1. This volume increase was statistically significant at the .001 level for all of the tests conducted with the exception of the rank test, for which it was statistically significant at the .05 level. Although not borne out by the general lack of abnormal price movement prior to the merger announcement date, the finding of significant volume increases prior to the merger announcement date could be indicative of advance market knowledge by certain market participants who are able to trade in relatively small amounts, which would not abnormally increase price while accumulating shares in anticipation of a potential merger announcement.
Table 3.4

**Daily Mean Abnormal Relative Volume and Test Statistics Surrounding Merger Announcements (N = 19)**

<table>
<thead>
<tr>
<th>Day</th>
<th>Mean abnormal relative volume</th>
<th>Patell Z</th>
<th>Portfolio time–series (CDA) t</th>
<th>StdCsect Z</th>
<th>Sign positive: negativea</th>
<th>Rank test Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>-20</td>
<td>-5.64</td>
<td>-0.478</td>
<td>-0.281</td>
<td>-0.601</td>
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<td>-0.471</td>
</tr>
<tr>
<td>-19</td>
<td>-6.81</td>
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<td>-0.339</td>
<td>-0.507</td>
<td>9:10</td>
<td>-0.370</td>
</tr>
<tr>
<td>-18</td>
<td>47.03</td>
<td>2.278*</td>
<td>2.343**</td>
<td>1.485</td>
<td>12:7</td>
<td>0.750</td>
</tr>
<tr>
<td>-17</td>
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<td>0.442</td>
<td>0.341</td>
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<td>-0.256</td>
</tr>
<tr>
<td>-16</td>
<td>33.99</td>
<td>1.958*</td>
<td>1.693</td>
<td>1.561</td>
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<td>0.470</td>
</tr>
<tr>
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<td>18.76</td>
<td>1.286</td>
<td>0.935</td>
<td>1.107</td>
<td>11:8</td>
<td>0.289</td>
</tr>
<tr>
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<td>30.85</td>
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<td>1.537</td>
<td>1.077</td>
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<td>0.093</td>
</tr>
<tr>
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<td>2.208*</td>
<td>2.284</td>
<td>2.112</td>
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<td>1.009</td>
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<tr>
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<td>1.951</td>
<td>1.396</td>
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<td>0.355</td>
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<td>44.53</td>
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<td>2.636**</td>
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<tr>
<td>-9</td>
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<td>0.600</td>
<td>1.109</td>
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<td>-0.236</td>
</tr>
<tr>
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<tr>
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<td>17.410***</td>
<td>13.888***</td>
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*a> denotes p < .05; >> denotes p < .01; >>> denotes p < .001, where the direction of the symbols designates the direction of the test.

*p< .05. **p< .01. ***p< .001.
Table 3.5

Mean Cumulative Abnormal Relative Volume and Test Statistics Surrounding Merger Announcements (N = 19)

<table>
<thead>
<tr>
<th>Day</th>
<th>Mean cumulative abnormal relative volume %</th>
<th>Precision Weighted CAARV %</th>
<th>Patell Z</th>
<th>Portfolio time-series (CDA) t</th>
<th>StdCsect Z</th>
<th>Sign positive: negative^a</th>
<th>Rank test Z</th>
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^a>>> denotes p < .001, where the direction of the symbols designates the direction of the test.
*p < .05. ***p < .001.

3.5.5 Hypothesis 5

The study identified abnormal volume (compared to the CRSP Value-Weighted index) of 349% for day 0; this return was statistically significant at the .001 level for all of the tests conducted including the Patell, CDA, standardized cross-sectional, generalized sign, and rank tests, as noted in Table 3.5.

Increased volume on the merger announcement date typically represents trades throughout the day by market participants who may wish to exit a stock due to the unexpected price appreciation as well entry by market participants who may believe that the proposed merger price may be exceeded through additional competitive bidding. The merger announcement date also typically sees entry by arbitrageurs who are interested in capturing small premiums over a short period of time leading up to the actual merger.

3.5.6 Hypothesis 6

A summary of the test results for the daily return is found in Table 3.4, which shows that average abnormal relative volume is positive and statistically significant for most tests on all days. The study identified cumulative abnormal volume (compared to the CRSP Value-
Weighted index) of 2,156%, representing a daily average of 108%, for days +1 to +20. This volume increase is statistically significant at the 001 level for all of the tests conducted including the Patell, CDA, standardized cross-sectional, generalized sign, and rank tests.

Abnormal volume in the period after a merger announcement is typically provided by market participants who may wish to exit a stock as they believe that the large portion of appreciation in the stock has already taken place and additional return can be captured in other markets. The purchasers of their shares are typically arbitrageurs who are interested in capturing small premiums over a short period of time leading up to the actual merger and profiting from minor daily fluctuations in a stock’s price.

3.6 Limitations and Suggestions for Future Research

There are several limitations to this study. First, market behavior is generally different under different economic circumstances. Although mergers are a well-studied phenomenon, the repeated study of differing periods could result in different conclusions. Second, as in any event study, the determination of the lengths of the ante- and post-event periods used in measuring returns may not be optimal. As a result, future researchers may wish to experiment with differing lengths of time to determine if any particular periods differed in their return profile.

Future studies on this topic could measure a similar dataset against different market benchmarks other than the CRSP Value-Weighted index. For example, the Standard & Poors 500 Composite index, the Equal-Weighted CRSP total market index, and the CRSP/Ziman real estate index could provide different results than the results obtained in this study and be more appropriate given the market capitalization and real estate focus of the merged stocks. Future researchers may also want to consider the impact of significant dates other than the
merger announcement date as the critical period for an event study. Data are readily obtainable from the Securities and Exchange Commission from which the dates of entry into confidentiality agreements, calls for offers, number of potential bidders at various points in time, and serious negotiation could be determined and utilized as Day 0 (the announcement date) in event studies in order to identify potential information leakage and insider trading activity. Researchers might also consider developing a logit model to determine whether early increases in volume and price might be predictive of future merger activity.

3.7 Conclusions

This study is significant in that it is the first to provide an empirical analysis of the most recent wave of hospitality merger and acquisition activity. Further, the dataset is very recent in comparison to the date of publication, which has not always been the case in previous, similar studies. This paper contributes to the body of knowledge regarding trading activity in hotel stocks and should be of significant interest to other hospitality industry researchers who may wish to further explore this topic or apply its findings to other aspects of the hospitality industry, including restaurants, cruise ships, or gaming, all of which saw similar merger and acquisition activity during the same period. This is of value to both researchers and practitioners as the cyclical nature of the hotel real estate industry and hotel stock and REIT performance will continue to result in future boom and bust cycles. One need only fast forward to October of 2008, 12 months from the last completed merger in this study, to see a decline in the average lodging stock of more than 70% from the peak levels of October 2007.

This is the first study to review abnormal trading volume data for hotel stocks subject to mergers and acquisitions and clearly identifies that there were not unexplained abnormal
volume trends in the period prior the merger announcement date. It was expected that there might be significant abnormal stock behavior in the period surrounding merger and acquisition transactions in hotel stocks between 2004 and 2007. This expectation was based, in part, on evidence from other industries that there is often a significant increase in price and volume in the period prior to announcements of merger and acquisition transactions. There was no reason to think that this would not be true within the hotel industry, perhaps even more so given the comparatively small community of industry leaders, investment bankers, and industry publications. Most of these previous studies have been inconclusive as to whether the source of the abnormal trading was related to illegal insider trading or other market factors including arbitrageurs and general investor accumulation based on prior and current transactions.

This study did not find meaningful statistical differences in abnormal return in the period prior to the merger announcement date for hotel stocks. This is consistent with the findings of Oak and Andrew (2006), who did not identify informed trading prior to hospitality acquisitions, although their study was focused on an analysis of bid–ask spreads rather than abnormal return.

The lack of statistically significant abnormal returns in the 20 trading days before the merger announcement and the identification of statistically significant abnormal returns in the 20 days including and after the merger announcement date generally confirms the findings of Kwansa (1994) and Canina (2001). The synchronized data are particularly noteworthy as they identified an abnormal return only on the merger announcement date (Day 0) as being statistically significant with an abnormal return of 0.55% on Day –1, 15.8% on Day 0, and –0.02% on Day +1. This is somewhat different than the findings in previous
studies in which Kwansa (1994) found abnormal returns averaging 3.8\% on Day –2, 9.7\% on Day –1, 5.8\% on Day 0, and 5.5\% on Day +1. The results in the present study were more similar to the Canina (2001) study in which abnormal returns averaged 0.65\% on Day –1, 8.9\% on Day 0, and 1.3\% on Day +1. One could observe that, as the availability of information has become more prevalent, trading becomes more concentrated on the actual date of the merger announcement rather than on days surrounding it. In part, this is likely due to the prominence of institutional investors, whose involvement in financial markets have generally made prices more efficient both in the overall market (Boehmer & Kelley, 2009) as well as in the hospitality industry (Oak & Dalbor, 2008).

The data in this study are also of value to individual investors, company management, hedge funds, and hotel stock analysts who can use this data and event study methodology to better understand the nature of information flow surrounding merger and acquisition events and understand that it is unlikely that an indicator of preannouncement trading will be found. In conclusion, the abnormal returns observed on the merger announcement date are statistically significant but merely represent the market’s reaction to a known price agreed to as part of a proposed merger or acquisition.

3.8 Acknowledgement

The author 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.
3.9 References


CHAPTER 4. ABNORMAL STOCK RETURN AND VOLUME ACTIVITY SURROUNDING CEO TRANSITION ANNOUNCEMENTS FOR LODGING COMPANIES

Modified from a paper presented at the International Council of Hospitality, Restaurant, & Institutional Educators 2010 Conference

Barry A.N. Bloom

4.1 Abstract

This study investigated whether or not there were abnormal stock market returns and volume activity for lodging stocks in the periods surrounding the announcement of chief executive officer (CEO) transitions for these companies from 2003 to 2009. The study found that there were statistically significant negative abnormal returns in the periods prior to and after the announcement of a CEO transition. Statistically significant abnormal volume was identified in the period after the announcement of a CEO transition. This is the first study in the hospitality industry to investigate abnormal stock returns related to senior management transitions.

4.2 Introduction

The chief executive officer (CEO) is generally the most senior management position in a company, responsible for achieving a corporations’ goals and objectives and often the only employee that reports directly to the Board of Directors (Bureau of Labor Statistics, 2007). More simply put, as the most senior leader in an organization, the CEO’s singular job is to get results (Goleman, 2000).

As a result, the CEO is often held responsible for not only getting results in the short-term, but also for the long-term health and prosperity of an organization over the long term. Firm performance is among the most studied areas of finance, with financial performance of
the firm being linked to a variety of factors including customer satisfaction, corporate
diversification, market orientation, and human resource management effectiveness among
others. Researchers have also attempted to establish a link between CEO turnover and
financial performance of the firm (Brickley, 2003; Furtado & Karan, 1990; Khurana &

In addition to the relationship between CEO turnover and financial performance,
researchers have also attempted to understand the relationship between CEO turnover and
stock performance and how shareholders react to CEO changes (Beatty & Zajac, 1987;
Clayton, Hartzell, & Rosenberg, 2005; Coughlan & Schmidt, 1985; Lubatkin, Chung,
Rogers, & Owens, 1989). Previous studies have identified that lodging stocks perform
differently than other investments (Quan, Li, & Sehgal, 2002) and may be undervalued
relative to other stock investments (Lee & Upneja, 2007) and that lodging Real Estate
Investment Trusts (REITs) generally underperform relative to other REITs (Jackson, 2009).
As a result, the study of various conditions that may impact the performance of lodging
stocks is warranted. The purpose of this study was to investigate whether or not there are
abnormal stock market returns for lodging stocks in the periods surrounding the
announcement of CEO transitions for these companies. Using event study methodology, this
is the first study in the hospitality industry to investigate firm performance and abnormal
stock returns related to senior management transitions. As a result, it should be of significant
interest to both academics and industry practitioners.
4.3 Literature Review

4.3.1 Function and the Leadership Role of the CEO

Some of the best discussions regarding the function and leadership role as it relates to the job function of the CEO have come from the popular business press rather than academic journals. Goleman (2000) identified six unique leadership styles, each based on his earlier work on emotional intelligence (Goleman, 1995), that are essential for executive and CEO success. The six leadership styles are coercive, authoritative, affiliative, democratic, pacesetting, and coaching (Goleman, 2000). According to Goleman (2000), the most effective leaders are able to use a multitude of these six leadership styles depending on the situation and the desired outcome of a certain situation.

Lafley (2009), the long-time CEO of Procter & Gamble, recently revisited the role of the CEO and defined it as being the only role in the company that focuses on the broad view of the company at the enterprise level and that is both internally and externally focused. As a result, the CEO is uniquely qualified to identify opportunities that are hidden to other actors within the company (Lafley, 2009). Lafley (2009) recently argued that the biggest challenge for the CEO is resisting becoming involved in job functions that are unique to the CEO and goes on to identify four fundamental tasks of the CEO: (a) interpret the outside world for the insiders in the company; (b) identify which business segments in which the company should, and should not, participate; (c) balance income in the present with necessary investment for the future; and (d) shape the values and culture of the organization.

Authors in academic journals have explored a variety of topics related to the CEO and his or her role in leading the organization. Much of this literature is rooted in the field of psychology. Early research in the 1970s suggested that leadership did not play a strong role
in organization performance, but recent research has focused on the relationship between the CEOs and their top management team (TMR; Peterson, Martorana, Smith, & Owens, 2003).

Very little has been studied specifically regarding the CEOs of hospitality companies. Muller and Inman (1996) conducted a survey resulting in some understanding regarding the characteristics and behavior of top chain-restaurant CEOs as the study focused solely on these measures rather than on compensation or company performance. They found that the pool of senior-level restaurant company executives was very shallow and that succession planning was notably lacking. Muller & Inman (1996) found that the most commonly shared characteristics among restaurant CEOs were (a) a reliance on a short-term planning horizon, (b) an entrepreneurial rather than hierarchal management style, and (c) an operations and/or field based perspective of the business. In describing themselves, the CEOs viewed themselves as “active, democratic, take-charge types who delegate responsibility” (Muller & Inman, 1996, p. 68). It is important to note, however, that although the study was conducted in the restaurant industry, it is probable that lodging CEOs might exhibit very different characteristics and behavior.

### 4.3.2 CEO Turnover and Firm Performance

An understanding of function and role of the CEO is important in order to set the stage regarding the impact that CEO change can have on firm performance. Firm performance is generally defined by specific accounting measures such as return on assets, return on equity, and profit margins. The earliest work done in this area was conducted by Osborn et al. (1981), who summarized the succession-related literature and confirmed through their own work that succession is a result of poor performance and that succession is
an organizational response to environmental volatility while calling for the development of a
theory of succession.

Furtado and Karan (1990) conducted a meta-analysis of much of the work done to-
date in this area and further confirmed that weak firm performance, bankruptcy, and the
origin of the successor were related to management transitions, but noted that there were only
a few studies of consequences of turnover in firms and their results were inconclusive.
Puffer and Weintrop (1991) furthered Furtado and Karan’s (1990) work with the contention
that the inconclusive findings may have been the result of insufficient attention being paid to
the performance indicators by the boards of directors who are generally responsible for CEO
turnover decisions. They found that the negative relationship between CEO turnover and
corporate performance grew stronger when the performance measures utilized reflected the
boards of directors’ expectations.

Research in this area was advanced considerably by Murphy and Zimmerman (1993)
who documented the behavior of a wide variety of financial variables surrounding CEO
departures in an effort to estimate which changes were caused by poor economic
performance rather than managerial oversight. They found little support for the hypothesis
that outgoing CEOs make efforts to increase earnings prior to their departure in order to
enhance their earnings-based compensation but did find that incoming CEOs do tend to
oversee substantial writeoffs in their first fiscal year.

There have not been any studies in the hospitality industry linking CEO turnover and
firm performance, but recent work has explored the relationship between CEO compensation
and firm performance (Madanoglu & Karadag, 2008), finding that there is a positive
relationship between stock returns and changes in CEO cash compensation. The present
study did not explore the other significant factors highlighted within this paper, namely the impact of CEO transition.

4.3.3 CEO Turnover and Stock Performance

Having established the impact of CEO transition on firm performance it is now relevant to transition to the financial measurement that most directly impacts shareholder value, i.e., stock price. Among other factors related to CEO turnover, Coughlan and Schmidt (1985) explored the relationship between frequency of CEO turnover and past stock price performance, finding that stock price performance and the probability of a change in CEO are inversely related, indicating that poor stock performance may be a predictor of CEO transition. This study appropriately set the background for the many studies that followed, which studied the impact of CEO turnover on stock performance.

Beatty and Zajac (1987) summarized the then-extant succession research and differentiated between the stream of research that examined the effects of leadership succession and the stream that analyzed leadership effects. Their study was an early effort to examine the incremental information content of a CEO succession announcement under the assumption that, if CEO transitions are anticipated, there should be no change in stock price upon announcement of a CEO change. Beatty & Zajac (1987) found that there was not a statistically significant difference in trading patterns for the period in advance of an announcement or on the day of an announcement, but they did find statistically significant changes in the stock trading activity of firms in the post-announcement period. These changes occurred particularly in the 2 days after the announcement of a CEO transition as determined using classic event study methodology (Beatty & Zajac, 1987).
At almost the same time, Warner, Watts, and Wruck (1988) also were studying the same phenomenon. Although focused on top management changes, but not exclusively CEO changes, this study is relevant as it both developed a logit regression model to determine management changes could be predicted using financial data and conducted an event study to determine if there were abnormal returns surrounding the announcement of a top management change. This study found little evidence of abnormal returns, but it is noted that there was some evidence of post-announcement stock price drop, although these were not concentrated in the 1 to 4 days immediately surrounding top management announcements (Warner et al., 1988).

Shortly thereafter, Lubatkin et al. (1989) studied CEO change specifically and utilized a variety of different time periods ranging from 50 days prior to an announcement to 300 days after an announcement, although they used a multiple regression model to determine investor expectations of earnings rather than pure excess price change relative to a market index. Most relevant to this study, they found that in the 51 days prior to the announcement there was a positive performance effect, in the day prior to and including the announcement there was no performance effect, and in the 50 days after the announcement there was a negative performance effect.

Denis and Denis (1995) found significant negative cumulative abnormal returns over the 250 days preceding a turnover announcement, far greater than any other researchers had found, but did not find statistically significant abnormal returns on either the day of or the day prior to the turnover announcement date. They found that forced resignations exhibited significantly higher levels of negative abnormal return than did normal retirements but, surprisingly, found that the variance was higher for non-top management changes than for
top executive changes, furthering their hypothesis that changes in operating income are the primary driver of senior management turnover (Denis & Denis, 1995).

Clayton et al. (2005) took a slightly different approach than had been taken previously, looking at the impact of CEO turnover on equity volatility. Using typical turnover classifications, their study used a volatility event study methodology, which uses the log ratio of post-event to pre-event standard deviations. Their study found that volatility increases significantly in the first year following turnovers of any type, with the highest volatility found in the first year following forced turnovers, providing an interesting advancement in the literature (Clayton et al., 2005).

4.3.4 Hypotheses

The literature review identified several interesting studies from which further testing can be derived and applied to the lodging industry. The literature review identified no literature in hospitality regarding either firm performance or excess stock return as related to top management transition, specifically CEO transition. Previous research has identified that lodging stocks may perform differently than other investments and other types of stocks, which makes this an interesting research question (Jackson, 2009; Lee & Upneja, 2007; Quan et al., 2002). The extant literature indicates the opportunity to apply a quantitative methodology to investigate an interesting human resource challenge; specifically, given the importance of the CEO to the organization, are there abnormal stock market returns for lodging stocks in the period surrounding the announcement of a CEO transition?

Lubatkin et al. (1989) provided lengthy commentary regarding the relevant horizon lengths that can be utilized to measure the impact of CEO transitions on organizations, noting that although the typical 2-day announcement period prevalent in the literature may be
relevant, the impact of CEO transition on stock price can and should be measured across a
variety of periods.

Based on the methodologies applied in other studies and in consideration of the
methodology that follows, the following hypotheses were proposed:

\( H_1 \): Cumulative abnormal price return (compared to the CRSP Value-Weighted
Index) for companies that announced chief executive officer transitions will be
greater than zero for the 30 trading days prior to the announcement date.

\( H_2 \): Daily abnormal price return (compared to the CRSP Value-Weighted Index) for
companies that announced chief executive officer transitions will be greater than
zero for the 5 days prior to, the day of, and the 5 days after the announcement
date.

\( H_3 \): Cumulative abnormal price return (compared to the CRSP Value-Weighted
Index) for companies that announced chief executive officer transitions will be
greater than zero for the 10 days after the announcement date.

\( H_4 \): Daily abnormal log-transformed trading volume (compared to the CRPS Value-
weighted log-transformed volume index) for companies that merged will be
greater than zero for the 30 trading days prior to the announcement date.

\( H_5 \): Daily abnormal log-transformed trading volume (compared to the CRPS Value-
Weighted log-transformed volume index) for companies that merged will be
greater than zero for the 5 days prior to, the day of, and the 5 days after the
announcement date.
H$_6$: Daily abnormal log-transformed trading volume (compared to the CRPS Value-Weighted log-transformed volume index) for companies that merged will be greater than zero for the 10 days after the announcement date.

4.4 Research Methodology

4.4.1 Data Collection

A typical event study approach was used to determine whether the announcement of a CEO transition resulted in abnormal returns for the periods prior to, surrounding, and after an announcement. Information regarding the announcement date of CEO transition announcement dates was researched using a variety of sources including *The Wall Street Journal* and company websites, and all dates were confirmed in 8-K filings with the Securities and Exchange Commission. Data were analyzed for 27 events working backward from December 31, 2009 so that a sufficient dataset was obtained. This ultimately covered a period from March 3, 2003 to September 14, 2009.

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. 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 Composite Index. However, when the events are related to stocks that are traded on a variety of stock exchanges, it is

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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.

4.4.2 Traditional Event Study Statistical Methods

Event studies utilizing a market model residual method with daily stock data are well documented (Brown & Warner, 1985). The event study procedure typically used calculates abnormal returns for an event-time portfolio. Each security in the sample is regressed for a time series of daily returns against the yields from a market index using the equation:

$$ R_t = \alpha + \beta RM_t + e_t, $$

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). Inherent in the market model is an assumption that $e_t$ is unrelated to the overall market and has an expected value of zero. The estimates of the 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 are then typically 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:

$$ Z_p = \frac{1}{\sqrt{m}} \sum_{j=1}^{m} \frac{A_{j,o}}{\sqrt{\text{Var}(A_{j,o})}} $$

One of the challenges in utilizing OLS regression for daily stock data is that there is an underlying assumption that the excess return data are normally distributed and cross-sectionally independent. The most commonly used statistical test in event studies, the Patell Z-test, a parametric, standardized abnormal return test, utilizes such an assumption (Patell, 1976).

### 4.4.3 Addressing the Issue of Non-Normality in the Data

It has long been recognized that daily stock data are not normally distributed (Fama, 1965; Mandelbrot, 1963; Officer, 1972), and as a result, care must be taken in analyzing event study results that assume that the data are normally distributed. 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.
The most popular approach to addressing non-normality of the data can be provided by nonparametric tests, specifically the sign test and the rank test (J. Y. 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 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. There are few, if any, potential shortcomings to using nonparametric tests, particularly given that nonparametric tests are typically not used in isolation but, rather, in conjunction with parametric tests so that each can provide a check on the robustness of conclusions as compared to the other (J. Y. Campbell et al., 1997)

4.4.4 Addressing the Issue of Cross-Sectional Dependence in the Data

Another challenge in utilizing OLS regression for daily stock data is that there is an underlying assumption that the data are cross-sectionally independent. Again, the most commonly used test statistic in event studies, the Patell Z-test, a parametric, standardized abnormal return test, utilizes this assumption as well (Patell, 1976). Cross-sectional
dependence is particularly likely when at least some of the returns used in an event study are correlated due to common macroeconomic or industry-specific activity or due to a single or clustered event date (Prabhala, 1997). Cross-sectional dependence inflates test statistics because the number of sample firms overstates the number of independent observations (Lyon, Barber, & Tsai, 1999). The most common cases for this issue occur when the event being analyzed occurs on the same date for all firms (such as a regulatory event or market shock), but it can be an issue anytime that at least some of the returns are sampled from common time periods (Bernard, 1987). The challenge of cross-sectional dependence is exacerbated when a common event is tested in a single industry, as in this study (Strong, 1992).

There is a significant body of literature that has developed around potential solutions to address cross-sectional dependence in the data with few conclusions regarding the best method or even whether cross-sectional dependence needs to be addressed at all. Beaver (1968) found that an increase in the cross-sectional dispersion of abnormal returns at the time of an event announcement implies that the announcement conveyed information and 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 and that the mean abnormal return in a cross-section of securities comes closer to normality as the number of securities in the sample is increased.
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. Their recommended method utilizes the calculation of calendar-time
portfolio abnormal returns, which may be either equally weighted or value weighted. In this
method, calendar-time abnormal returns are calculated for sample firms and then a $t$-statistic
is derived from the time-series of the monthly calendar-time portfolio abnormal returns. The
advantage of this approach is that it eliminates the issue of cross-sectional dependence
among sample firms. The disadvantage of this approach is that it provides an abnormal
return measure that does not precisely measure the actual experience of investors over the
specified time period.

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. As a result, it is proposed below that a number of
different tests be conducted and results compared for future event studies conducted with
hospitality stocks.
4.4.5 Additional Statistical Methods Applied

In addition to the commonly used Patell test, the present study also performed two additional parametric tests. The first additional parametric test is a standardized cross-sectional test developed by Boehmer et al. (1991) that compensates for possible variance increases on the event date itself by incorporating a cross-sectional variance adjustment. The second additional parametric test applied in this study is a time-series standard deviation test also known as the crude dependence adjustment (CDA) indicated by Brown and Warner (1980, 1985). This test computes the standard from the time series of portfolio mean abnormal returns during the estimation period.

Two nonparametric tests were also performed on the data. The first nonparametric test is 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). The second nonparametric test is the rank test, in which each firm’s abnormal return is ranked over the combined period, including both the estimation and event windows, and then compared with the expected average rank under the null hypothesis of no abnormal return (Corrado, 1989).

Although event studies are most commonly conducted using abnormal returns related to stock price, they can also be conducted using volume data. Abnormal trading volume is generally calculated using the log-transformed percentage of shares outstanding for each security as compared with an estimated market model abnormal trading volume (Ajinkya & Jain, 1989; Biktimirov, Cowan, & Jordan, 2004; Cready & Ramanan, 1991). As with price event studies, both parametric and nonparametric tests are indicated and the same tests
utilized for abnormal price returns were used for the abnormal volume returns (C. Campbell & Wasley, 1996).

As indicated in the hypotheses, cumulative abnormal return was calculated for the 30 days prior to and following the CEO transition announcement date and daily abnormal return was analyzed for the 10 trading days prior to, the day of, and the 10 trading days following the CEO transition announcement date.

4.5 Study Results and Data Analysis

The research objective was to determine whether or not there are abnormal stock market returns for lodging stocks in the periods surrounding the announcement of CEO transitions as measured by abnormal stock return as compared to a market model based on the CRSP Value-Weighted index. The results of each hypothesis proposed follow.

4.5.1 Hypothesis 1

A summary of the results for each daily return is found in Table 4.1. The study identified negative daily abnormal returns compared to the daily CRSP Value-Weighted index return of –7.60% for the 30 trading days preceding the announcement date (Table 4.2). These returns were statistically significant at the .01 level for all tests conducted, including the Patell, CDA, standardized cross-sectional, generalized sign, and calendar-time tests and at the .05 level for the rank test, as noted in Table 4.2.

This result is indicative of potential challenges at the subject firms that may have led to a CEO transition. These could include general dissatisfaction with management, poor earnings announcements, or advance knowledge of a CEO transition. This information could be considered as a potential indicator of potential CEO transition and further degradation of stock performance that might be of use to industry analysts and investors.
Table 4.1

Daily Mean Abnormal Returns and Test Statistics for CEO Change Announcements (N = 27)

<table>
<thead>
<tr>
<th>Day</th>
<th>Mean abnormal relative volume %</th>
<th>Patell Z</th>
<th>Portfolio time-series (CDA) t</th>
<th>StdCsect Z</th>
<th>Sign positive: negative</th>
<th>Rank test Z</th>
<th>Calendar time t</th>
</tr>
</thead>
<tbody>
<tr>
<td>−30</td>
<td>−0.07</td>
<td>0.571</td>
<td>−0.138</td>
<td>0.417</td>
<td>12:15</td>
<td>−0.228</td>
<td>0.417</td>
</tr>
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<td>−29</td>
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<td>−0.043</td>
<td>−0.125</td>
<td>16:11</td>
<td>0.613</td>
<td>−0.125</td>
</tr>
<tr>
<td>−28</td>
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<td>−0.112</td>
<td>0.014</td>
<td>14:13</td>
<td>−0.011</td>
<td>0.014</td>
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<tr>
<td>−27</td>
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<td>−0.022</td>
<td>−1.335</td>
<td>−0.014</td>
<td>14:13</td>
<td>0.038</td>
<td>−0.014</td>
</tr>
<tr>
<td>−26</td>
<td>−1.55</td>
<td>−3.530***</td>
<td>−3.248***</td>
<td>−3.372***</td>
<td>6:21&lt;&lt;</td>
<td>−2.801**</td>
<td>−2.750</td>
</tr>
<tr>
<td>−25</td>
<td>0.12</td>
<td>−0.277</td>
<td>0.252</td>
<td>−0.256</td>
<td>16:11</td>
<td>0.106</td>
<td>−0.256</td>
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<tr>
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<td>−0.222</td>
<td>−0.262</td>
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<td>0.293</td>
<td>0.304</td>
</tr>
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<td>−0.629</td>
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<td>0.161</td>
<td>−0.881</td>
</tr>
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<td>−2.398**</td>
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<td>−1.470</td>
<td>−1.505</td>
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<td>−1.201</td>
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<td>−0.371</td>
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<td>0.250</td>
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<td>−0.645</td>
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<td>−1.786*</td>
<td>−1.764*</td>
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<td>1.314</td>
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<td>−1.003</td>
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<td>15:12</td>
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<td>1.034</td>
</tr>
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<td>−1.61</td>
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<td>−3.732***</td>
<td>−2.397**</td>
<td>9:18</td>
<td>−2.432**</td>
<td>−2.397*</td>
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<td>−2.644**</td>
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<td>1.299</td>
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<td>0.371</td>
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<td>−0.024</td>
<td>−0.958</td>
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<td>0.592</td>
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<td>0.450</td>
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<td>−2.962**</td>
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<td>−0.522</td>
</tr>
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<td>8</td>
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<td>−2.782**</td>
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<td>−2.099*</td>
<td>−2.005*</td>
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<td>−0.310</td>
<td>−0.167</td>
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<tr>
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<td>0.032</td>
<td>0.138</td>
<td>0.031</td>
<td>13:14</td>
<td>0.433</td>
<td>0.031</td>
</tr>
</tbody>
</table>

*a* < denotes *p < .05; << denotes *p < .01, where the direction of the symbols designates the direction of the test.

* p < .05. ** p < .01. *** p < .001.
Table 4.2

*Daily Mean Abnormal Returns and Test Statistics for CEO Change Announcements (N = 27)*

<table>
<thead>
<tr>
<th>Day</th>
<th>Mean CAAR %</th>
<th>Precision weighted CAAR %</th>
<th>Mean CT portfolio cumulative CAAR %</th>
<th>Patell time-series (CDA) Z</th>
<th>StdCsect Z</th>
<th>Sign positive: negative</th>
<th>Rank test Z</th>
<th>Calendar time t</th>
</tr>
</thead>
<tbody>
<tr>
<td>(-5,+5)</td>
<td>-2.44</td>
<td>-2.43</td>
<td>-2.44</td>
<td>-1.829*</td>
<td>-1.544</td>
<td>-1.067</td>
<td>13:14</td>
<td>-0.715</td>
</tr>
<tr>
<td>(+1,+10)</td>
<td>-4.75</td>
<td>-4.01</td>
<td>-4.75</td>
<td>-3.164***</td>
<td>-3.157***</td>
<td>-1.768*</td>
<td>12:15</td>
<td>-1.817*</td>
</tr>
</tbody>
</table>

*a<< denotes p < .01, where the direction of the symbols designates the direction of the test.*

*p < .05. **p < .01. ***p < .001.*

4.5.2 Hypothesis 2

The study also identified negative daily abnormal returns compared to the daily CRSP Value-Weighted index return of –2.44% for the 11 days (5 ante, the announcement date itself and 5 post) including and immediately surrounding the CEO transition announcement (Table 4.2). However, this relationship was only statistically significant at the .05 level for the Patell test. Using data that are both ante- and post-transition announcement in the same analysis is helpful as this accounts for both potential information leakage as well as the inability to reconcile the precise timing of a CEO transition announcement that could impact the day prior to, the day of, or the day after an announcement is made depending on the specific time at which an announcement was made. Based on the literature review, it is not particularly surprising that the overall announcement of a CEO transition is generally viewed as a negative event by the market.

4.5.3 Hypothesis 3

Most importantly, the study identified negative daily abnormal returns compared to the daily CRSP Value-Weighted Index return of –4.75% for the 10 days following the CEO
transition announcement and this relationship is statistically significant at the .001 level for the Patell and CDA tests (Table 4.2). The significance of this result is confirmed at the .05 level of significance for the standardized cross-sectional, rank, and calendar time tests but not confirmed by the generalized sign test. The level of negative returns is unusually strong and it is noted that the negative returns are persistent on most trading days following the announcement and that one of the least negative abnormal returns is on the announcement day itself. This data clearly indicate that, overall, the announcement of a CEO transition is generally viewed as a negative event by the market and that there may be significant trading opportunities that can be exploited using publicly available information.

4.5.4 Hypothesis 4

A summary of the results for each daily return is found in Table 4.3. The study identified cumulative abnormal volume (compared to the CRSP Value-Weighted index) for days –30 to –1 of –21.4% (Table 4.4). This volume decrease is very close to zero on an average daily basis and is not statistically significant at the .05 level in any of the tests conducted. Although price movement was negatively abnormal during this period, trading volume did not bear out any likelihood that investors had advance information or particular knowledge of a CEO transition announcement.

4.5.5 Hypothesis 5

The study identified cumulative abnormal volume (compared to the CRSP Value-Weighted index) of 166% for the 11 days (5 ante, the announcement date itself, and 5 post) including and immediately surrounding the CEO transition announcement; this return is statistically significant at the .001 level for the Patell test, statistically significant at the .01 level for the CDA and rank tests, and statistically significant at the .05 level for the
### Table 4.3

**Daily Mean Abnormal Relative Volume and Test Statistics for CEO Change Announcements**  
(N = 27)

<table>
<thead>
<tr>
<th>Day</th>
<th>Mean abnormal relative volume (%)</th>
<th>Patell Z</th>
<th>Portfolio time–series (CDA) t</th>
<th>StdCsect Z</th>
<th>Sign positive: negative</th>
<th>Rank test Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>−30</td>
<td>26.51</td>
<td>1.577</td>
<td>1.682*</td>
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*a* > denotes $p < .05$; *>>* denotes $p < .01$, where the direction of the symbols designates the direction of the test.

* $p < .05$. ** $p < .01$. *** $p < .001$. **
Table 4.4

Mean Cumulative Abnormal Relative Volume and Test Statistics for CEO Change Announcements (N = 27)

<table>
<thead>
<tr>
<th>Day</th>
<th>Mean cumulative abnormal relative volume</th>
<th>Precision Weighted CAARV</th>
<th>Portfolio time–series (CDA)</th>
<th>Sign positive: negative</th>
<th>Rank test Z</th>
</tr>
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<tbody>
<tr>
<td>(–30,–1)</td>
<td>–21.41%</td>
<td>–6.91%</td>
<td>–0.203</td>
<td>–0.248</td>
<td>–0.071</td>
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<td>(–5,+5)</td>
<td>166.32%</td>
<td>141.71%</td>
<td>3.899***</td>
<td>3.181***</td>
<td>1.713*</td>
</tr>
<tr>
<td>(+1,+10)</td>
<td>171.45%</td>
<td>167.57%</td>
<td>4.891***</td>
<td>3.440***</td>
<td>2.035*</td>
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</table>

*p < .05, **p < .01, ***p < .001.

It is interesting to note that abnormal volume was statistically significant at the .01 level on the announcement date for all tests except the generalized sign test and statistically significant at the .001 level on day +1 for all tests with the exception of the generalized sign test, for which it was statistically significant at the .01 level. This volume likely represents trading by market participants who viewed uncertainty in the announcement of a CEO transition and who were not interested in remaining invested in the stock at that point. Based on the continued abnormal volume on day +1, it appears that market participants may wait until they have obtained more information before trading the stock.

4.5.6 Hypothesis 6

The study identified cumulative abnormal volume (compared to the CRSP Value-Weighted index) of 171%, representing a daily average of 17%, for days +1 to +10. This volume increase is statistically significant at the .001 level for the Patell, CDA, and rank tests and statistically significant at the .05 level for the standardized cross-sectional test but not
statistically significant for the generalized sign test. A review of each daily return is found in Table 4.4, which shows that average abnormal relative volume is positive but not statistically significant for most of the individual days observed. Abnormal volume in the period after a CEO transition announcement is typically provided by market participants who may wish to exit a stock as they believe that the uncertainty may increase the volatility of the stock price.

4.6 Limitations and Suggestions for Future Research

Limitations on this research are that, as in any event study, the determination of the lengths of the ante- and post-event periods used in measuring returns may not be optimal. As a result, future researchers may wish to experiment with differing lengths of time to determine if any particular periods differed in their return profile. The study was somewhat limited by challenges in identifying whether CEO transition announcement dates were made before or after market hours, which would have some impact on the specific days immediately surrounding the CEO transition announcement date. In order to eliminate this impact, more inclusionary dates were utilized in this study.

It is likely that certain individual company CEO transitions had statistically significant abnormal returns based on the circumstances that led to the announcement of a CEO transition, and this is an area for further research. It would be interesting to compare the returns of companies in which a CEO departure announcement was made simultaneously with an announcement of a new CEO as compared to when a new CEO was not announced simultaneously. This would likely identify CEOs who resigned as part of a succession plan as opposed to those who either resigned voluntarily or were asked by the company to resign. As with many hospitality studies, there is also the opportunity to extend this study to other hospitality industries including the restaurant, gaming, and cruise industries.
4.7 Conclusions

Given the importance of the CEO position to the overall organization in terms of leadership and strategic direction, it was anticipated that the announcement of a CEO transition would have impact on companies’ stock prices, although there was no particular reason to believe that it would identify findings that were different than those of previous studies. As summarized in the literature review, in general there are persistent, but not statistically significant, abnormal returns in the periods prior to and following announcements of CEO transitions. No studies were identified that researched this topic within a specific industry, however it appears that CEO transitions in the lodging industry differ somewhat from the overall market, perhaps due to its small size and relatively insular nature, generally confirming the findings of previous researchers that lodging stocks do differ from the market in their performance characteristics.

The results of the study indicate that there is readily available information that could be utilized by both industry analysts and investors to achieve enhanced returns for their portfolios in the periods surrounding lodging CEO transition announcements. The significant negative abnormal return experienced by lodging companies following CEO transition announcements is pronounced and in excess of that found in similar cross-industry studies. Specifically, the 10 trading days following the announcement of CEO transitions resulted in a cumulative negative return of 4.8% as compared to the CRSP Value-Weighted index. A savvy trader could sell short the lodging stock that made the announcement and potentially achieve a significant level of return over a very short period of time.
4.8 Acknowledgment

The author 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.

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CHAPTER 5. THE IMPACT OF THE ANNOUNCEMENT OF WEEKLY LODGING REVPAR ON LODGING STOCK PERFORMANCE

A paper prepared for submission to the Journal of Hospitality & Tourism Research

Barry A.N. Bloom

5.1 Abstract

This study investigated whether or not there were abnormal stock market returns on the announcement date of weekly RevPAR (revenue per available room) data by the lodging industry research firm STR. The study found that there were not statistically significant abnormal returns on the weekly RevPAR announcement date (typically Wednesdays) for the period from 2004 to 2009. The study also developed a fixed effects regression model for predicting abnormal stock returns using weekly RevPAR, but the model was not found to be statistically significant.

5.2 Introduction

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 had a measurable impact on lodging stock performance. 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.

Because the data produced by STR are so robust and cover the entire U.S. lodging market, there may also 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 may have access to information, which may lead them to believe that they have advance knowledge of the direction and magnitude of the weekly RevPAR announcement.

5.3 Literature Review

Although RevPAR is a commonly utilized measure by lodging practitioners, there have been few references to RevPAR in the academic literature and no researchers have worked with weekly RevPAR data in conducting analyses.

5.3.1 Definition of Revenue per Available Room (RevPAR)

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. Utilizing the RevPAR method, room revenue from hotel to hotel can be compared on an equal basis.

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. Alternatively, RevPAR can be calculated mathematically by multiplying the occupancy rate of a hotel (rooms occupied divided by rooms available) by the average daily room (ADR) rate. These two measures are mathematically equivalent. It is noted, however, that there are inconsistencies in the identification of the definition of RevPAR and application of practices across the lodging industry.

The most widely accepted definition of RevPAR, and that utilized in the remainder of this paper, is used in industry-wide reporting by STR, which defines RevPAR as follows:

Revenue per Available Room (RevPAR) is the total guest room revenue divided by the total number of available rooms. RevPAR differs from ADR because RevPAR is affected by the amount of unoccupied available rooms, whereas ADR shows only the average rate of rooms actually sold. Occupancy x ADR = RevPAR. (STR Global, n.d.)
5.3.2 RevPAR in the Lodging Literature

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. J. Brown and Dev (1999) indicated that RevPAR suffers from two major limitations: (a) it fails to include revenue from other departments and from food and beverage, and (b) it does not take into consideration additional cost incurred to provide special services. 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. However, they identified that RevPAR is not a perfect proxy for market return. Their study analyzed 167 monthly RevPAR observations supplied by Smith Travel Research (now STR) for the United States from January 1987 through November 2000 and developed indices of percentage changes in RevPAR for each of 10 defined price and location segments.

Utilizing regression analysis, Ismail et al. (2002) found that high-price segments exhibited greater variation in RevPAR than did low-price segments and that volatility was ordered from luxury as the highest volatility segment to budget as the lowest volatility
segment. They did not find a similar relationship among property location types such as urban, suburban, resort, and airport-located properties, as they could not determine what impact higher and lower prices in these various locations had on the outcome.

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 night rooms from 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 (2010) studied whether the stock market actually cares about RevPAR, using a case study of five large U.S. lodging chains. The purpose of the study was to compare 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 and the authors
suggested that RevPAR may not be of the importance implied by other lodging researchers. The authors suggested that practitioners and analysts should consider the validity of RevPAR as a performance measure and consider the adoption or development of alternative industry-specific measurements such as profit-related measures.

5.3.3 Hypotheses

The literature review did not identify any studies that were substantially similar to the present study. This study neither accepted nor rejected RevPAR as the most appropriate measure of lodging performance. However, it is acknowledged that RevPAR is widely used to report on the overall health of the industry and is followed by both industry practitioners and market participants. 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 of lodging stocks.

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 hypotheses were proposed:

\[ H_1: \] Abnormal price return (compared to the CRSP Value-Weighted Index) for all lodging stocks on the weekly RevPAR announcement date will be greater than zero.
H₂: Using a fixed effects regression model, abnormal returns can be predicted based on the STR weekly RevPAR data and will be statistically significant at the .01 level.

5.4 Research Methodology

5.4.1 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 Chicago⁴. 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

⁴ ©200912 CRSP®, Center for Research in Security Prices. Graduate School of Business, The University of Chicago (www.crsp.chicagogsb.edu). Used with permission. All rights reserved.
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.

5.4.2 Traditional Event Study Statistical Methods

Event studies utilizing a market model residual method with daily stock data are well documented (S. J. Brown & Warner, 1985). The event study procedure typically used calculates abnormal returns for an event-time portfolio. Each security in the sample is regressed for a time series of daily returns against the yields from a market index using the equation:

\[ R_t = \alpha + \beta R_M + \epsilon_t, \]

where \( R_t \) denotes the return on the security for time period \( t \), \( R_M \) denotes the return on a market index for period \( t \), and \( \epsilon_t \) represents a firm-specific return (Lintner, 1965; Sharpe, 1963, 1964). Inherent in the market model is an assumption that \( \epsilon_t \) is unrelated to the overall market and has an expected value of zero. The estimates of the 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 are then typically 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:

\[
Z_P = \frac{1}{\sqrt{m}} \sum \frac{A_{j,0}}{\sqrt{Var(A_{j,0})}}
\]

One of the challenges in utilizing OLS regression for daily stock data is that there is an underlying assumption that the excess return data are normally distributed and cross-sectionally independent. The most commonly used statistical test in event studies, the Patell Z-test, a parametric, standardized abnormal return test, utilizes such an assumption (Patell, 1976).

5.4.3 Addressing the Issue of Non-Normality in the Data

It has long been recognized that daily stock data are not normally distributed (Fama, 1965; Mandelbrot, 1963; Officer, 1972), and as a result, care must be taken in analyzing event study results that assume that the data are normally distributed. Although S. J. 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.

The most popular approach to addressing non-normality of the data can be provided by nonparametric tests, specifically 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. There are few, if any, potential shortcomings to using nonparametric tests, particularly given that nonparametric tests are typically not used in isolation but, rather, in conjunction with parametric tests so that each can provide a check on the robustness of conclusions as compared to the other (Campbell et al., 1997).

5.4.4 Addressing the Issue of Cross-Sectional Dependence in the Data

Another challenge in utilizing OLS regression for daily stock data is that there is an underlying assumption that the data are cross-sectionally independent. Again, the most
commonly used test statistic in event studies, the Patell Z-test, a parametric, standardized abnormal return test, utilizes this assumption as well (Patell, 1976). Cross-sectional dependence is particularly likely when at least some of the returns used in an event study are correlated due to common macroeconomic or industry-specific activity or due to a single or clustered event date (Prabhala, 1997). Cross-sectional dependence inflates test statistics because the number of sample firms overstates the number of independent observations (Lyon, Barber, & Tsai, 1999). The most common cases for this issue occur when the event being analyzed occurs on the same date for all firms (such as a regulatory event or market shock), but it can be an issue anytime that at least some of the returns are sampled from common time periods (Bernard, 1987). The challenge of cross-sectional dependence is exacerbated when a common event is tested in a single industry, as in this study (Strong, 1992).

There is a significant body of literature that has developed around potential solutions to address cross-sectional dependence in the data with few conclusions regarding the best method or even whether cross-sectional dependence needs to be addressed at all. Beaver (1968) found that an increase in the cross-sectional dispersion of abnormal returns at the time of an event announcement implies that the announcement conveyed information and that researchers need to control for factors leading to varying announcement effects across firms. S. J. 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, S. J. Brown and Warner (1985) found that non-normality of daily and abnormal returns had no obvious impact on event study
methodologies and that the mean abnormal return in a cross-section of securities comes
closer to normality as the number of securities in the sample is increased.

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. Their recommended method utilizes the calculation of calendar-time
portfolio abnormal returns, which may be either equally weighted or value weighted. In this
method, calendar-time abnormal returns are calculated for sample firms and then a $t$-statistic
is derived from the time-series of the monthly calendar-time portfolio abnormal returns. The
advantage of this approach is that it eliminates the issue of cross-sectional dependence
among sample firms. The disadvantage of this approach is that it provides an abnormal
return measure that does not precisely measure the actual experience of investors over the
specified time period.

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. As a result, it is proposed below that a number of
different tests be conducted and results compared for future event studies conducted with hospitality stocks.

5.4.5 Additional Statistical Methods Applied

In addition to the commonly used Patell test, the present study also performed two additional parametric tests. The first additional parametric test is a standardized cross-sectional test developed by Boehmer et al (1991), which compensates for possible variance increases on the event date itself by incorporating a cross-sectional variance adjustment. The second additional parametric test applied in this study is a time-series standard deviation test also known as the crude dependence adjustment (CDA) indicated by S. J. Brown and Warner (1980, 1985). This test computes the standard from the time series of portfolio mean abnormal returns during the estimation period.

Two nonparametric tests were also performed on the data. The first nonparametric test is 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). The second nonparametric test is the rank test, in which 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).

In the case of this study, which utilizes panel data with significant cross-sectional dependence in the data, the calendar-time portfolio regression method is considered as the most appropriate test statistic and will be observed and discussed separately from the traditional parametric and nonparametric test statistics.
5.4.6 Fixed Effects Regression

One of the most significant challenges with the use of regression analysis with non-experimental data is how to control for variables that cannot be observed (Allison, 2009). Fixed effects regression controls for variables that have not or cannot be measured by using each item as its own control (Allison, 2009). Fixed effects regression models are a particularly appropriate statistical method when using panel data, that is when data are observed for \( n \) entities observed at \( T \) different time periods as exists in this study (Stock & Watson, 2007).

In order to derive a model that explains the relationship between weekly RevPAR and abnormal lodging stock performance on the date of the announcement, a fixed effects regression model was developed and analyzed using Stata Version 11. The individual abnormal returns were derived using Eventus and downloaded into Excel 2007 for preparation prior to input into Stata.

5.5 Study Results and Data Analysis

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.

5.5.1 Hypothesis 1

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 5.1. 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 5.1 highlights the results and statistical significance of each test statistic.

The findings appear to indicate 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 5.1

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

**p < .01. ***p < .001.
5.5.2 Hypothesis 2

In order to address the issue of direction or magnitude of the relationship between the RevPAR announcement and abnormal lodging stock return, a fixed effects regression analysis was conducted. It is typical to first observe the results of a typical OLS regression, and the model developed for the prediction of abnormal stock return based on weekly RevPAR was determined to be $0.0001739 + 0.000003$ (RevPAR). The model is not statistically significant and explains virtually none of the variance with an $R^2$ of 0.0001. The fixed effects regression model for the prediction of abnormal stock return based on within group variance (in this case the within group variance for company included in the dataset) was determined to be $0.0001474 + 0.0000385$ (RevPAR). Again, the model is not statistically significant and explains virtually none of the variance with an $R^2$ of 0.0035, which was greater than for the OLS regression model. Table 5.2 provides detailed information regarding the results of the OLS and fixed effects regression models.

As a result of these findings, it can be strongly concluded that the weekly announcement of RevPAR has little to no impact on lodging stock performance.

<table>
<thead>
<tr>
<th>Table 5.2</th>
<th>Regression Model Results for Weekly RevPAR Announcements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OLS regression</td>
</tr>
<tr>
<td></td>
<td>df</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Model</td>
<td>1</td>
</tr>
<tr>
<td>Residual</td>
<td>9279</td>
</tr>
<tr>
<td>Total</td>
<td>9280</td>
</tr>
<tr>
<td>Prob &gt; F</td>
<td>.3450</td>
</tr>
<tr>
<td>$R^2$</td>
<td>.0001</td>
</tr>
<tr>
<td>Intercept</td>
<td>0.0001739</td>
</tr>
<tr>
<td>$b$</td>
<td>.0003 ± .000317</td>
</tr>
</tbody>
</table>
5.6 Limitations and Suggestions for Future Research

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.
5.7 Conclusions

Although it was hypothesized that there would be abnormal stock returns associated with the announcement of weekly RevPAR by STR, the results of this study were conclusive that abnormal stock returns were not evident over the time period from 2003 to 2009. 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.

5.8 Acknowledgments

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5.9 References


CHAPTER 6. GENERAL CONCLUSIONS

6.1 General Discussion

This dissertation presented three studies applying event study methodology to lodging stock performance. Each of these studies utilized both parametric and nonparametric techniques in an effort to identify abnormal returns and volume activity of lodging stocks under certain event conditions, namely (a) the announcement of mergers and acquisitions; (b) the announcement of chief executive officer transitions; (c) the announcement of weekly RevPAR data for the prior week by STR, a leading lodging industry consulting firm.

In comparison to other discrete industries, the performance of lodging stocks has not been fully explored. The event studies conducted as part of this dissertation are of benefit to the industry by further highlighting the differentiation between the performance of lodging stocks and the overall stock market, which further identifies the complexity of the lodging industry. These studies are also of benefit to a broad range of practitioners including investors, research analysts, and company executives who seek to better understand lodging stock performance and to profit from capitalizing on abnormal market activity. The specific questions explored were:

1. Is there abnormal stock performance for lodging stocks surrounding specified events that could indicate market inefficiencies that can be exploited by market actors?

2. Are there event study methodologies that are more or less robust for use in lodging stock event studies that should be considered in future research?
Each study stands alone on an individual basis and contributes to the extant literature on lodging stock events. Overall, these studies advance the body of knowledge in the lodging event study literature by discussing and then applying both parametric and nonparametric statistical methods to the events being studied. As stocks within any individual industry, event studies conducted among lodging stocks may contain challenges related to heteroskedasticity and dependence due to the derived abnormal returns being (a) correlated in event time, (b) having different variances across firms, and (c) not being independent across time for individual firms. These issues of non-normality and cross-sectional dependence in the data can be addressed utilizing nonparametric statistical methods, which can then confirm the more traditionally used parametric statistical methods.

The first paper, entitled “Parametric and Nonparametric Analysis of Abnormal Stock Return and Volume Activity for Lodging Stock Mergers from 2004 to 2007,” presented a study on the unprecedented number of hotel company mergers that took place between 2004 and 2007. The purpose of this study was to determine, using both parametric and nonparametric event study methodologies, whether there were abnormal stock returns or volume activity in the periods surrounding the merger announcement in the trading of 19 public hotel companies that were merged during this period. The study identified statistically significant abnormal returns only on the merger announcement date and statistically significant volume activity only on the announcement date and thereafter, indicating that there was little prior knowledge of these transactions.

In this study, as the abnormal returns were so strong and so strongly evident only on the merger announcement date, there was no material difference between the results of the parametric and nonparametric statistical tests. The results of this study, as compared to prior
studies conducted in this area, highlight changes over time in the concentration of abnormal returns on the event announcement date rather than spread out among surrounding dates.

The second paper, entitled, “Abnormal Stock Return and Volume Activity Surrounding CEO Transition Announcements for Lodging Companies,” presented an investigation into whether or not there were abnormal stock market returns and volume activity for lodging stocks in the periods surrounding the announcement of Chief Executive Officer (CEO) transitions for these companies from 2003 to 2009. The study found that there were statistically significant negative abnormal returns in the periods prior to and after the announcement of a CEO transition. In particular, the persistent and strong negative returns evident even after the announcement date could represent an opportunity for investors to capitalize on this potential market inefficiency.

This study identifies some of the challenges in relying only on parametric statistical techniques that assume normality and cross-sectional independence in the data. While statistical significance was similar for the mean cumulative average abnormal returns for the 30 days prior to the CEO transition announcement date for the parametric and nonparametric tests, the results were much stronger for the parametric tests than for the nonparametric tests for the 10 trading days following the CEO transition announcement date. Researchers relying only on parametric methods could be led to believe that trading opportunities exist when the statistical significance was generated from only a small subset of the sample firms. Statistically significant abnormal volume was identified in the period after the announcement of a CEO transition. This is the first study in the hospitality industry to investigate abnormal stock returns related to senior management transitions.
The third paper, entitled “The Impact of the Announcement of Weekly Lodging RevPAR on Lodging Stock Performance,” presents an investigation on whether or not there were abnormal stock market returns on the announcement date of weekly RevPAR data by the lodging industry research firm STR. The study found that there were not statistically significant abnormal returns on the weekly RevPAR announcement date (typically Wednesdays) for the period from 2004 to 2009. The study also developed a fixed effects regression model for predicting abnormal stock returns using weekly RevPAR, but the model was not found to be statistically significant.

Although the results of this study did not directly identify any potential trading opportunities for investors, it was noted that the day prior to the weekly RevPAR announcement date exhibited statistical significance in the parametric tests. While these results were not confirmed by the more robust nonparametric tests, there may be potential trading arbitrage opportunities based on these findings.

The first two studies contained in this dissertation are the first studies to identify abnormal volume activity for certain lodging events. Abnormal volume activity can serve to confirm abnormal return activity or identify abnormal trading activity that may not have resulted in abnormal return activity.

6.2 Recommendations for Future Research

It is strongly recommended that future researchers conducting lodging stock event studies utilize both parametric and nonparametric statistical tests due to the unique construct of the lodging industry and in order to avoid issues of non-normality and cross-sectional dependence in the data. It is also recommended that, whenever possible, future researchers conduct abnormal volume event studies along with abnormal return event studies.
In addition to these general recommendations, each study contains recommendations that can be explored by future researchers. The first paper, entitled “Parametric and Nonparametric Analysis of Abnormal Stock Return and Volume Activity for Lodging Stock Mergers from 2004 to 2007,” identifies opportunities to utilize different market benchmarks, noting that the CRSP/Ziman real estate index has not been utilized in lodging event studies and may be a very appropriate index given both the operating and real estate characteristics of lodging stocks. Future researchers may also wish to consider developing a logit model to determine whether abnormal price and volume returns in the period prior to merger announcement dates might be predictive of future merger activity.

The second paper, entitled, “Abnormal Stock Return and Volume Activity Surrounding CEO Transition Announcements for Lodging Companies,” identifies opportunities to utilize differing time horizons to determine if any particular periods differ in their return profile. As has been done in the general finance literature, there may also be an opportunity to investigate whether abnormal returns differ based on the reason for a CEO transition and/or whether a successor is announced immediately. In order to study this, researchers would need to access many more years of data in order to develop datasets that are robust enough to make appropriate statistical comparisons.

The third paper, entitled “The Impact of the Announcement of Weekly Lodging RevPAR on Lodging Stock Performance,” recommends that future researchers investigate the abnormal returns on the day prior to the weekly announcement date which were much stronger than on the weekly announcement date. This could indicate that traders and arbitrageurs are reacting earlier than expected in an effort to capture some level of market inefficiency. Future researchers should also consider looking at different and additional time
periods as the length of the study period at 6 years may have resulted in offsetting trends that could be better identified looking at shorter windows. Additional study could also be performed comparing the performance of lodging operating companies to lodging real estate investment trusts (REITs) and comparing the results for firms based on their trading volume.

There are numerous event studies that can be conducted utilizing lodging stocks. Many of these will be drawn from studies conducted in the general business literature, but as there is a discrete body of knowledge related to the lodging industry, many of these studies can be replicated utilizing lodging stocks and may continue to identify different results than general business studies. The large majority of event studies conducted in the hospitality industry have been conducted using lodging stocks. However, the number of lodging stocks has become greatly reduced in recent years due to merger and acquisitions activity. At this time, there are fewer than 25 lodging stocks traded on U.S. stock exchanges, which may call into question the statistical power of event studies conducted in this industry.

There is also a significant opportunity for hospitality researchers to conduct event studies on restaurant stocks. Many of the event studies that have been conducted in the lodging industry can be easily applied to the restaurant industry as well, and comparisons can then be made between these two allied industries. It is hoped that future event studies in the hospitality industry will be of value both to the academic and practitioner communities.
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