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Is Capital Asset Pricing Model (CAPM) the best way to estimate cost-of-equity for the lodging industry?

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Abstract

Purpose – The purpose of this paper is to compare traditional methods of estimating the cost-of-equity (capital asset pricing model and Fama and French three-factor model) with a new approach, implied cost-of-equity method, to provide lodging analysts, investors, executives and researchers with a more reliable way to estimate cost-of-equity.

Design/methodology/approach – The study uses data from publicly traded lodging firms in the USA that provide all necessary financial data for cost-of-equity estimation. The data range from 1976 to 2005.

Findings – The study finds that the price-to-forward earnings (PFE), using the implied cost-of-equity (ICE), approach, estimates cost-of-equity of publicly-traded lodging firms more reliably, compared with CAPM.

Practical implications – The study recommends that lodging industry analysts, investors, executives and researchers adopt the ICE approach, especially using the PFE model, to estimate cost-of-equity of publicly-traded lodging firms.

Originality/value – The study attempts to provide a more reliable approach to estimate cost-of-equity for publicly-traded lodging firms, specifically compared with the traditional approach, the CAPM.

Keywords Capital asset pricing model, Equity theory, Return on capital employed, Hospitality management

Paper type Research paper

Introduction

Equity-risk premium, which is the difference between expected return on risky stocks (expected return, hereafter) and the risk-free rate, is considered to be one of the most critical numbers and has been extensively investigated in finance literature (Cornell, 1999; Dimson *et al.*, 2002). In equity-risk premium computation, the expected return plays a key role since the government treasury rate reliably represents risk-free rate (Cornell, 1999). Sharpe (1964), Lintner (1965), and Black (1972) made significant contributions in this field by developing the capital asset pricing model (CAPM, hereafter) that explains the expected return by a market beta. Ever since its development, the financial community has been widely using CAPM for calculating the expected return.

Fama and French (1992 and 1993), however, argued that market beta alone is not sufficient to explain expected return, and they developed their own model by adding

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two extra factors (size and book-to-market equity ratio) to CAPM. This model is known as the Fama and French three-factor (FF, hereafter) model and the financial community gradually adopted the model for practical and academic purposes. Elton (1999) and Fama and French (1997) later further examined the two traditional asset pricing models (CAPM and FF model) and concluded that estimates of the expected return computed using the two models are not reliable. They asked fellow researchers to come up with an alternative way to estimate the expected return and Botosan (1997) made such an effort.

To estimate the cost-of-equity capital, Botosan (1997) did not use CAPM, but employed an equity valuation model developed by Ohlson (1995) to calculate the capitalization rate as a proxy for the expected return. This practice has been somewhat used by practitioners, but operationalization of the use is quite simplistic and moreover, it has not been utilized in academia for its research until Botosan (1997). This estimate is referred to as "implied cost-of-equity capital" (ICE, hereafter) and the approach is referred to as the ICE approach in this series because this rate is what the market implicitly assumes for discounting all expected future cash flow for estimating current stock price.

One major challenge in extant ICE literature is evaluating the predictive ability of ICE estimates computed using different equity valuation models (e.g. dividend, residual income valuation, and Ohlson-Juettner models) on future realized returns (Chen *et al.*, 2004; Gode and Mohanram, 2003; Guay *et al.*, 2004; Shröder, 2004). The estimates calculated using these models or different versions of the same model differ from each other because the operationalizations used in implementing each model differ from each other. Therefore, how to determine which specific model provides the estimate with the highest predictive ability on future realized returns becomes an empirical question.

Even though several ICE studies suggest that the residual income valuation model provides the ICE estimate with the highest predictive ability, mixed results still exist. Moreover, even if ICE literature generally supports one specific model or version of a model, the empirical question remains whether the suggested model provides the estimate with the highest predictive ability for the lodging industry. This is because the lodging industry demonstrates different characteristics from the entire economy (Keiser, 1998; Lee, 1984; Lee and Upneja, 2007; Powers, 1992; Winata and Mia, 2005). For example, the lodging industry is known as a slow-growth industry (Lee, 1984; Powers, 1992; Withiam, 1985) and our analysis of the past 15-, 25-, 35-, and 45-year sales growth rate for 48 different industries, presented in Table I, supports this argument. Moreover, Lee and Upneja (2007) argued that the lodging equity security is undervalued compared to equity securities of other industries while Madanoglu and Olsen (2005) proposed the Lodging Asset Pricing Model (LAPM) by including two industry-specific variables (i.e. brand strength index and property ownership structure) along with equity risk premium and size factor because of unique characteristics of the lodging industry.

Even though many researchers have been investigating this particular issue in recent years in main stream literature, the ICE approach only has recently been introduced to lodging literature in a conceptual, not an empirical, manner (Lee and Upneja, 2006). Therefore, the purpose of this study is to investigate the ICE approach for the lodging industry and further compare the ICE approach with traditional asset

Industry	1990-2005	1980-2005	1970-2005	1960-2005	1950-2005
Average	7.45	7.77	8.94	9.00	8.96
Hotel	5.32**	5.59**	6.82**	7.04**	7.08**
Health	15.20	15.67	16.25	16.41	16.28
Textiles	2.11	3.77	5.52	5.88	5.87
Autos	7.82	7.41	9.00	9.16	9.03
Computers	7.56	9.45	10.73	11.00	11.00
Electronic equipment	9.50	9.51	10.43	10.63	10.63
Retail	8.77	9.40	10.22	10.24	10.10
Insurance	9.52	9.95	10.45	10.51	10.51
Real estate	3.80	3.41	3.34	3.80	3.82

Notes: All figures are medians in percentage; ** represents p-value of less than 0.01 when compared with the "Average"

Table I.
Long-term sales growth rate of industries

pricing models (CAPM and FF model). More specifically, this study examines the predictive ability of eight cost-of-equity capital estimates (six different ICE models, CAPM and FF model estimates) on future realized returns to identify the estimate that demonstrates the highest predictive ability for lodging firms. The findings of the main analysis strongly suggest that the price-to-forward earnings model provides the cost-of-equity capital estimate with higher predictive ability than the other seven methods for the lodging industry.

Review of literature

The implied cost-of-equity (ICE) approach is not a newly created method. Financial analysts have been using the method for a while and typical finance textbooks explain the capitalization rate concept, which is equivalent to the ICE approach. In the past, mainstream accounting and finance literature concentrated on using the average realized return as a proxy for the expected market return to test asset pricing theories. Soon after Botosan's study (1997) introduced the ICE approach, more financial economists began to use the ICE approach and it became very popular (Botosan and Plumlee, 2005; Chen *et al.*, 2004; Claus and Thomas, 2001; Easton and Monahan, 2005; Gebhardt *et al.*, 2001; Gode and Mohanram, 2003; Guay *et al.*, 2004; Shröder, 2004).

The ICE approach, as described above, is equivalent to calculating the capitalization rate. First, an equity valuation model (e.g. residual income valuation model or dividend model) is assumed. Second, current stock price and analysts' short- and long-term earnings forecasts as proxies for all expected future cash flows are introduced into the valuation model. Finally, the capitalization rate that equates the present value of all expected future cash flows to the current stock price is solved. In other words, this capitalization rate is the discount factor that the market implicitly uses for the equity valuation purpose.

Financial economists figured that the ICE approach may be beneficial in testing the asset pricing theory because, with this approach, researchers no longer need to use the average realized return which, had been widely criticized for its inaccuracy as a proxy for the expected market return (Elton, 1999; Fama and French, 1997). On the other hand, the ICE approach may be deficient because the approach uses the analysts' forecasting data. The use of analysts' forecasting data has been investigated by several studies, and it is generally accepted that the analysts' forecasting data tend to be overly optimistic and sluggishly updated (Dechow and Sloan, 1997; Lys and Sohn, 1990). These possible problems may have a negative impact on calculating reliable estimates of the cost-of-equity by using the ICE approach. However, no clear way exists to overcome the problems because they are not easily fixable by researchers.

The major, current challenge in this field seems to be evaluation of the different ICE estimates from the different equity valuation models and determination of the model that provides the ICE estimate with the highest predictive ability on future realized returns. Researchers have used several methods to evaluate the predictive ability of the estimates and the main methodology seems to be the relation test between the cost-of-equity capital estimates and the subsequent realized stock returns (Gode and Mohanram, 2003; Guay *et al.*, 2004; Shröder, 2004). Therefore, this study employs such a relation test as the main methodology.

Model description

The study uses six equity valuation models for the ICE estimation and two traditional asset pricing models (CAPM and FF model). The models are described in the Appendix.

Data description and test procedure

Data

The sample of this study consists of publicly traded lodging firms available in the I/B/E/S database. The sample period starts from 1976 when the database began to provide required forecasting data and ends in 2005. The study requires firms to have a one-year-ahead earnings-per-share (EPS) forecast in I/B/E/S. The study collected all additional available EPS forecast data to be used in the analysis. When available, long-term growth rate is obtained and used. When the long-term growth rate data was not available from I/B/E/S, as discussed in detail in model specification section, the study used a linear interpolation process for RIV1 estimation and collected firm EPS data of the past ten years (or at least five years based on the data availability), to estimate a firm-specific average long-term growth rate for other equity valuation model estimations.

In addition to forecasted data, firms must have data on book values, earnings, dividends, and long-term debt from the merged COMPUSTAT annual industrial file and have data of the required stock prices, trading volumes and shares outstanding from the Center for Research in Security Prices (CRSP). Table II provides sample firm information consisting of nine lodging firms.

Test procedure

To evaluate the predictive ability of the cost-of-equity capital estimates, the main analysis employs an examination of the relationship between cost-of-equity capital estimates and subsequent realized stock returns. The main analysis involves subsequent returns for one quarter to three years in future. As a part of the main analysis, this study employs Vuong's z-test (1989) to compare eight cost-of-equity capital estimates to see if their performances in the main analyses are statistically different from each other.

Name	Sample size
Hilton	30
Marcus Hospitality	20
La Quinta	19
Starwood	18
Marriott	12
Red Lion Inns	11
Club Med	8
United Inns	5
Fairmont	3
Total	126

Table II.
Summary of sample firms

Relation test of ERP estimates with future realized ERP

According to the findings of Frankel and Lee (1998) and Dechow *et al.* (1999), on average, the cost-of-equity capital should positively correlate with realized returns in the future. Elton (1999) examined this relation by using the average realized return as a proxy for the expected return and found low correlations with future realized returns. This finding has encouraged many to search for alternatives to estimating the expected cost-of-equity capital. Gode and Mohanram (2003), Guay *et al.* (2004) and Shröder (2004) mainly performed this relation test by using the implied cost-of-equity (ICE) estimates and this study follows their practice.

This study regresses each of the realized ERPs in quarter one to four on the ERP estimate. Additionally, regressions for year two and three examine the explanatory powers of the ERP estimates for a long run. The general regression analysis form is:

$$ERP_{future} = \beta_0 + \beta_1 ERP_t + e$$

where, ERP_{future} = the future realized ERP (1, 2, 3 and 4 quarter, and 2 and 3 year ahead), and ERP_t = the ERP estimates at time, t.

Findings

Descriptive statistics

Descriptive statistics of the estimates of cost-of-equity capital are shown in Table III. All eight cost-of-equity capital estimates are before subtracting the risk-free rate (one-month Treasury bill rate) for the main analysis. There are small variations in sample size for different estimates. For the ICE estimation, some sample observations were eliminated because the discount factor is included in the model as multiple powers and sometimes the estimation is not possible in that setting. For the traditional asset pricing model estimation, seven sample observations were eliminated because of using time-series data to estimate the beta. The difference in sample size of the eight estimates is minimal and therefore is expected to have no significant impact on the results of the analysis.

The summary statistics of Table II are based on the original estimates before winsorizing the data for statistical analysis. The range of the finalized equity-risk premium estimate for the analysis is from 0 to 50 percent following the general ICE literature. When the equity-risk premium estimate goes below 0 percent, the estimate is winsorized to 0 percent and when the estimate goes above 50 percent, it is winsorized

Estimates	n	Mean	Median	Std. Dev.	Min	Max
RIV1	126	1.95%	1.10%	6.76%	0.03%	73.50%
RIV2	123	4.25	3.40	3.35	0.00	12.99
DIV1	126	5.84	5.01	2.14	3.88	13.10
DIV2	126	7.36	6.39	3.08	4.23	20.45
OJ	122	11.76	11.02	4.12	1.13	30.35
PFE	124	6.83	6.45	3.63	0.20	17.80
CAPM	119	0.63	1.01	4.48	−15.27	13.06
FF	119	0.77	1.32	4.99	−21.36	11.51

Notes: RIV1 is cost-of-equity capital estimate computed using residual income valuation model as implemented by Gebhardt *et al.* (2001); RIV2 is cost-of-equity capital estimate computed using residual income valuation model as implemented by Claus and Thomas (2001); DIV1 is cost-of-equity capital estimate computed using two-stage dividend model; DIV2 is cost-of-equity capital estimate computed using three-stage dividend model; OJ is cost-of-equity capital estimate computed using Ohlson-Juettner model (2003); PFE is cost-of-equity capital estimate computed using price-to-forward earnings model; CAPM is cost-of-equity capital estimate computed using CAPM model; FF is cost-of-equity capital estimate computed using Fama and French Three Factor Model; n = number of sample size

Table III. Summary statistics of cost-of-equity

to 50 percent. OJ estimate presents the highest mean (11.76 percent) and median (11.02 percent) values and the CAPM estimate shows the lowest mean (0.63 percent) and median (1.01 percent) values among all of the eight estimates. The differences between the estimates widely vary and therefore, reliable and precise implications from all of these different estimates are difficult.

One noticeable finding is that both of the CAPM and FF model estimates are very low. The CAPM estimate shows a mean value of 0.63 percent and median value of 1.01 percent, while the FF model estimate shows a mean value of 0.77 percent and a median value of 1.32 percent. Another important point about the CAPM and FF estimates is their negative minimum values. The minimum value of the CAPM estimate is −15.27 percent while the minimum value of the FF estimate is −21.36 percent. Again, these values are not the data used for the analysis, but are winsorized to 0 percent for the analysis. However, what these negative figures possibly imply is that the CAPM and FF estimates may not be reliable in the lodging setting because the cost-of-equity capital cannot fall below 0%. The cost-of-equity capital is the expected return to investors, and investors would not buy a security if their expected return on that particular security is below the risk-free rate because they can achieve the return at risk-free rate without any risk. Some previous studies used 5 percent as an average premium when CAPM or FF model provided negative estimates. However, when considering there are no negative cost-of-equity capital estimates from any of the models based on the ICE approach while a significant proportion of the cost-of-equity capital estimates from CAPM and FF model are negative: forty-nine observations out of 119 (41 percent) show negative signs for the CAPM estimate and 45 observations out of 119 (38%) for the FF model estimate, it certainly suggests that the ICE estimates are more reliable than CAPM or FF model estimates.

Primary analysis

The results of the primary analysis for the entire sample period of 1976 to 2005 are presented in Table IV. Two estimates of the residual income valuation model (RIV1

Quarter1	ERPRIV1	ERPRIV2	ERPDIV1	ERPDIV2	ERPOJ	ERPPFE	ERPCAPM	ERPFF
β_1	−0.12463	−1.04495	−1.47307	−0.94401	−0.13432	0.23980	0.21904	−0.14410
T-stat	−0.65	−2.68	−2.41	−2.24	−0.47	0.65	0.43	−0.29
p-value	0.5137	0.0083	0.0175	0.0269	0.6398	0.5140	0.6700	0.7718
Quarter2								
β_1	−0.08342	−0.91893	−0.06111	−0.23663	0.05635	1.33937	−0.49875	−0.39384
T-stat	−0.26	−1.38	−0.06	−0.33	0.12	2.23	−0.58	−0.48
p-value	0.7932	0.1700	0.9534	0.7423	0.9063	0.0279	0.5605	0.6343
Quarter3								
β_1	−0.28514	−1.43958	0.16015	0.05076	0.02567	2.47325	0.13798	−0.41676
T-stat	−0.81	−1.95	0.14	0.06	0.05	3.82	0.14	−0.45
p-value	0.4222	0.0536	0.8910	0.9497	0.9617	0.0002	0.8855	0.6525
Year1								
β_1	−0.30609	−1.60127	−0.08005	-0.06685	−0.05448	2.59002	−0.42513	−0.95081
T-stat	−0.82	−2.05	−0.07	−0.08	−0.10	3.79	−0.42	−0.98
p-value	0.4136	0.0422	0.9483	0.9373	0.9232	0.0002	0.6738	0.3288
Year2								
β_1	−0.66063	−2.76202	0.06398	−0.11966	0.50114	4.68276	−0.74561	−0.92174
T-stat	−1.09	−2.14	0.03	−0.09	0.54	4.22	−0.45	−0.58
p-value	0.2784	0.0343	0.9748	0.9319	0.5869	<.0001	0.6521	0.5646
Year3								
β_1	−0.10747	−3.16724	−0.25126	−0.87250	0.28850	6.43090	−0.37170	−1.58586
T-stat	−0.14	−1.83	−0.09	−0.47	0.24	4.49	−0.17	−0.76
p-value	0.8922	0.0703	0.925	0.6365	0.8108	<.0001	0.8639	0.4501

Notes: ERP_{future} (the future realized ERP (1, 2, 3 and 4 quarter, and 2 and 3 year ahead) $= \beta_0 + \beta_1 ERP_t + e$); ERP_t is the ERP estimates at time, t; ERPRIV1 is equity risk premium estimate computed using residual income valuation model as implemented by Gebhardt *et al.* (2001); ERPRIV2 is equity risk premium estimate computed using residual income valuation model as implemented by Claus and Thomas (2001); ERPDIV1 is equity risk premium estimate computed using two-stage dividend model; ERPDIV2 is equity risk premium estimate computed using three-stage dividend model; ERPOJ is equity risk premium estimate computed using Ohlson-Juettner model (2003); ERPPFE is equity risk premium estimate computed using price-to-forward earnings model; ERPCAPM is equity risk premium estimate computed using CAPM model; ERPFF is equity risk premium estimate computed using Fama and French Three Factor Model; Sample period: 1976-2005

Table IV.
Regression analysis of the equity-risk estimates with realized returns

and RVI2) constantly display a negative relation with future realized returns, which is inconsistent with the expected direction. RIV1 does not show any statistically significant relation with the realized returns while RIV2 shows several statistically significant relations with the realized returns in quarter-1 (t-value $= -2.68$, p-value $= 0.0083$), year-1 (t-value $= -2.05$, p-value $= 0.0422$), and year-2 (t-value $= -2.14$, p-value $= 0.0343$). However, all of these relations are negative, and therefore, both of these residual income valuation model estimates do not present good predictive ability.

The two estimates of the dividend model (DIV1 and DIV2) present more negative relations with the future realized returns than positive ones. Both of DIV1 (t-value $= -2.41$, p-value $= 0.0175$) and DIV2 (t-value $= 2.24$, p-value $= 0.0269$) show statistically significant relations with the realized returns in only quarter-1;

however, the relationship is negative. All other relations do not present any significance in a statistical manner with *p*-value ranging from 0.6365 to 0.9748. The findings suggest that the dividend model estimates are not able to predict future realized returns well.

The OJ estimate shows all positive relations with the realized returns except in quarter-1 and year-1. However, none of the positive relations presents a statistical significance, not even at a marginal level, with p-value ranging from 0.5869 to 0.9617. The last ICE estimate and the simplest model estimate, PFE estimate, shows significantly positive relations with most of realized returns in the future except for quarter-1. The relation becomes statistically significant between the estimate and the returns in quarter-2 (t-value = 2.23, p-value = 0.0279). The significance becomes even stronger for later periods of quarter-3 (t-value = 3.82, p-value = 0.0002), year-1 (t-value = 3.79, p-value = 0.0002), year-2 (t-value = 4.22, p-value < 0.0001), and year-3 (t-value = 4.49, p-value < 0.0001). Obviously the PFE estimate distinguishes itself from its peer ICE estimates in showing a strong relation with realized returns in the future, and therefore, the PFE estimate is the ICE estimate with the highest predictive ability.

Both the traditional asset pricing model estimates present a negative relation with realized returns in most periods. None of the CAPM and FF model estimates show statistically significant relation with the p-value ranging from 0.5605 to 0.8855 for the CAPM estimate and from 0.3288 to 0.7718 for the FF model estimate. The findings suggest that the two traditional asset pricing models do not have good predictive ability in the lodging setting, supporting the general arguments by Elton (1999), Fama and French (1997) and Guay *et al.* (2004).

This study performs Vuong's Z-test (1989), which none of previous ICE studies has performed, to statistically compare the predictive ability between the PFE and other estimates and presents the results in Table V. Based on Vuong's *Z* statistic, the PFE estimate demonstrates statistically significant differences in predictive ability from others for year-1 to-3. For quarter-1 to -3, none of the comparisons is statistically different. However, except for three, all other comparisons show positive *z* statistics which present favor for the PFE estimate even though they are not statistically

			z-statistic			
Comparison	Quarter1	Quarter2	Quarter3	Year1	Year2	Year3
ERPPFE vs ERPRIV1	0.00	1.12	1.50	1.85*	1.99**	2.14**
ERPPFE vs ERPRIV2	−1.57	0.73	1.26	1.37	1.67*	2.04**
ERPPFE vs ERPDIV1	−1.14	1.13	1.58	1.95*	2.17**	2.13**
ERPPFE vs ERPDIV2	−1.15	1.08	1.57	1.95*	2.16**	2.10**
ERPPFE vs ERPOJ	0.13	1.15	1.58	1.94*	2.20**	2.18**
ERPPFE vs ERPCAPM	0.17	0.93	1.61	1.84*	2.09**	2.12**
ERPPFE vs ERPFF	0.26	1.04	1.55	1.72*	2.11**	2.09**

Notes: * and ** represent *p*-value less than 0.05 and 0.025, respectively; This Table presents results of the Vuong's *Z*-test to statistically compare performance differences between the PFE and other seven estimates; Sample period: 1976-2005

Table V. Summary of Vuong's *Z*-test significant. The findings of Vuong's *Z*-test, in general, support that the PFE estimate has a better predictive ability than other estimates, especially for year-1 to -3.

Sensitivity analysis

This study performs additional analysis examining the relationship between the eight cost-of-equity capital estimates and main firm risk factors, beta and size, to provide a better understanding of the estimates. According to the CAPM, a positive relationship between the market beta and equity-risk premium is predictable, and Berk (1995) suggested the negative relationship of the equity-risk premium with firm size. Univariate and multivariate analyses of the estimates with beta and size were conducted and the results are presented in Table VI. The results confirm the main findings of this study. OJ and PFE estimates present a positive and statistically significant relationship with beta while none of other estimates shows such relationship. An expected negative relationship with size variable appears for RIV2, DIV1, DIV2 and PFE estimate with statistical significance. The traditional asset pricing model estimates positively correlate with the size variable, which is inconsistent with the expectation. PFE estimate is the only estimate identified as one presenting a correct and significant relationship with both risk factors in univariate analyses.

To see the effects of the two risk factors together, the study performs multivariate analysis of the estimates with beta and size. The findings of the multivariate analysis clearly suggest that the PFE estimate is the best among other cost-of-equity capital estimates. Only PFE estimate shows expected relationship with beta and size together. Based on univariate and multivariate analyses with two widely accepted risk factors (beta and size), the PFE estimate once more distinguishes itself from other cost-of-equity capital estimates by presenting significant and expected relationships with the two risk factors for the lodging industry.

Implications for lodging analysts, investors, executives and researchers

The findings of this study are important to the lodging industry in many ways. First of all, lodging financial analysts must strongly consider the ICE approach, especially using the PFE equity valuation model, a reliable tool to estimate the cost-of-equity

					Beta & Size			
	Beta		Size		Beta		Size	
Estimate	*T*-value	*p*-value	*T*-value	*p*-value	*T*-value	*p*-value	*T*-value	*p*-value
ERPRIV1	−0.10	0.9220	−0.73	0.4645	−0.18	0.8561	−0.78	0.4382
ERPRIV2	−0.64	0.5210	−7.61	<.0001	−1.57	0.1190	−7.36	<.0001
ERPDIV1	−0.92	0.3591	−6.47	<.0001	−1.78	0.0784	−6.54	<.0001
ERPDIV2	−0.53	0.5989	−4.98	<.0001	−1.13	0.2600	−5.11	<.0001
ERPOJ	2.44	0.0160	−0.36	0.7194	2.46	0.0153	0.38	0.7061
ERPPFE	2.25	0.0262	−2.43	0.0167	2.02	0.0452	−2.37	0.0195
ERPCAPM	1.44	0.1517	0.33	0.7392	1.47	0.1455	0.34	0.7362
ERPFF	1.28	0.2033	1.11	0.2673	1.39	0.1667	1.09	0.2766

Notes: ERP_t is the ERP estimates at time, *t*; *Beta* is estimated according to CAPM by using 60 lagged monthly returns of individual security and of the CRSP value-weighted index as the market proxy; *Size* is estimated using the log of the capitalization of equity; $ERP_t = \omega_0 + \omega_1 Beta_t + \omega_2 Size_t + e_t$

Table VI.
Relation of the equity-risk premium estimates with beta and size

capital when they perform lodging firm analysis. The lodging analysts have been using the CAPM and FF models when the cost-of-equity capital estimation is required because these are the prevailing models in financial literature and the market. In some cases, as in Rushmore (1992a; 1992b), the cost-of-equity capital estimate was simply assumed, based on historical data in the equity valuation process. However, this application has not been empirically investigated in the lodging industry setting.

Now with the new findings, specifically for the lodging industry, lodging analysts should take a close look at the possibility of utilizing the ICE approach, employing the PFE equity valuation model for their cost-of-equity capital estimations. The influence for the lodging analysts will flow to lodging investors as well. They both should be aware of the limitations of cost-of-equity capital estimation by traditional asset pricing models and the possibility of the superior predictive ability of the new ICE approach. With that awareness and the findings of this study, lodging investors should employ the ICE approach using the PFE model for making their investment decisions. If the investors follow the lodging analysts' recommendations, they can determine how lodging analysts estimate cost-of-equity capital in an analysis process. The findings also influence lodging corporate executives in their own stock value analyses. More reliable and better corporate decisions and plans regarding equity issues will develop after employing an approach for estimating cost-of-equity capital with better predictive ability.

The findings of this study make another significant contribution to lodging industry financial research. Lodging industry researchers have mostly employed the CAPM and FF model to estimate cost-of-equity capital when conducting their studies. If the CAPM and FF model estimates are not reliable, specifically for the lodging industry setting, as suggested in this study, the findings of previous studies using them for estimates become unreliable as well. The ICE estimate, particularly the PFE estimate, demonstrates a better predictive ability than the CAPM and FF model estimates in the lodging industry setting, and therefore, employing it for the lodging studies will enhance and enrich lodging industry financial literature.

Note

1. Please contact the authors for detailed descriptions and operationalizations of the models.

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Appendix. Model descriptions[1]

Equity valuation models

Residual income valuation (RIV1) model (as implemented in Gebhardt *et al.* (2001)):

The model including the first stage is:

$$P_0 = B_0 + \sum_{t=1}^{3} \frac{FROE_t - r_e}{(1+r_e)^t} B_{t-1} + TV$$

where, P_0 = current share price at year 0; B_0 = book value of equity from the most recent financial statement divided by the number of shares outstanding in the current month; r_e = cost-of-equity capital or, equivalently, shareholders' expected rate of return; $FROE_t$ = forecasted return on equity (*ROE*) at time,*t*. For the first three years, this variable will be computed as $FEPS_t/B_{t-1}$, where $FEPS_t$ is the I/B/E/S mean forecasted *EPS* for year, *t*, and B_{t-1} is the book value per share for year, $t-1$. Beyond the third year, *FROE* is forecast by using a linear interpolation for the industry median *ROE*; $B_t = B_{t-1} + FEPS_t - FDPS_t$, where $FDPS_t$is the forecast dividend per share at time*t*, estimated using the current dividend payout ratio (k_{DIV}). Specifically, the assumption is that $FDPS_t = FEPS_t^* k_{DIV}$.

The second and third stages include the period from year four to year 12 and the terminal value as given below:

$$TV = \sum_{t=4}^{12} \frac{FROE_t - r_e}{(1+r_e)^t} B_{t-1} + \frac{FROE_{12} - r_e}{r_e(1+r_e)^{12}} B_{11}$$

Residual income valuation (RIV2) model (as implemented in Claus and Thomas (2001)):

$$P_0 = B_0 + \sum_{t=1}^{5} \frac{ae_t}{(1+r_e)^t} + TV$$

where, P_0 = current share price at year 0; B_0 = book value of equity from the most recent financial statement divided by the number of shares outstanding in the current month;e_t = earnings forecast at year *t; $ae_t = e_t - r_e(B_{t-1})$* = expected abnormal earnings at year *t*, or forecast accounting earnings less a charge for the cost-of-equity capital; r_e = cost-of-equity capital or, equivalently, shareholders' expected rate of return.

The terminal value (*TV*) calculation beyond year five is:

$$TV = \frac{ae_5(1+g_{\inf lation})}{(r_e - g_{\inf lation})(1+r_e)^5}$$

where, $g_{\inf lation}$ = perpetual growth rate beyond year 5, equal to the inflation rate ($= r_f - 3\%$); r_f = risk-free rate (ten-year Treasury bond rate);

Two-stage dividend (DIV1) model (as implemented in Damodaran (1999)):

$$P_0 = \sum_{t=1}^{5} \frac{FDPS_t}{(1+r_e)^t} + \frac{FDPS_5(1+g_{GDP})}{(r_e - g_{GDP})(1+r_e)^5}$$

where, P_0 = current share price at year 0; $FDPS_t$ = forecast dividends per share at the end of year, *t;* r_e = cost-of-equity capital or, equivalently, shareholders' expected rate of return, and g_{GDP} = perpetual growth rate beyond year five, equal to long-term GDP growth rate.

Three-stage dividend (DIV2) model (as implemented in Cornell (1999)):

$$P_0 = \sum_{t=1}^{5} \frac{FDPS_t}{(1+r_e)^t} + \sum_{t=6}^{20} \frac{FDPS_t}{(1+r_e)^t} + \frac{FDPS_{20}(1+g_{GDP})}{(r_e - g_{GDP})(1+r_e)^5}$$

The first stage is the growth period for five years and is implemented exactly the same as the DIV1 model. The second stage represents the transition period for 15 years from year six to 20. This study assumes the growth rate of the dividend during the transition period to linearly decline from the analysts' consensus long-term growth rate (g_{long}) to the estimated long-term GDP growth rate of the economy (g_{GDP}). For example, the forecast dividend at year six calculates as follows:

$$FDPS_6 = FDPS_5 \times \left\langle 1 + \left[g_{long} - \left(\frac{g_{long} - g_{GDP}}{15} \right) \right] \right\rangle$$

assuming the relation of$g_{long} > g_{GDP}$. The third stage is the stable growth period and begins with year 21. The growth rate for the third stage is g_{GDP} and is assumed to be constant for perpetuity.

Ohlson-Juettner (OJ) model (as implemented in Ohlson and Juettner-Nauroth (2003)):

$$P_0 = \frac{FEPS_1}{r_e} + \frac{[FEPS_2 - FEPS_1 - r_e(FEPS_1 - FDPS_1)]}{r_e(r_e - g)}$$

The dividend payout ratio (k_{DIV}) is estimated the same as the RIV1 model. The study computes the forecast dividends per share at year one ($FDPS_1$) by multiplying the forecast earnings per share at year one ($FEPS_1$) by k_{DIV}. The other important input to the OJ model is the perpetual growth rate (*g*) and the study uses the inflation rate ($g_{\inf lation}$) derived as in the RIV2 model and is the proxy:

$$g_{inflation} = r_f - 3\%$$

Price-to-forward earnings (PFE) model (as implemented in Easton and Monahan (2005)):

$$P_0 = \frac{[FEPS_1 + (r_e \times FDPS_1) + FEPS_2]}{(r_e + 1)^2 - 1}$$

Asset pricing models

Capital asset pricing model (CAPM):

$$E(R) - R_f = \beta[E(R_m) - R_f]$$

where, $E(R)$: expected return on equity, or equivalently cost-of-equity capital; R_f: risk-free rate; $E(R_m)$: expected market return, and β: systematic risk.

The Fama and French three factor (FF) model:

$$R_i - R_f = \beta[R_m - R_f] + s_i SMB + h_i HML + e_i$$

where, R_i = expected return on equity, or equivalently cost-of-equity capital; R_f = risk-free rate; R_m = expected market return; SMB = size, and HML = book-to-market equity.

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