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## A REEXAMINATION OF CURRENT HOTEL VALUATION TECHNIQUES – WHICH APPROACH IS MORE REALISTIC?

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## A REEXAMINATION OF CURRENT HOTEL VALUATION TECHNIQUES – WHICH APPROACH IS MORE REALISTIC?

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**ABSTRACT.** This study revisits the issue of accuracy in contemporary hotel valuation. Along with the hotel valuation techniques used by Rushmore (1992) and Chen and Kim (2010), this study uses the cost approach and the automated valuation model (AVM) in its examination of contemporary hotel valuation techniques. Fourteen randomly selected hotel firms are analyzed using nine valuation approaches. The valuation results are then compared to the market values of these firms to assess which technique provides the most robust and supportable estimate. Research results reveal that, at least for the analyzed sample, the discounted cash flow (DCF) technique provides the most realistic estimate of a hotel firm's value. Results also show that the valuation estimate of AVM is significantly different from both Band of Investment methods. As such, the process of valuing hotel properties is better understood.

### INTRODUCTION

The issue of estimating fair value of a hotel property has often fascinated hotel investors, lenders, analysts, and operators alike. Much has already been written on this subject in the existent literature. Books by authors such as Rushmore (1978), Rushmore and Baum (2001), and Harper (2008), and studies by Rushmore (1992), Rushmore and deRoos (1999), and O'Neill (2003, 2004) are only a few examples. Jackson (2008) defines valuation as the determination of the amount for which the property will transact on the open market at a particular time. Valuation provides a quantitative measure of the benefits and liabilities accruing from the ownership of the real estate and is carried out by a number of different players. An understanding of this valuation process is important not only for sellers and buyers of hotel businesses (Cullinan, Le Roux, & Weddigen, 2004), but also for managers who are involved in making important resource allocation decisions. Understanding the importance of this issue, hotels often conduct

comprehensive valuation on an average of every three years (Jackson, 2008).

Hotel valuation can be more complex than other form of real estate (Walsh & Staley, 1993). Hotel rooms must be rented daily, which increases the risk and commands higher rates of return. Payroll costs and benefits account for as much as 40% of a hotel's operating expenses. Affiliation and management have a substantial impact on operations and therefore, on value. Further, because of the high fixed costs in this business, the importance of sufficient and continuous cash flow cannot be over emphasized.

In this article, we reexamine the issue of accuracy in current hotel valuation techniques. We build on the foundations established by Rushmore (1992), O'Neill (2004), and Chen and Kim (2010). Our study differs from Rushmore (1992), O'Neill (2004), and Chen and Kim (2010) in two ways. Along with the hotel valuation techniques used by Rushmore (1992) and Chen and Kim (2010), we also use

the cost approach and the AVM in our examination of contemporary hotel valuation techniques. Second, instead of using a single hotel firm or a case study approach, our study analyzes a much broader sample of 14 randomly selected hotel companies. The valuation results are then compared with the market values of these firms to assess which technique provides the most robust and supportable estimate.

The remaining sections of this article are organized as follows: the second section summarizes the existent hotel valuation literature; the third section presents the methodology, including the sample of hotels studied and the nine current hotel valuation models used in the analysis; the fourth section presents an analysis and discussion of our findings; finally, the implications and limitations of our research are presented in the fifth and final section.

## ANTECEDENTS

In order to assess which hotel valuation technique provides a robust and supportable estimate, it is important to evaluate the inherent strengths of each technique and the nature of the hotel in question (Rushmore & deRoos, 1999). Three traditional techniques are commonly used in valuing hotel properties: income capitalization, sales comparison, and the cost approach.

### Income Capitalization

The income capitalization approach is based on the premise that the value of a property is indicated by its net return, in other words, "the present worth of future benefits." The future benefits of income-producing properties, such as hotels, are the net income estimated by a forecast of income and expense along with anticipated proceeds from a future sale (Rushmore & deRoos, 1999). There are different variations in this category, among which discounted cash flow (DCF) is the most popular.

**Discounted Cash Flow (DCF).** During the 1980s, DCF became the most popular valuation method because it enables an investor to see the changing income stream

over the course of a holding period (Walsh & Staley, 1993). Del Sol and Ghemawat (1999) summarized nine surveys and plotted a nearly linear increase in the fraction of large U.S. firms using DCF methods and concluded that nearly all of the largest U.S. firms use DCF methods to value at least some of their investment decisions. As for the reliability of the DCF method, the literature proposes two validation perspectives: the *ex-ante* and the *ex-post*. The *ex-ante* perspective is concerned with the inputs of a valuation process, including sensitivity analysis and simulation. Cassia, Plati, and Vismara (2007) match the sensitivity analysis of two-stage DCF models to the assumption of *long term steady-state*, and proposes *joint sensitivity* to measure the effect on the estimated value of joint variations of forecast inputs. On the other hand, the *ex-post* perspective compares the estimated value with a term of reference. Kaplan and Ruback (1995) use a sample of 51 firms engaged in high-leverage transactions and find that the median cash flow value estimate is within 10% of the market price and that cash flow estimates significantly outperform those that are based on comparable or multiple approaches.

However, the outcomes of decisions made using DCF methods are heavily dependent on the rate selected, especially when the alternatives being evaluated include cash flows over a long time horizon (Regnier, 2001). DCF analysis involves a multitude of projections, and error in anyone of them can have a serious impact on outcomes.

### Sales Comparison

The basic idea behind this methodology is that identical assets must have identical prices, which is known as the *law of one price* (LOOP). In practice, one estimates the value of the subject company by observing prices paid for similar companies relative to some benchmark, such as earnings before interest and taxes (EBIT). The data are generally quoted from stock market or completed transactions. The process includes three steps: search and select a group of comparable companies;

adjust and compute; apply and conclude (Luehrman, 2005).

The difficulties in applying the sales comparison approach include the paucity of sales, obtaining sales that are truly comparable to the subject, and making accurate adjustments. Rushmore and deRoos (1999) suggested that the most effective use of this tool is to establish a reasonable range of value. Luehrman (2005) confirmed that it is indeed possible to distort multiples via selection bias or to become overconfident by ignoring noise in the sample, but he still believed free-market value was the gold standard in valuation practice. In fact, many valuation professionals apply both income capitalization and sales comparison methodologies to a single company or transaction, because they often give somewhat different indications of value (Luehrman, 2005). Walsh and Staley (1993) took it one step further to offer a hybrid approach. The argument was that income potential may be the only value determinant that results in diverse prices being paid for otherwise similar assets. Walsh and Staley (1993) applied a ratio analysis using net operating income (NOI) per room to adjust for income differentials between the sales and the subject property.

### Cost Approach

The cost approach provides a physically oriented estimate of value, focusing on asset replacement, which is rebuilding costs less allowances for depreciation (Jackson, 2008). This method emphasizes the reduction of costs, doesn't reflect any income-related considerations, and ignores the value of the hotel both in terms of a property and as a business (Lesser, 1992). It also requires a number of subjective and unsubstantiated depreciation estimates (Sikich, 1993). The cost approach is appropriate for estimating the value of newly constructed properties. However, as a building becomes older, its loss in value becomes increasingly difficult to quantify accurately (Jackson, 2008). It is usually given little weight in hotel valuation (Lesser, 1992).

Rushmore (1992) evaluated a single hotel property to illustrate seven hotel valuation

techniques, including four income capitalization models, two sales comparison methods, and one room-rate multiplier approach. Rushmore (1992) illustrated each technique using a step-by-step procedure, making it conducive to future application. The article also summarized the strengths and weaknesses of each technique. No benchmark (such as actual sales price or market value) was provided, leaving readers unclear about which technique was the most appropriate.

Chen and Kim (2010) built on the foundation provided by Rushmore (1992), applying their seven techniques to a state-owned hotel in China. Interestingly, for the income approach, they use historic data from 1995–2005 of the hotel, rather than projecting the hotel's future income (as in Rushmore's article). Sensitivity analysis was added in this case study to assist the comparison of each technique. There were more deviations in the property values estimated by Chen and Kim (2010) than those in Rushmore (1992). Once again, no accuracy benchmark (such as actual sales price or market value) was provided, leaving readers unclear about which technique was the most appropriate, even though the authors concluded that the income capitalization approach was the most reliable valuation technique for China's hotels.

Later, Rushmore and deRoos (1999) added detailed illustrations of the cost approach, new variations of income capitalization technique as well as a public company technique. With the exception of room-rate multiplier, the nine techniques produced values that varied in a very narrow range. Once again, the absence of any actual accuracy benchmark was quite noticeable in this article, leaving the readers unclear about which technique was the most appropriate.

All three studies mentioned above included the room-rate multiplier (i.e., ADR rule of thumb)—one of the many rules of thumb used in the industry.

### Rules of Thumb

Besides orthodox methodologies described above, industry people have some simple rules

of thumb by which to estimate the value of a hotel. A very interesting one included in Rushmore and deRoos (1999) revealed that each room of a hotel is worth 100,000 times the price of a Coke in the on-floor vending machine or in-room minibar. However, the reliability of such techniques remains questionable.

**Average Daily Rate Rule of Thumb.** The Average Daily Rate (ADR) rule states that a property is worth one thousand times its ADR on a per-room basis. For example, a 100-room hotel with a \$120 ADR would be valued for \$12,000,000. Despite the fact that more sophisticated real estate valuation techniques exist, executives, investors, and even real-estate appraisers frequently use this simple method (O'Neill, 2003). O'Neill (2003) tested the validity of this technique and also provided guidelines to managers about applying it. The database used in this research was developed over a 12-year period from 1990 to 2002. It included properties representing different types of hotels (economy, midscale, full service, all-suite without food and beverage, and all-suite with food and beverage) from various regions of the United States. Using regressions and analysis of variance (ANOVA), the study showed that ADR was the single best predictor of overall hotel selling prices, and that all-suite hotels without food and beverage (e.g., Residence Inns) were much closer to the ADR rule of thumb, whereas midscale hotels (e.g., Holiday Inns) were furthest. The study also suggested an update of the ADR rule of thumb by hotel type.

Staley (1999) used a modified approach to measure the required ADR, and prepared 10-year financial projections based on the typical operating results of limited service, midscale products. The study showed that a "\$1.13 to \$1.33" per \$1,000 rule was more appropriate, at least at the 70% occupancy level.

According to Rushmore and deRoos (1999), one of the questions that immediately arises when implementing the rule is whether to use a "trailing" or historical ADR, ADR in the first projection year, or the "stabilized year" ADR. Research shows that practitioners generally use

the current year's expected ADR when applying the rule to existing hotels, but apply a stabilized ADR when applying the rule to properties under development. Such inconsistency is a source of confusion and inaccuracy (Rushmore & deRoos, 1999). Further, the approach does not consider occupancy, other sources of revenue, or expenses, and it assumes a stabilized operation (Sahlins, 2000). In line with such problems, Morrison (1994) suggested that the ADR rule of thumb was frequently abused and misunderstood.

### Automated Valuation Model

O'Neill (2004) utilized the Penn State Index and created an AVM for hotels using stepwise regression analysis. This model essentially employed the sales comparison approach that was quick and easy to use. The study found four key factors that provided a reasonable estimate of a property's value—twelve-month lagging averages of NOI, ADR, occupancy, and number of rooms. The study suggested that the AVM was not quite accurate on average, but residuals (difference between predicted and actual hotel sale price) were smallest for hotels with relatively more guest rooms, higher occupancy, higher ADR, and higher NOI. The study also indicated that the AVMs were probably most useful for analyzing portfolios of hotels rather than individual properties.

## METHODOLOGY

### Sample

At the onset, this study researched the Mergent Online database for a list of all public companies registered in the United States under the North American Industry Classification System (NAICS) code of 721110 or the Standard Industry Classification (SIC) code of 7011 as primary identifiers. The NAICS is the standard used by federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy. The code for hotels (except Casino Hotels) and motels is 721110. This industry

comprises establishments primarily engaged in providing short-term lodging in facilities known as hotels, motor hotels, resort hotels, and motels. The SIC was replaced by the NAICS starting in 1997, but several datasets are still available with SIC-based data. Both SIC and NAICS classify establishments by their primary type of activity. In SIC, 7011 is the equivalent for 721110 in NAICS. The final sample was consolidated from the 24 companies obtained through NAICS and 35 obtained through the SIC system for the period 1999–2009, after verifying for completeness of data. Several companies did not make the list because of the lack of information to perform all valuation

methods. Table 1 explains the final sample used in this study.

### Valuation Process

This section explains the models used in our study. At the onset, it is important to know the basic symbols used in these models. Table 2 summarizes the list of basic symbols used in this article.

Our explanation of the nine valuation techniques follows next.

**Method 1: ADR Rule of Thumb.** The owned and leased hotel revenue represents primarily room rentals and food and beverage sales from owned, majority owned, and leased

**TABLE 1.** Firms Included in the Final Research Sample

Company Name	Included	Reason for Rejection
Archon Corp.	Y	
Arlington Hospitality, Inc.	N	no 2009 report
Buckhead America Corp.	N	no 2009 report
Cala Corp.	N	no stock price
Caribbean American Health Resorts, Inc.	N	no 2009 report
Castle Group, Inc. (UT)	N	no owned property
Choice Hotels International, Inc.	Y	
CN Dragon Corp.	N	China-based
Consolidated Pictures Group Inc.	N	no report
Gaylord Entertainment Co.	Y	
Gold Horse International Inc.	N	China-based
Golf Host Resorts, Inc.	N	no report or price
Great American Hotels & Resorts, Inc.	N	no report
Great Wolf Resorts, Inc.	Y	
Hammons (John Q.) Hotels L.P./Hammons Hotels Finance Corp.	N	private
Hotel Tamanaco, C.A. (Venezuela)	N	no report
Hudson Hotels Corp.	N	no stock
Hyatt Hotels Corp.	Y	
International Leisure Hosts, Ltd.	N	no report
Jockey Club, Inc.	N	no stock price
Las Vegas Sands Corp.	Y	
Lottery & Wagering Solutions, Inc.	N	no stock price
Marcus Corp. (The)	Y	
Marriott International, Inc.	N	no owned property
MGM Mirage	Y	
Morgans Hotel Group Co.	Y	
Portsmouth Square, Inc.	Y	
Red Lions Hotels Corp.	Y	
Riviera Holdings Corp.	Y	
ShoLodge, Inc.	N	no report
Sonesta International Hotels Corp.	Y	
Stakool Inc.	N	missing operation data
Starwood Hotels & Resorts Worldwide, Inc.	N	no owned hotel data
Sunstone Hotel Investors, Inc.	Y	
Trump Atlantic City Associates / Trump Atlantic City Funding, Inc.	N	bankruptcy, no stock
Trump Entertainment Resorts, Inc.	N	Bankruptcy, no stock
Uptowner Inns, Inc.	N	no stock
Wyndham Worldwide Corp.	N	no owned property

**TABLE 2.** List of Basic Symbols Used

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$1/S^n$	= Present worth of a \$1 factor (discount factor) at the equity yield rate (Ye)
$1/W^n$	= Present worth of a \$1 factor (discount factor) at the WACC rate
$1/D^n$	= Present worth of a \$1 factor (discount factor) at the overall discount rate
b	= Brokerage and legal cost percentage = 3%
C	= Market capitalization rate
$E_d$	= Cash on cash (equity dividend)
f	= Annual debt service constant
$f_p$	= Annual debt service constant required to amortize the entire loan during the projection period
i	= the average interest rate for all the long term debt
M	= Loan-to-value ratio
N	= number of owned and leased rooms
NI	= Net income available for debt service (Operating income before debt, tax & depreciation)
$NI_{Ave}$	= Average historical net income available for debt service
NOI	= Net operation income
P	= Fraction of the mortgage paid off during the projection period
$Rev_{Ave}$	= average total revenue from 1999 to 2009
$Rev_O$	= revenue of owned hotels
$Rev_{OL}$	= revenue of owned and leased hotels
$R_r$	= Overall terminal capitalization rate that is applied to net income to calculate the total property reversion (sales price at the end of the projection period)
V	= Value (what we want to calculate)
$V_{per\ room}$	= value per room
Y	= the amortization period, predetermined to be 25 years

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hotels, which is fairly standard. However, most of the corporations enjoy revenues from management and franchised fees as well as timeshare and other income. Therefore, we propose a modified formula as follows:

$$V = \frac{ADR * N * 1000}{\left(\frac{Rev_{OL}}{Rev}\right)}$$

**Method 2: Automated Valuation Model.** Consistent with past research, we used the following formula for the AVM model:

$$V_{per\ room} = F\left(\frac{NOI}{N}, ADR, Occupancy\right)$$

$$V = V_{per\ room} * N.$$

**Method 3: Band of Investment – One Stabilized Year.** This is a method utilizing weighted average cost of capital (WACC) to capitalize the stabilized net income into a value estimate.

The formulas are as follows:

$$WACC = M * f + (1 - M) * E_d$$

$$V = \frac{NI_{Ave}}{WACC}$$

Yearly Mortgage Constant:

$$f = \frac{i}{1 - \frac{1}{(1+i)^Y}}$$

In this formula,  $i$  represents the average interest rate for all the long-term debt, whereas  $Y$  represents the amortization period, predetermined to be 25 years.

Inspired by Chen and Kim (2010), we adopted the average historical net income before debt service ( $NI_{Ave}$ ) obtained from Mergent Online as the stabilized income, reducing the negative effect of a depressed economy, and the historical return on equity for each hotel as a proxy to measure cash on cash ( $E_d$ ). Using data from as far back as 1999, we obtained the average over the last 10 years. However, some companies have a history of incorporation shorter than 10 years, and some might have encountered huge change (such as merger and acquisition) within the decade so that data before the incident is considered incomparable. For example, on October 2, 2000, Archon's wholly owned subsidiary, Santa Fe Hotel, Inc., sold substantially all of its assets including the Santa Fe Hotel and Casino for \$205,000,000, which explained the huge difference between total revenue of \$131,066,749 in 2000 and that of \$48,003,091 in 2001. Another company, Portsmouth Square, Inc. was a pure investing company before 2006, when it started to own a hotel. Therefore, the data before 2006, with no depreciation involved, is not comparable with the data afterwards. This company, together with Choice Hotels International, Inc. and Riviera Holdings Corp. has a negative average of equity, making their valuation results difficult to interpret.

**Method 4: Band of Investment – Three-Year Buildup.** This is an extension of Method 3 that is expected to reduce the subjectivity of using single-year income. This technique takes the third year's net income and capitalizes it at the capitalization rate derived in Method 3 (WACC). All three years' net incomes are then

discounted back to the present value using WACC as a discount rate. The sum of these present values produces the estimate.

$$V = \frac{NI^1}{W^1} + \frac{NI^2}{W^2} + \frac{NI^3/WACC}{W^2}$$

Here, yearly NI is a percentage of that year's total revenue ( $NI_{Ave}/Rev_{Ave}$ ).

**Method 5: 10-Year Discounted Cash Flow Using Mortgage and Equity Rates of Return.** This technique is appropriate in dynamic hotel markets where supply and demand is constantly changing and the subject property's occupancy, rate, and net income has not stabilized. A stabilized income and expense statement is intended to reflect the anticipated operating results of a property over its remaining economic life, given any or all applicable stages of buildup, plateau, and decline in the life cycle of the hotel (Lesser, 1992). Rushmore and deRoos (1999) also suggested that for simplicity purposes, stabilized income could still be used in this technique.

To convert the projected income stream into an estimate of value, the anticipated net income is allocated to the mortgage and equity components based on market rates of return and loan-to-value ratios. The total of the mortgage component and the equity component equals the value of the property.

$$\begin{aligned} & \frac{NI^1 - (f * M * V)}{S^1} + \frac{NI^2 - (f * M * V)}{S^2} + \dots \\ & + \frac{NI^{10} - (f * M * V)}{S^{10}} \\ & + \frac{NI^{11}/R_r - b * NI^{11}/R_r - (1 - P) * M * V}{S^{10}} \\ & = (1 - M) * V. \end{aligned}$$

Transform into:

$$\begin{aligned} & \frac{NI^1}{S^1} + \frac{NI^2}{S^2} + \dots + \frac{NI^{10}}{S^{10}} + \frac{(1 - b)NI^{11}/R_r}{S^{10}} \\ & = \left( \left( \frac{1}{S^1} + \dots + \frac{1}{S^{10}} \right) * f * M \right. \\ & \left. + \frac{1 - P}{S^{10}} * M + (1 - M) * V \right). \end{aligned}$$

Next, we will explain our projection of the above factors.

NI:

In Method 4, we already projected the NI for three years, 2010–2012. Assuming 2012 (year 3) as the stabilized year, we can project the future NI at a certain inflation rate. Table 3 summarizes the historical inflation rate from 1999 to 2010.

With the exception of 2009–2010, the normal inflation is approximately 3%. Therefore, we assumed a yearly growth rate of 3% for NI for the period 2013 to 2020.

The Fraction of the Loan Paid Off in 10 years (P)

$$(f - i)/(f_p - i) = P$$

$$f_p = \frac{i}{1 - \frac{1}{(1+i)^{10}}}$$

The Terminal Capitalization Rate (Rr) and the Equity Yield Rate

Table 4 provides the basis for our financial assumptions.

Depending on the type of hotels owned by each company, we assume certain equity yield rate and terminal capitalization rate within the range provided in Table 4. Here is an example. Royal Sonesta Hotel in Boston, the only hotel owned by Sonesta International Hotel Corporation is an upscale, full-service hotel. Therefore we set its equity yield rate (S) at 17%, discount rate (D) at 12%, terminal capitalization rate at 9%. The overall capitalization rate (C) will be explained in Method 9. Based on Table 4, the equity yield rate, terminal capitalization rate, and discount rate by hotel type used in our study are as follows:

**Method 6: 10-Year Discounted Cash Flow with Overall Discount Rate.**

Because of large cash flow surpluses, the large institutional investors often tend to purchase hotels without any debt. In this case, the debt service should not be deducted from the net income. The formula is slightly different from that of Method 5.

$$\begin{aligned} V = & \frac{NI^1}{D^1} + \frac{NI^2}{D^2} + \dots \\ & + \frac{NI^{10}}{D^{10}} + \frac{NI^{11}/R_r - b * NI^{11}/R_r}{D^{10}}. \end{aligned}$$



TABLE 3. Historical Inflation Rates – 1999 to 2010

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVE
2010	2.63%	2.14%	2.31%	2.24%	2.02%	1.05%	1.24%	1.15%	1.14%	1.17%	1.84%	2.72%	-0.34%
2009	0.03%	0.24%	-0.38%	-0.74%	-1.28%	-1.43%	-2.10%	-1.48%	-1.29%	-0.18%	1.07%	0.09%	3.85%
2008	4.28%	4.03%	3.98%	3.94%	4.18%	5.02%	5.60%	5.37%	4.94%	3.66%	4.31%	4.08%	2.85%
2007	2.08%	2.42%	2.78%	2.57%	2.69%	2.69%	2.36%	1.97%	2.76%	3.54%	1.97%	2.54%	3.24%
2006	3.99%	3.60%	3.36%	3.55%	4.17%	4.32%	4.15%	3.82%	2.06%	1.31%	3.46%	3.42%	3.39%
2005	2.97%	3.01%	3.15%	3.51%	2.80%	2.53%	3.17%	3.64%	4.69%	4.35%	3.52%	3.26%	2.68%
2004	1.93%	1.69%	1.74%	2.29%	3.05%	3.27%	2.99%	2.65%	2.54%	3.19%	1.77%	1.88%	2.27%
2003	2.60%	2.98%	3.02%	2.22%	2.06%	2.11%	2.11%	2.16%	2.32%	2.04%	2.20%	2.38%	1.59%
2002	1.14%	1.14%	1.48%	1.64%	1.18%	1.07%	1.46%	1.80%	1.51%	2.03%	1.90%	1.55%	2.83%
2001	3.73%	3.53%	2.92%	3.27%	3.62%	3.25%	2.72%	2.72%	2.65%	2.13%	3.45%	3.39%	3.38%
2000	2.74%	3.22%	3.76%	3.07%	3.19%	3.73%	3.66%	3.41%	3.45%	3.45%	2.62%	2.68%	2.19%
1999	1.67%	1.61%	1.73%	2.28%	2.09%	1.96%	2.14%	2.26%	2.63%	2.56%			

Source: [http://www.inflationdata.com/inflation/inflation\\_rate/historicalinflation.aspx](http://www.inflationdata.com/inflation/inflation_rate/historicalinflation.aspx)

Note. Blank cells = Data not available because it has not been released by the Bureau of Labor Statistics

**TABLE 4.** 2010 Current Capitalization, Equity Yield, and Discount Rates

	Overall Capitalization Rates Based On:		Equity Yield	Terminal Cap. Rate	Discount Rate
	T-12	Year One			
Luxury	4% to 6%	5% to 7%	13% to 16%	7% to 9%	10% to 11.5%
Upper Upscale	5% to 7%	6% to 8%	15% to 18%	8% to 10%	11% to 12.5%
Upscale/Mid-Scale	6% to 8%	7% to 8%	17% to 20%	9% to 11%	12% to 13.5%

Source: HVS

**Source:** Rushmore, S., Michael, J.P., and Neel, M. L. (2010). 2010 United States Hotel Valuation Index. Retrieved from <http://www.hvs.com/Library/Articles/?cat=11>

**TABLE 5.** Equity Yield, Terminal Cap, and Discount Rate by Hotel Type

Hotel Type	Equity Yield (Ye)	Terminal Cap. (Rr)	Discount Rate (D)
Luxury	16%	8%	11%
Full Service	17%	9%	12%
Mid-scale	18%	10%	13%
Economy	20%	11%	13.5%

The discount rate is set based on Table 4 by the different type of the owned hotel.

**Method 7: Cost Approach.** Among the six primary sources of replacement costs introduced by Cahill and Mitroka (1992), development cost surveys for various hotel types are the most accessible. This study adopted the development cost estimates from the 2009 Hotel Development Cost Survey of Hospitality Valuation Systems (HVS) Global Hospitality Services. Table 6 summarizes the average replacement costs on a per-room basis for different types of hotels in 2008/2009.

A major problem in applying this method is to define the hotel type for each owned hotel. This study adopted the star rating of each hotel on third-party websites such as Priceline and

Expedia in order to complete such classification. Table 7 summarizes the classification rule for criteria for our sampled hotels.

The next step was to calculate the depreciation expenses. The assumption of the average age of the properties comes from the following formula.

$$\frac{\text{Building}}{\text{Life}} * \text{age} + \frac{\text{FF\&E}}{\text{Life}_2} * \text{age} = \text{Accu. Depreciation.}$$

In this formula, "Life" refers to the estimated useful lives of buildings, and "Life<sub>2</sub>" refers to those of building improvements, furniture, and equipment. We assume the longest useful lives for both.

$$\left( (\text{Building} + \text{Soft Cost}) * \frac{\text{age}}{\text{life}} + \text{FF\&E} * \frac{\text{age}}{\text{life}_2} \right) * \text{number of rooms} = \text{depreciation}$$

$$\text{Total replacement cost} - \text{depreciation} = \text{Value of Owned hotels}$$

Leased, managed, and franchised hotels don't seem to qualify for the cost approach;

**TABLE 6.** Average Replacement Costs on per-Room Basis for Hotels – 2008/2009

Unit: U.S. Dollar (Cost Per Room)	Land	Building Improvements	Soft Costs	FF&E	Pre-Opening and Working Capital	Total
Economy	13800	48800	4500	8500	3000	63900
Mid-scale hotel w/o F&B	27500	68700	11400	10000	4100	96100
Extended stay	14400	76000	11700	13300	3300	129000
Mid-scale hotel w F&B	16300	73800	13600	12600	3800	115000
Full service	18700	120500	22700	23200	6900	206000
Luxury hotels and resorts	96300	338900	136500	56800	20800	592600

**Source:** Hotel Development Cost Survey 2009 published by Hospitality Valuation Systems (HVS).

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TABLE 7. Classification Rule for Sampled Hotels

Star Rating	HVS Type
5 stars	Luxury
4 & 4.5 stars	Full
3.5 & 3 stars	Mid-scale hotel w F&B
2.5 stars	Mid-scale hotel w/o F&B
Under 2 stars	Economy

therefore the percentage of owned hotel revenue over total revenue is used in the estimation of total value.

**Method 8: Sales-Comparison Approach.** The Hotel Valuation Index (HVI) tracks hotel values in 51 major markets and the United States as a whole, and produces a pro forma performance for a typical full-service hotel in each respective market of the United States (Rushmore, Michael, & Neel, 2010). Most of the hotels owned by the 14 companies are full service. Some companies own only a few hotels, for which it's easy to price each hotel according to its location. Some companies have a large hotel portfolio of various locations and types, for which we adopt the national price. The national price is also used when the location of the hotel is not within 51 major markets. Royal Sonesta Hotel in Boston is a 400-room, full-service hotel, so we price it at \$190,991 per room. As stated in Method 7, some companies have leased, managed, and franchised hotels, whose values are different from owned hotels. We use a percentage of owned-hotel revenue over total revenue in the estimation of total value.

$$V = V_{\text{per room}} * \frac{N}{\frac{\text{Rev}_O}{\text{Rev}}}$$

TABLE 8. U.S. Hotel Financing and Appraisal Rates

Hotel Financing and Appraisal Rates				
Financing Parameters	1999	2006	2007	2008
Mortgage Interest Rates	7.5%–9.0%	6.0%–6.75%	6.5%–7.0%	7.0%–8.0%
Amortization	20–25 Years	25–30 Years	15–25 Years	15–25 Years
Loan-to-Value	60%–70%	70%–80%	60%–70%	55%–70%
Capitalization Rates				
Luxury	9.0%–11.0%	5.0%–6.5%	6.5%–8.5%	7.0%–9.0%
Mid-Rate	10.0%–12.0%	7.0%–9.0%	8.5%–10.5%	8.5%–11.0%
Budget	11.0%–13.0%	8.0%–11.0%	9.5%–12.0%	10.0%–12.5%

Source: Smith, E. and N. Lund (2008, August). 2008 US hotel valuation index.

### Method 9: Market-Derived Capitalization Rate.

$$V = \frac{NI}{C}$$

The Market-Derived Capitalization Rate is also a form of sales comparison. We use average historical NI of the past decade. This was accomplished after pairing average NI with average capitalization rate:

$$V = \frac{NI_{\text{Ave}}}{C_{\text{Ave}}}$$

Table 8 summarizes the U.S. hotel financing and appraisal rates for 1999, 2006, 2007, and 2008 based on the 2008 U.S. hotel valuation index (Smith & Lund, 2008).

This study makes the following assumptions (Table 9) based on Table 8, and applies them to the formula.

Table 10 presents a summary of all the hotel valuation models explained thus far.

**Transaction Value.** Adopting the method of Kaplan and Ruback (1995), we calculate transaction value as: (a) the market value of the firm's common stock; plus (b) the market value of the firm's preferred stock; plus (c) the value of the firm's debt; plus (d) transaction fees; less (e) the firm's cash balances and marketable securities.

## ANALYSIS OF RESULTS AND DISCUSSION

At the onset, the study performed a one-sample *t*-test for each company, to evaluate whether the market value based on the stock price was indeed different from our

**TABLE 9.** Assumptions Applied to the Formula

Assumption	Average Capitalization Rate ( $C_{Ave}$ )
Luxury	8%
Full Service	9%
Mid-scale	10%
Economy	11%

estimations. Table 11 summarizes the results of our *t*-tests.

As shown in Table 11, Morgans, Choice Hotels, Las Vegas Sands and Archon have significant *p*-values smaller than 0.02 and negative means, suggesting that the estimated values for these companies were significantly different from their market values. The negative variation in these estimations vis-à-vis actual values were possibly influenced by the recessionary figures from 2008–2009.

**Variation Errors**

To examine which method was most efficient, the study further computed variation errors as:

(Estimated price - Market price)/Market price. Table 12 presents a summary of the mean variation errors derived from the 9 methods. Figure 1 shows a graphic representation of these variation errors.

As shown in Table 12 and Figure 1, the minimum variation error for the overall sample is for the Ten-Year Discounted Cash Flow Method (-.05) followed by the Sales Comparison Method (-.0957), while the maximum variation error is for the Automated Valuation Model (.6607), followed by the Band of Investment Method with One Stabilized Year (-.5893). Stated otherwise, the Ten-Year DCF (Method 5) seems to provide the closest estimation overall. Such results further confirm the findings of past valuation studies (Chen & Kim, 2010). However, its standard deviation is relatively high, possibly due to the multitude of projections and uncertainties in the process. Interestingly, the Ten-Year DCF with Overall Discount Rate (Method 6) shows a larger variation error (-0.2257) but lower deviation. The Sales Comparison Approach (Method 8) emerged as second most accurate in this study with a mean variation error of -.0957. Our results further show that the estimate of AVM is significantly different from both Band of Investment methods. The AVM approach, on an average, yielded significant overestimation with a mean variation error of 0.6607. In contrast, the two Band of Investment approaches, One Stabilized Year and Three-Year Buildup, significantly underestimated firm

**TABLE 10.** Methods Summary Table

Method	Formula
1. ADR rule of thumb	$V = \frac{ADR * N * 1000}{Rev_{OL}}$
2. AVM	$V_{per\ room} = F(\frac{NOI}{N}, ADR, Occupancy)$
3. Band of Investment – One Stabilized Year	$V = \frac{NI_{Ave}}{WACC}$
4. Band of Investment – Three-Year Buildup	$V = \frac{NI^1}{W^1} + \frac{NI^2}{W^2} + \frac{NI^3}{W^3}$
5. 10-Year Discounted Cash Flow Using Mortgage and Equity Rates of Return	$\frac{NI^1 - (f * M * V)}{S^1} + \frac{NI^2 - (f * M * V)}{S^2} + \dots + \frac{NI^{10} - (f * M * V)}{S^{10}} + \frac{NI^{11} / R_c - b * NI^{11} / R_c - (1 - P) * M * V}{S^{10}} = (1 - M) * V$
6. 10-Year Discounted Cash Flow Using Overall Discounted Rate	$V = \frac{NI^1}{D^1} + \frac{NI^2}{D^2} + \dots + \frac{NI^{10}}{D^{10}} + \frac{NI^{11} / R_c - b * NI^{11} / R_c}{D^{10}}$
7. Cost Approach	$V = \frac{Total\ replace\ cost - depre.}{Rev_{CO} / Rev}$
8. Sales Comparison	$V = V_{per\ room} * \frac{N}{Rev}$
9. Market-Derived Capitalization Rate	$V = \frac{NI_{Ave}}{C_{Ave}}$

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**TABLE 11.** t-Test Results by Firm for Differences Between Estimated and Actual Market Value

Ticker	Sig. 2-tail	Standard Deviation	Mean Variation
SHO	0.542	0.429	-0.091
SNST A	0.056	1.020	0.760
MHGC	<b>0.000</b>	0.180	-0.561
H	0.382	1.694	0.522
WOLF	0.213	0.554	-0.250
GET	0.068	0.502	-0.353
CHH	<b>0.014</b>	0.494	-0.513
MCS	0.420	0.420	0.119
RLH	0.103	1.439	0.882
PRSI	0.103	0.560	-0.343
LVS	<b>0.001</b>	0.273	-0.503
MGM	0.856	1.134	0.071
ARHN	<b>0.000</b>	0.138	-0.744
RVHLQ.PK	0.786	0.607	0.202

values with mean variation errors of  $-0.5893$  and  $-0.4557$ , respectively. Even though the Sales Comparison Approach (Method 8) emerged as the second most accurate in this study, past studies suggest that this approach would work best to support other more accurate techniques such as Income Capitalization (Rushmore, 1992; Chen & Kim, 2010). To further corroborate if there were significant between-group differences among variations from the nine methods employed, our study

conducted a One-Way ANOVA. Table 13 summarizes the ANOVA results:

As shown in Table 13, the F value for between-group differences was 2.661 with a significance level of .005, confirming the presence of significant difference in mean variation between the groups.

Each hotel valuation technique has its own strengths as well as weaknesses. The results of this study confirm that at least in the context of the U.S. markets, hotel investors would benefit more if they relied on the Ten-Year Discounted Cash Flow Method (Method 5) to evaluate their hotel investment decisions. Given the magnitude of variation errors for the AVM (0.6607) and the two Band of Investment methods ( $-0.5893$  and  $-0.4557$ ), our results also suggest that these methods should best be used in a supportive role to complement other more-accurate valuation methods such as the Income Capitalization Approach or the Discounted Cash Flow Method.

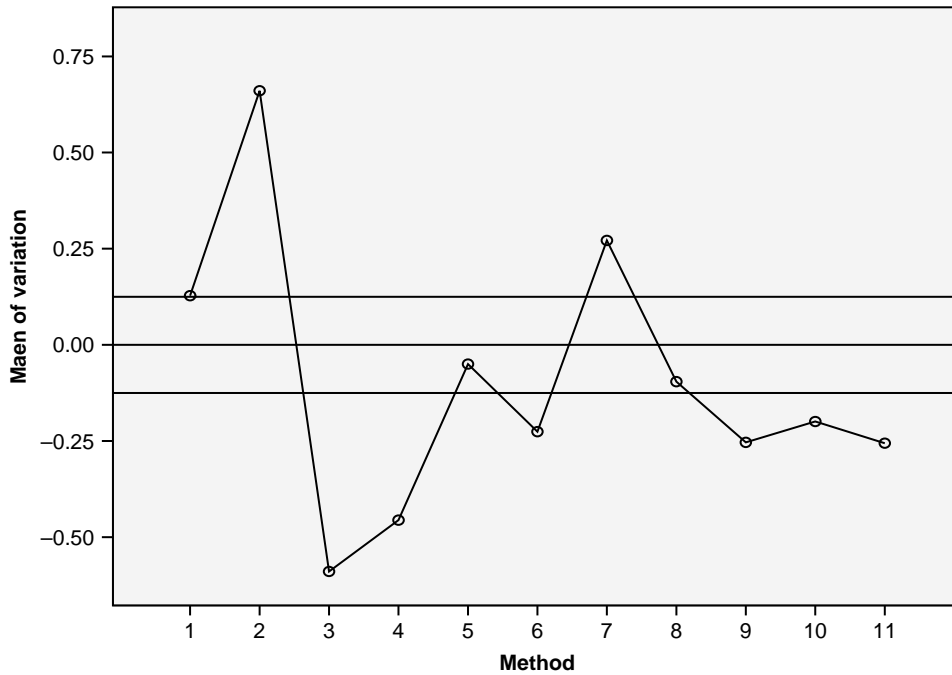
## LIMITATIONS

This study is not without limitations. At the onset, the nine techniques evaluated in this study required the use of several assumptions. The

**TABLE 12.** Variation Errors Relevant to Hotel Valuation Techniques

Variation	N	Mean	Std. Deviation	Std. Error	Descriptives			
					95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	14	.1279	.70862	.18939	-.2813	.5370	-.72	1.73
2	14	.6607	1.95367	.52214	-.4673	1.7887	-1.01	4.97
3	14	-.5893	.33308	.08902	-.7816	-.3970	-1.32	-.20
4	14	-.4557	.30272	.08091	-.6305	-.2809	-1.24	.00
5	14	-.0500	.56867	.15198	-.3783	.2783	-.72	1.41
6	14	-.2257	.38892	.10394	-.4503	-.0012	-.70	.52
7	14	.2714	.62991	.16835	-.0923	.6351	-.84	1.75
8	14	-.0957	1.04056	.27810	-.6965	.5051	-.86	2.37
9	14	-.2536	.47686	.12745	-.5289	.0218	-.73	.84
Mean	14	-.1993	.40149	.10730	-.4311	.0325	-.71	.70
Median	14	-.2557	.37609	.10051	-.4729	-.0386	-.72	.57
Total	154	-.0968	.84025	.06771	-.2306	.0369	-1.32	4.97

Note. 1 = ADR; 2 = AVM; 3 = Band of Investment-One Stabilized Year; 4 = Band of Investment-Three-Year Buidup; 5 = Ten-Year DCF; 6 = Ten-Year DCF with Overall Discount Rate; 7 = Cost Approach; 8 = Sales Comparison Approach; 9 = Market Derived Capitalization Rate.



**FIGURE 1.** Graphic representation of variation errors for hotel valuation techniques. Note. 1 = ADR; 2 = AVM; 3 = Band of Investment–One Stabilized Year; 4 = Band of Investment-Three-Year Buildup; 5 = Ten-Year DCF; 6 = Ten-Year DCF with Overall Discount Rate; 7 = Cost Approach; 8 = Sales Comparison Approach; 9 = Market Derived Capitalization Rate; Data obtained from Table 9.

**TABLE 13.** ANOVA Results for Test of Differences in Mean Variation from the Valuation Methods

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	16.946	8	1.695	2.661	.005
Within Groups	91.075	125	.637		
Total	108.020	133			

more information available about a property, its market, and its competitors, the more accurate the estimation can be. Most companies have multiple hotel properties, making it unrealistic to conduct thorough market analysis on each. Hence, the accuracy of assumptions in such valuations is greatly compromised. Further, the study evaluated hotel corporations and not individual hotel properties. The generalization of corporate finance norms to financial decisions in individual businesses is often constrained by the unique circumstances of a given business. Accordingly, it is recommended that readers exercise some caution when interpreting and generalizing the results of this study.

**AUTHOR NOTES**

Jung Fu and Jeff Lang are graduate students, and Atul Sheel, PhD is an Associate Professor of Finance in the Department of Hospitality and Tourism Management, Isenberg School of Management, University of Massachusetts, Amherst.

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