

Journal of Hospitality Financial Management

The Professional Refereed Journal of the International Association of Hospitality Financial Management Educators

Volume 26 | Issue 1

Article 3

Summer 2018

Multifactor Asset Pricing Model Evidence From Hotel Stocks and Lodging Real Estate Investment Trusts

Fahad Almudhaf

Follow this and additional works at: <https://scholarworks.umass.edu/jhfm>

Recommended Citation

Almudhaf, Fahad (2018) "Multifactor Asset Pricing Model Evidence From Hotel Stocks and Lodging Real Estate Investment Trusts," *Journal of Hospitality Financial Management*: Vol. 26 : Iss. 1 , Article 3.

DOI: <https://doi.org/10.7275/R5GT5KDG>

Available at: <https://scholarworks.umass.edu/jhfm/vol26/iss1/3>

This Refereed Article is brought to you for free and open access by ScholarWorks@UMass Amherst. It has been accepted for inclusion in Journal of Hospitality Financial Management by an authorized editor of ScholarWorks@UMass Amherst. For more information, please contact scholarworks@library.umass.edu.

Multifactor Asset Pricing Model Evidence From Hotel Stocks and Lodging Real Estate Investment Trusts

Fahad Almudhaf

Department of Finance and Financial Institutions, Kuwait University, Kuwait City, Kuwait

ABSTRACT

The main objective of this study is to examine the performance of hotel stocks and lodging real estate investment trusts (REITs) by estimating the recent Fama-French five-factor model (including investment and profitability factors) with an additional momentum factor during the 2000–2015 period. Using multifactor models, results show that lodging REITs underperform hotel stocks in the United States, while the opposite is true in Japan. Our findings indicate that the momentum factor is significant in explaining variation of lodging returns in both the United States and Japan. Smaller lodging firms are generating higher returns than larger firms in the United States and Japan, on average. Operating profitability is strongly associated with average returns of hotel stocks and REITs in the United States. However, it seems that the investment factor plays an insignificant role in the asset pricing of lodging industry stocks and REITs. We find no evidence of the effectiveness of adding profitability and investment factors in Japan. Our results offer valuable investment insights that help lodging investors better understand the nature of their investments. Also, findings of the current study would benefit hotel owners who are considering both organizational structures (i.e., REITs vs. C-corps) and portfolio managers who are considering lodging for diversification purposes.

Keywords: *lodging REIT, hotel stock, Fama-French five-factor model, Japan, multifactor model, capital asset pricing model, momentum*

Introduction

Lodging real estate investment trusts (REITs) manage and own hotels. By June 2017, there were 21 publicly traded U.S. lodging / resort REITs, with a market capitalization of \$54.7 billion (National Association of Real Estate Investment Trusts, 2017). Lodging REITs attract investors who are interested in diversification, dividends, and some tax benefits. A number of studies compare the performance of lodging stocks and lodging REITs. For example, Tang and Jang (2008) show that hotel REITs and hotel C-corporations are similar in terms of profitability, while C-corps have more flexibility in dividends and payout ratios. This is contrary to Madanoglu and Upneja (2008), who find that hotel REITs achieve a better risk-adjusted performance. Recently, Dogru (2017) compares C-corps hotels to hotel REITs in terms of their business models, financing methods, and profitability. He finds that

hotel REITs are superior in terms of corporate governance and operational performance. However, hotel C-corps have lower risks and higher expected growth.

Our paper is based on the theoretical construct of the capital asset pricing in finance that relates required returns to risks. Investors seeking to maximize their wealth usually measure the performance of their portfolios using risk-adjusted measures. Earlier studies apply a single-factor risk-adjusted model based on the capital asset pricing model (CAPM). For example, Kim, Mattila, and Gu (2002) apply the CAPM and Jensen index to evaluate the performance of lodging REITs, which appeared to exhibit the highest market risk while underperforming other REIT subsectors. According to Kim and Jang (2012), the Fama-French three-factor model explains 67% and 69% of the variation in returns of U.S. hotel REITs and hotel C-corps, respectively, during the 2000–2009 period. Therefore, they

CONTACT: Address correspondence to Fahad Almudhaf, Department of Finance and Financial Institutions, Kuwait University, P.O. Box 5486 Safat, Kuwait 13055. Email: fmudhaf@cba.edu.kw.

© 2018 International Association of Hospitality Financial Management Education

suggest further research into a more concise model explaining the remaining variation. Thus we aim to fill the gap by applying the recent Fama and French (2015) five-factor asset pricing model to better understand the performance characteristics. Fama and French (2015) show that adding the factors of profitability and investment improves the performance of the model. Recently, Fama and French (2017) apply their five-factor model to several international stock markets. In addition, we augment their five-factor model with a momentum factor (Carhart, 1997). To add an international dimension to the analysis, we apply these models for the most developed Asian market (Japan) and compare it with our U.S. findings. Comparing our U.S. and Japanese results would suggest that such factors could be country specific and that we should be cautious in generalizing our conclusions to other developed or emerging lodging markets.

The lodging industry has unique characteristics and thus requires separate examination. Hotels are a unique hybrid of retail and housing that combine operating business with real estate. Due to the nature of their business, hospitality firms tend to have high financial leverage to finance their fixed assets, relatively high capital expenditures when compared to other industries, and low cash holdings and operating margins due to competition (Altin, Kizildag, & Ozdemir, 2016). Intangible assets such as human capital, technology, safety, and brand could play an important part in the valuation of hotel companies (Madanoglu & Olsen, 2005). Also, lodging REITs deserve examination of the profitability and investment factors for asset pricing because of their asset-intensive nature and the regulations governing them regarding dividends payments and taxes. Since they must distribute a minimum of 90% of their earnings, they could face investment constraints preventing them from growing and using internal funds. Therefore, it would be interesting to see how the investment factor plays a role within such an environment and among such restrictions.

Since asset pricing is important for investment performance and evaluation, our results are of interest to investors and fund managers. It can be used to better predict the future performance of the lodging sector while enhancing forecasting abilities of lodging investors. Portfolio managers and hotel owners aim to choose the best investment instrument

or structure (i.e., REIT vs. C-corp), and our findings would help make this determination, with the enhanced power of explaining risk and return. Our results help business executives properly estimate the cost of equity in the lodging industry, which is essential in the capital-budgeting decisions of the executive management, as it is strongly related to the performance and future of the firm.

Literature Review

Ever since the seminal work of Fama and French (1993), hundreds of scholars continued the factor-discovery journey to better explain asset pricing, with some studies finding that certain factors subsume the explanatory power of others. Not all anomalous patterns or factors previously documented are similarly important. The debate continues on how to synthesize, deal with, and filter anomalies, especially because the significance of published results is not consistent over time or across markets. The reader can refer to two of the most recent thought-provoking articles on the topic for further details (Harvey, Liu, & Zhu, 2016; Novy-Marx & Velikov, 2016).

Novy-Marx (2013) provides evidence that the Fama-French three-factor model does not capture variation in returns related to profitability. In addition, Aharoni, Grundy, and Zheng (2013) find significant relation between returns and investments. Thus Fama and French (2015) proposed two extra risk proxies to better explain returns: the investment factor and the profitability factor. Lodging stocks have their own attributes and unique characteristics that deserve separate attention. For example, Lee and Upneja (2007) show that lodging stocks are undervalued when compared to other sectors of the stock market and therefore deserve separate investigation.

Several studies applied multifactor models in the overall REIT market (e.g., Chui, Titman, & Wei, 2003). Goebel, Harrison, Mercer, and Whitby (2013) document that momentum is a significant factor in explaining REIT returns. Glascock and Lu-Andrews (2014) show that profitable REITs have higher returns and that using gross profit adds explanatory predictive power to the model. Recently, Ling, Ooi, and Xu (2016) document that equity REITs with higher asset growth rates underperform those with

lower asset growth. Applying an investment-based asset pricing model, Bond and Xue (2017) confirm that profitability and investment are significant factors in predicting equity REIT returns. Since lodging REITs have different risks and characteristics from general equity REITs, we aim to test them separately.

Earlier studies covering the performance of lodging industry use the single-factor CAPM model (e.g., Jackson, 2009; Kim, Gu, & Mattila, 2002; Kim, Mattila, & Gu, 2002; Kim, Jackson, & Zhong, 2011; Mao & Gu, 2007). However, Madanoglu, Olsen, and Kwansa (2005) show that the Fama-French three-factor model is superior to the CAPM model and recommend utilizing it when calculating the cost of equity for the lodging industry. Since the model adjusts for additional risk factors such as size and distress, it can be viewed as more realistic and enhanced. Another strand of the literature relates macro and nonmacro factors to lodging stock returns (e.g., Chen, 2007; Chen, Kim, & Kim, 2005). Chen (2010) documents a significant negative relationship between lodging stocks and inflation. Later, Chen (2014) finds that hotel stocks are significantly affected by surprises in the U.S. federal fund rate during business contraction periods. Investigating the determinants of systematic (i.e., market) risk in the online travel agency industry, Lee, Moon, Lee, and Kerstetter (2015) find that firm size and liquidity play a crucial factor in determining beta. Examining unsystematic risks (i.e., firm specific or unique) in hospitality firms, Hsu and Jang (2008) document that larger and more profitable hotel firms have lower unsystematic risks.

Using U.S. hotel stocks and REITs, Kim and Jang (2012) show that a multifactor model (market, size, and value) has more explanatory power when compared to a single-factor CAPM. The market factor does not capture all risk premiums; however, Kim and Jang (2012) suggest adding more factors to explain the remaining variations in returns. Therefore, we extend and complement the work of these scholars by including three additional factors (momentum, investment, and profitability). In addition, we provide out-of-sample evidence from Japan to compare results and test whether such factors are only relevant in the U.S. lodging sector. Chen, Agrusa, Krumwiede, and Lu (2012) show that Japanese hotel returns are influenced by macroeconomic

factors such as inflation and oil prices. However, they did not include fundamental factors. This is similar to Mohanty, Nandha, Habis, and Juhabi (2014), who find a negative relationship between U.S. travel and leisure sector stocks and oil prices. Thus we complement the existing literature, which adds to our understanding of how lodging stocks are impacted by multiple risk factors.

Methodology and Data

We use historical monthly returns of U.S. hotel stocks and lodging REITs for the January 2000–December 2015 period from Bloomberg. The data for Japanese lodging REITs goes from March 2006 to December 2015 due to data availability. Japanese lodging firms and REITs were included in the sample because Japan is the most developed Asian market. This suggests that other developed international markets could have different exposures to such factors. The factors (market [Mkt], small minus big market capitalization [SMB], high minus low book-to-market [HML], conservative minus aggressive investment [CMA], robust minus weak operating profit [RMW], and winner minus loser [WML]) are downloaded from the website of Kenneth R. French (French, n.d.). We cover a total of 18 lodging and resort REITs and 30 hotel C-corps in the United States. In addition, we cover 3 lodging REITs and 14 hotel C-corps in Japan. The list of firms in our sample is included in Table 1.

Currency fluctuations could influence the equity valuation relationship in different countries. However, we do not add a factor to control for currency-fluctuation influence in our analysis of U.S. and Japanese stocks, since we use the domestic currency of each market and run the models separately. We use value-weighted (market-cap-weighted) portfolios. In order to avoid “survivorship bias,” we included not only the most recent active firms but any listed firm or REIT that was traded during the sample period and we perform monthly rebalancing of the portfolio based on the market capitalization. Including international data from Japan helps avoid “data snooping,” where results could be sample specific, existing in the United States only. We apply the following ordinary least squares (OLS) regression for a value-weighted portfolio of stocks and REITs separately,

Table 1. The List of Hotel C-Corps and Lodging REITs Included in the Sample

U.S. Hotel Stocks	U.S. Lodging REITs	Japanese Hotel Stocks	Japanese Lodging REITs
MARRIOTT INTL-A	HOST HOTELS & RE	CSS HOLDINGS LTD	JAPAN HOTEL REIT
HILTON WORLDWIDE	HOSPITALITY PROP	NIPPON VIEW HOTE	HOSHINO RESORTS
WYNDHAM WORLDWID	APPLE HOSPITALIT	AMAZE CO LTD	ICHIGO HOTEL REIT
HYATT HOTELS-A	LASALLE HOTEL PR	WBF RESORT OKINA	
VAIL RESORTS	SUNSTONE HOTEL	FUJITA KANKO INC	
CHINA LODGIN-ADS	RYMAN HOSPITALIT	IMPERIAL HOTEL	
EXTENDED STAY AM	RLJ LODGING TRUS	JOBAN KOSAN CO	
CHOICE HOTELS	DIAMONDROCK HOSP	RESOL HOLDINGS C	
MARRIOTT VACATIO	PEBBLEBROOK HOTE	ROYAL HOTEL LTD	
BELMOND LTD-A	XENIA HOTELS & R	AGORA HOSPITALIT	
LA QUINTA HOLDIN	CHESAPEAKE LODGI	KAMOGAWA GR.HOTE	
INTRAWEST RESORT	SUMMIT HOTEL PRO	HOTEL NEW GRAND	
RED LION HOTELS	FELCOR LODGING	KYOTO HOTEL LTD	
MORGANS HOTEL GR	HERSHA HOSPITAL	RESORTTRUST INC	
PEAK RESORTS INC	CHATHAM LODGING		
INNSUITES HOSPIT	ASHFORD HOSPITALITY		
GROGENESIS INC	BEHRINGER HARVAR		
SKYTOP LODGE COR	SOTHERLY HOTELS		
CASTLE GROUP INC	CONDOR HOSPITALITY		
SHOLODGE INC			
CN DRAGON CORP			
FUTURELAND CORP			
PURE HOSPITALITY			
CHILCO RIVER HOL			
CANDLEWOOD HOTEL			
WINDSTREAM TECHN			
MYRIAD ENTERTAIN			
OASIS HOTEL & RE			
KYN CAPITAL GROU			
WINTER SPORTS			
HEYU LEISURE HOL			

$$R_{it}-R_{Ft}=c_i+\beta_i(R_{Mt}-R_{Ft})+\gamma_iSMB_t+\delta_iHML_t+\theta_iCMA_t+\omega_iRMW_t+\tau_iWML_t+\varepsilon_{it} \quad (1)$$

where R_{it} is the return on the portfolio of hotel stocks or lodging REITs, R_{Ft} is the risk-free rate, R_{Mt} is the return on the market portfolio, c is a constant intercept term, SMB is the size factor (return of small minus big based on market cap), HML is the value factor (return of high minus low B/M), RMW is the profitability factor (return of robust minus weak measured by operating profits), CMA is the investment factor (return of conservative minus aggressive), WML is the momentum factor (return of winner minus loser), and ε_{it} is the error term. We use Newey-West autocorrelation and heteroscedasticity consistent standard errors to obtain our t-statistics in all regressions. In addition, we use the Durbin Watson (DW) statistic to investigate for serial correlation in the residuals.

Results and Discussion

The descriptive statistics, which are presented in Table 2 show that U.S. lodging C-corps outperformed U.S. lodging REITs by generating higher returns while having lower risks. There is an apparent systematic relationship between U.S. lodging stocks and size along with value premiums, as evident by the statistical significance of the coefficients of SMB and HML from Table 3. This is consistent with Kim and Jang (2012). However, it seems that the three-factor model explains less of the variation in our recent sample (58% compared to 67% during their sample period). This encourages and motivates researchers to make further efforts to explain the remaining variation. If we have a zero constant c , we can interpret this as evidence that the factor exposures loadings capture most of the variation in the returns; therefore, the intercept is

Table 2. Descriptive and Summary Statistics
U.S. Lodging Stocks and REITs, January 2000 to December 2015

	HOTEL_ STOCK	HOTEL_REIT	MKT	HML	SMB	RMW	CMA	WML
Mean	1.195927	0.180356	0.459687	0.333490	0.392396	0.451042	0.386979	0.264427
Median	2.014200	0.924474	1.190000	-0.045000	0.205000	0.375000	0.140000	0.470000
Maximum	41.65030	51.37025	11.35000	12.91000	18.72000	13.52000	9.550000	18.38000
Minimum	-31.77850	-42.04948	-17.15000	-11.25000	-15.28000	-19.11000	-6.550000	-34.58000
Std. Dev.	8.387031	9.701372	4.498556	3.244362	3.219773	3.261330	2.126998	5.693782
Skewness	-0.060343	-0.586568	-0.561649	0.142152	0.535865	-0.449026	1.000286	-1.535532
Kurtosis	7.549981	10.49680	3.757180	5.944398	10.15857	11.51669	5.959133	11.92480
Observations	192	192	192	192	192	192	192	192

Japanese Lodging Stocks, January 2000 to December 2015

	HOTEL_STOCK	MKT	HML	SMB	RMW	CMA	WML
Mean	0.614527	0.150365	0.681146	0.447917	-0.060260	0.344844	-0.028698
Median	-0.089100	0.320000	0.395000	0.345000	0.095000	0.165000	0.375000
Maximum	24.10160	15.12000	10.92000	8.250000	3.910000	7.270000	14.46000
Minimum	-18.75710	-13.43000	-8.100000	-6.410000	-6.600000	-6.470000	-15.99000
Std. Dev.	6.557181	4.807971	2.896531	2.664932	1.662784	2.142461	4.147889
Skewness	0.765804	-0.070424	0.349435	0.031353	-0.529678	0.214552	-0.563088
Kurtosis	5.415098	3.151130	3.968474	3.058002	3.915770	4.283043	5.347332
Observations	192	192	192	192	192	192	192

Japanese Lodging REITs, March 2006 to December 2015

	REIT	MKT	HML	SMB	CMA	RMW	WML
Mean	1.531636	0.200169	0.196102	0.131186	0.204237	0.093644	0.061695
Median	1.423900	0.465000	0.190000	0.185000	0.060000	0.205000	0.375000
Maximum	39.28940	10.89000	6.780000	5.760000	7.220000	3.310000	8.340000
Minimum	-47.29440	-13.43000	-4.980000	-6.410000	-5.920000	-4.170000	-15.99000
Std. Dev.	10.04162	4.275211	2.142208	2.382760	1.954064	1.510934	3.621289
Skewness	-0.109334	-0.397033	0.350374	-0.109721	0.397881	-0.336130	-0.955806
Kurtosis	8.848474	3.895194	3.951145	2.922503	4.938691	3.171489	6.174968
Observations	118	118	118	118	118	118	118

Note: MKT is the average market return. SMB is the size factor. HML is the value factor. RMW is the profitability factor. CMA is the investment factor. WML is the momentum factor.

insignificant, since the factors explain the variation in returns. If the intercept is not zero, the factors do not explain portfolio returns. From panel A of Table 3, we notice that the intercept is insignificant and not distinguishable from zero, with a t-statistic of only 0.479. The residuals do not seem to be serially correlated as indicated by the DW statistic. The market factor (beta) continues to play a significant role in asset pricing. The results from positive and significant factor loading of SMB indicate that smaller lodging firms are generating higher returns than larger firms on average. The SMB factor of the Fama-French model shows that the lodging industry portfolio behaves similarly to stocks of small market capitalization firms. Moreover, significant and positive factor exposures on HML show that higher BE/ME hotel firms earn more than lower BE/ME on average. This could be viewed as support

for the argument that higher book-to-market lodging firms are riskier, and thus investors are compensated for bearing the additional risk with higher returns on average. Regressing excess lodging portfolio returns on market premium as the only single factor yielded a much lower R-squared (0.494) compared to the alternative multifactor models (0.691). This indicates that adding fundamental factors improves the power of the model. Moreover, it seems that the profitability effect is evident based on the loadings of the RMW factor, and operating profitability is strongly associated with average returns in hotel stocks and REITs. However, adding an investment factor, which distinguishes between conservative and aggressive stocks (CMA), does not have any value when it comes to the lodging industry in the United States, especially with lodging REITs. Surprisingly, hotel REITs underperform

Table 3. Returns and Risks of U.S. Hotel Stocks and REITs Estimated by Alternative Models

USA	Int	$R_m - R_f$	SMB	HML	WML	RMW	CMA	Adj-R ²	DW
Panel A: Stocks									
CAPM									
Coef	0.639	1.308 ***						0.494	2.178
t-stat	1.616	7.535							
FF 3 factor									
Coef	0.281	1.287 ***	0.303 *	0.736 ***				0.576	2.168
t-stat	0.828	11.614	1.684	5.044					
FF 3 + MOM									
Coef	0.467	1.035 ***	0.465 ***	0.603 ***	-0.476 ***			0.659	2.142
t-stat	1.516	10.397	3.076	5.315	-5.078				
FF 5 factor									
Coef	0.152	1.355 ***	0.572 ***	0.788 ***		0.491 ***	-0.615 **	0.603	2.194
t-stat	0.433	12.793	3.168	5.093		2.776	-2.128		
FF 5 + MOM									
Coef	0.153	1.184 ***	0.793 ***	0.440 ***	-0.502 ***	0.699 ***	-0.298	0.691	2.184
t-stat	0.479	12.254	5.219	3.008	-6.674	5.372	-1.270		
USA	Int	$R_m - R_f$	SMB	HML	WML	RMW	CMA	Adj-R ²	DW
Panel B: REITs									
CAPM									
Coef	-0.429	1.471 ***						0.467	2.023
t-stat	-0.828	5.614							
FF 3 factor									
Coef	-1.060 ***	1.400 ***	0.693 ***	1.147 ***				0.642	2.161
t-stat	-2.732	8.944	4.947	6.742					
FF 3 + MOM									
Coef	-0.910 **	1.198 ***	0.823 ***	1.040 ***	-0.383 ***			0.681	2.056
t-stat	-2.180	8.093	6.110	7.510	-2.962				
FF 5 factor									
Coef	-1.212 ***	1.477 ***	0.882 ***	1.106 ***		0.387 **	-0.279	0.648	2.162
t-stat	-3.037	9.053	5.229	5.481		2.251	-1.065		
FF 5 + MOM									
Coef	-1.212 ***	1.335 ***	1.064 ***	0.817 ***	-0.416 ***	0.560 ***	-0.016	0.692	2.019
t-stat	-2.743	8.609	6.426	3.893	-3.473	2.811	-0.056		

Note: The sample covers January 2000 to December 2015. Int is the intercept. FF is Fama-French factors. SMB is the size factor. HML is the value factor. RMW is the profitability factor. CMA is the investment factor. WML is the momentum factor. DW is the Durbin Watson statistic. *, **, *** indicates significance at 10%, 5%, and 1% respectively.

hotel stocks in the United States, as shown by the significant negative constant (alpha). This is contrary to earlier findings by Kim and Jang (2012). Differences in our results could be due to using different time periods, since their sample covers only the January 2000–December 2009 period.

From Table 4, we can obviously notice that CMA and RMW factors have no marginal power in explaining the variation of returns in Japanese hotel stocks and REITs. Also, the value factor (HML) does not have any added value in Japan, which is consistent with results of Fama and French (2012) on the Japanese general stock market. Only market, size, and momentum factors show consistent significance in explaining Japanese hotel stocks returns. In

contrast with the results of Fama and French (2015), the momentum factor of Carhart (1997) in both the United States and Japan has a regression slope significantly different from zero, thus improving the performance of the model. This implies that lodging stocks are affected by the phenomenon whereby stocks that have been going up in the near past (i.e., last year) will continue to go up and vice versa. Our evidence on Japanese hotel stocks is similar to findings from Hanauer (2014) on the general Japanese stock market. The very low R-squared (0.29) in Japanese REITs could be due to the small sample and shorter period. Such findings motivate scholars to continue their attempts at better explaining lodging returns.

Table 4. Returns and Risks of Japanese Hotel Stocks and REITs Estimated by Alternative Models

Japan	Int	$R_m - R_f$	SMB	HML	WML	RMW	CMA	Adj-R ²	DW
Panel A: Stocks									
CAPM									
Coef	0.465	0.856 ***						0.393	2.022
t-stat	1.327	7.986							
FF 3 factor									
Coef	0.010	0.901 ***	0.850 ***	0.109				0.508	2.053
t-stat	0.030	9.841	7.702	0.836					
FF 3 + MOM									
Coef	0.023	0.920 ***	0.739 ***	0.176	0.321 ***			0.545	2.111
t-stat	0.078	10.901	6.356	1.266	2.769				
FF 5 factor									
Coef	0.034	0.895 ***	0.842 ***	0.033		-0.176	0.061	0.506	2.050
t-stat	0.097	9.912	7.328	0.213		-0.659	0.271		
FF 5 + MOM									
Coef	0.042	0.916 ***	0.739 ***	0.151	0.318 ***	-0.132	-0.028	0.541	2.107
t-stat	0.134	10.768	6.362	0.847	2.646	-0.455	-0.111		
Japan	Int	$R_m - R_f$	SMB	HML	WML	RMW	CMA	Adj-R ²	DW
Panel B: REITs									
CAPM									
Coef	1.305 *	1.239 ***						0.274	2.160
t-stat	1.658	4.440							
FF 3 factor									
Coef	1.275 *	1.298 ***	0.664 *	-0.327				0.294	2.163
t-stat	1.694	5.114	1.845	-0.969					
FF 3 + MOM									
Coef	1.276 *	1.294 ***	0.676 *	-0.324	-0.037			0.287	2.161
t-stat	1.686	5.285	1.855	-0.958	-0.208				
FF 5 factor									
Coef	1.350 *	1.226 ***	0.699 **	-0.043		0.050	-0.643	0.293	2.190
t-stat	1.798	5.064	2.020	-0.123		0.103	-1.444		
FF 5 + MOM									
Coef	1.363 *	1.229 ***	0.676 *	-0.031	0.078	0.011	-0.712	0.287	2.198
t-stat	1.805	5.177	1.894	-0.087	0.425	0.021	-1.473		

Note: The stock sample covers January 2000 to December 2015. However, REIT sample covers March 2006 to December 2015. Int is the intercept. FF is Fama-French factors. SMB is the size factor. HML is the value factor. RMW is the profitability factor. CMA is the investment factor. WML is the momentum factor. DW is the Durbin Watson statistic. *, **, *** indicates significance at 10%, 5%, and 1% respectively.

Conclusion, Implications, and Limitations

The main purpose of our study is to examine hotel stocks and lodging REITs in the United States and Japan using the recent Fama and French (2015) five-factor risk-adjusted model. We extend and complement Kim and Jang (2012), who apply the Fama and French (1993) three-factor model to U.S. hotel C-corps and REITs. By using the five-factor model (including profitability and investment factors) as well as a momentum factor (Carhart, 1997), we find that the momentum factor adds more explanatory power of returns. Consistent with Kim and Jang (2012), we show that the size and value factors continue to play an important role in asset pricing in

the United States. Thus we agree with them in their argument that a portfolio of growth (i.e., low book-to-market) or large-cap stocks benefits the most from adding hotel stocks, since a portfolio of hotel stocks is highly sensitive to returns of value and small-cap stocks. However, in Japan, the value factor does not add any significant explanatory power. Moreover, we find no evidence of the effectiveness of adding profitability and investment factors (RMW and CMA) in Japan. Similarly, the investment factor does not produce significant improvement in the U.S. lodging model once momentum is added.

Our findings have important implications for portfolio managers who specialize in evaluating lodging investments. Based on our results, investors

Table 5. Correlation Analysis of Returns

USA	R_{stock}	R_{REIT}	MKT	SMB	HML	CMA	RMW	WML
R_{stock}	1.00	0.84	0.70	0.25	0.23	-0.08	-0.20	-0.54
R_{REIT}	0.84	1.00	0.69	0.34	0.32	0.05	-0.22	-0.45
MKT	0.70	0.69	1.00	0.24	-0.05	-0.23	-0.51	-0.36
SMB	0.25	0.34	0.24	1.00	-0.12	0.04	-0.54	0.11
HML	0.23	0.32	-0.05	-0.12	1.00	0.60	0.46	-0.16
CMA	-0.08	0.05	-0.23	0.04	0.60	1.00	0.27	0.14
RMW	-0.20	-0.22	-0.51	-0.54	0.46	0.27	1.00	0.12
WML	-0.54	-0.45	-0.36	0.11	-0.16	0.14	0.12	1.00

Note: The sample covers January 2000 to December 2015. R_{stock} is the average return of lodging stocks. R_{REIT} is the average return of hotel REITs. MKT is the average market return. SMB is the size factor. HML is the value factor. RMW is the profitability factor. CMA is the investment factor. WML is the momentum factor.

Japan	R_{stock}	MKT	SMB	HML	CMA	RMW	WML
R_{stock}	1.00	0.63	0.30	-0.11	-0.02	-0.06	0.23
MKT	0.63	1.00	-0.07	-0.24	-0.16	0.03	-0.05
SMB	0.30	-0.07	1.00	0.00	0.08	-0.04	0.23
HML	-0.11	-0.24	0.00	1.00	0.59	-0.46	-0.13
CMA	-0.02	-0.16	0.08	0.59	1.00	-0.55	0.05
RMW	-0.06	0.03	-0.04	-0.46	-0.55	1.00	-0.03
WML	0.23	-0.05	0.23	-0.13	0.05	-0.03	1.00

Note: The sample covers January 2000 to December 2015. R_{stock} is the Japanese average return of lodging stocks. MKT is the Japanese average market return. SMB is the size factor. HML is the value factor. RMW is the profitability factor. CMA is the investment factor. WML is the momentum factor.

Japan	R_{REIT}	MKT	SMB	HML	CMA	RMW	WML
R_{REIT}	1.00	0.53	0.05	-0.15	-0.28	0.15	-0.08
MKT	0.53	1.00	-0.22	-0.10	-0.30	0.16	-0.18
SMB	0.05	-0.22	1.00	-0.14	0.05	-0.03	0.23
HML	-0.15	-0.10	-0.14	1.00	0.48	-0.40	0.03
CMA	-0.28	-0.30	0.05	0.48	1.00	-0.51	0.35
RMW	0.15	0.16	-0.03	-0.40	-0.51	1.00	-0.01
WML	-0.08	-0.18	0.23	0.03	0.35	-0.01	1.00

Note: The sample covers March 2006 to December 2015. R_{REIT} is the Japanese average return of hotel REITs. MKT is the Japanese average market return. SMB is the size factor. HML is the value factor. RMW is the profitability factor. CMA is the investment factor. WML is the momentum factor.

and hotel owners would prefer hotel stocks in the United States while preferring lodging REITs in Japan, since they generate excess returns even while using multifactor models. However, they should also consider other aspects of the organizational structures for lodging REITs and C-corps. This could also benefit portfolio managers who are looking to reduce risk through diversification and considering adding lodging to their existing portfolios. Such managers would like to add investments that have different sensitivity to risk factors such as size, value, and momentum. Our results help business executives properly estimate the cost of equity in the lodging industry, which is essential in the capital-budgeting decisions of the executive management, as it is strongly related to the performance and future of the firm.

Our study has some limitations. Our sample is restricted to publicly traded hotel stocks and lodging REITs because we do not have data on private companies. Also, we cannot generalize our findings to all international lodging markets. Thus future research can apply these variables to the hospitality sector in other developed and emerging markets. In addition, a future study could include the asset growth, liquidity, accruals, trading volume, analyst recommendation, idiosyncratic volatility, and macroeconomic factors. There is still room for other researchers to apply additional factors proposed by Madanoglu and Olsen (2005) to fit the lodging industry. They suggest using variables related to human capital, technology, safety, and brand strength as well as industry-specific variables such as the ownership structure of hotels.

References

- Aharoni, G., Grundy, B., & Zeng, Q. (2013). Stock returns and the Miller Modigliani valuation formula: Revisiting the Fama French analysis. *Journal of Financial Economics*, 110(2), 347–357.
- Altin, M., Kizildag, M., & Ozdemir, O. (2016). Corporate governance, ownership structure, and credit ratings of hospitality firms. *Journal of Hospitality Financial Management*, 24(1), 5–19.
- Bond, S., & Xue, C. (2017). The cross section of expected real estate returns: Insights from investment-based asset pricing. *Journal of Real Estate Finance and Economics*, 54(3), 403–428.
- Carhart, M. M. (1997). On persistence in mutual fund performance. *Journal of Finance*, 52(1), 57–82.
- Chen, M. H. (2007). Macro and non-macro explanatory factors of Chinese hotel stock returns. *International Journal of Hospitality Management*, 26(4), 991–1004.
- Chen, M. H. (2010). Federal Reserve monetary policy and US hospitality stock returns. *Tourism Economics*, 16(4), 833–852.
- Chen, M. H. (2014). Cyclical variation in the effect of federal funds target rate surprises on hospitality index returns. *Tourism Economics*, 20(2), 373–387.
- Chen, M. H., Agrusa, J., Krumwiede, D., & Lu, H. J. (2012). Macroeconomic influences on Japanese hotel stock returns. *Journal of Hospitality Marketing & Management*, 21(1), 81–99.
- Chen, M. H., Kim, W. G., & Kim, H. J. (2005). The impact of macroeconomic and non-macroeconomic forces on hotel stock returns. *International Journal of Hospitality Management*, 24(2), 243–258.
- Chui, A. C., Titman, S., & Wei, K. C. (2003). The cross section of expected REIT returns. *Real Estate Economics*, 31(3), 451–479.
- Dogru, T. (2017). C-corporation hotels vs. Hotel-REITs: A theoretical and practical comparison. *Boston Hospitality Review*, 5(1), 1–8.
- Fama, E. F., & French, K. R. (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics*, 33(1), 3–56.
- Fama, E. F., & French, K. R. (2012). Size, value, and momentum in international stock returns. *Journal of Financial Economics*, 105(3), 457–472.
- Fama, E. F., & French, K. R. (2015). A five-factor asset pricing model. *Journal of Financial Economics*, 116, 1–22.
- Fama, E. F., & French, K. R. (2017). International tests of a five-factor asset pricing model. *Journal of Financial Economics*, 123(3), 441–463.
- French, K. R. (n.d.). Data files. Tuck School of Business at Dartmouth. Retrieved from http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html
- Glascocock, J. L., & Lu-Andrews, R. (2014). The profitability premium in real estate investment trusts. Retrieved from <https://ssrn.com/abstract=2375431>
- Goebel, P. R., Harrison, D. M., Mercer, J. M., & Whitby, R. J. (2013). REIT momentum and characteristic-related REIT returns. *Journal of Real Estate Finance and Economics*, 47(3), 564–581.
- Hanauer, M. (2014). Is Japan different? Evidence on momentum and market dynamics. *International Review of Finance*, 14(1), 141–160.
- Harvey, C. R., Liu, Y., & Zhu, H. (2016). . . . And the cross-section of expected returns. *Review of Financial Studies*, 29, 5–68.
- Hsu, L. T., & Jang, S. (2008). The determinant of the hospitality industry's unsystematic risk: A comparison between hotel and restaurant firms. *International Journal of Hospitality & Tourism Administration*, 9(2), 105–127.
- Jackson, L. A. (2009). Lodging REIT performance and comparison with other equity REIT returns. *International Journal of Hospitality & Tourism Administration*, 10(4), 296–325.
- Kim, H., Gu, Z., & Mattila, A. S. (2002). Hotel real estate investment trusts' risk features and beta determinants. *Journal of Hospitality & Tourism Research*, 26(2), 138–154.
- Kim, H., Mattila, A. S., & Gu, Z. (2002). Performance of hotel real estate investment trusts: A comparative analysis of Jensen indexes. *International Journal of Hospitality Management*, 21(1), 85–97.
- Kim, J., & Jang, S. (2012). Comparative analyses of hotel REITs: Examining risk-return and performance characteristics. *International Journal of Contemporary Hospitality Management*, 24(4), 594–613.
- Kim, W. G., Jackson, L. A., & Zhong, J. (2011). Performance comparison of lodging REITs, hotel C-corporations and resorts and casinos. *Tourism Economics*, 17(1), 91–106.
- Lee, W. S., Moon, J., Lee, S., & Kerstetter, D. (2015). Determinants of systematic risk in the online travel agency industry. *Tourism Economics*, 21(2), 341–355.
- Lee, S., & Upneja, A. (2007). Does Wall Street truly understand valuation of publicly traded lodging stocks? *Journal of Hospitality & Tourism Research*, 31(2), 168–181.
- Ling, D. C., Ooi, J. T., & Xu, R. (2016). Asset growth and stock performance: Evidence from REITs. Retrieved from <https://ssrn.com/abstract=2826610>
- Madanoglu, M., & Olsen, M. D. (2005). Toward a resolution of the cost of equity conundrum in the lodging industry: A conceptual framework. *International Journal of Hospitality Management*, 24(4), 493–515.
- Madanoglu, M., Olsen, M. D., & Kwansa, F. A. (2005). Empirical investigation of the CAPM vs. Fama-French model: Evidence from the lodging industry. *Journal of Hospitality Financial Management*, 13(1), 127–127.
- Madanoglu, M., & Upneja, A. (2008). Hotel REITs vs. Hotel C-Corporations: Who has an edge? In E. Christou and M. Sigala (Eds.), *Proceedings of 2008 international CHRIE conference* (pp. 378–386). Atlanta, GA: International CHRIE.
- Mao, Z., & Gu, Z. (2007). Risk-adjusted stock performance: A cross-sector analysis of hospitality firms in the recent

- economic downturn. *International Journal of Hospitality & Tourism Administration*, 8(4), 77–98.
- Mohanty, S., Nandha, M., Habis, E., & Juhabi, E. (2014). Oil price risk exposure: The case of the US Travel and Leisure Industry. *Energy Economics*, 41, 117–124.
- National Association of Real Estate Investment Trusts. (2017, June). REITWatch: REIT industry fact sheet. Retrieved from <https://www.reit.com/sites/default/files/reitwatch/RW1706.pdf>
- Novy-Marx, R. (2013). The other side of value: The gross profitability premium. *Journal of Financial Economics*, 108(1), 1–28.
- Novy-Marx, R., & Velikov, M. (2016). A taxonomy of anomalies and their trading costs. *Review of Financial Studies*, 29(1), 104–147.
- Tang, C. H. H., & Jang, S. S. (2008). The profitability impact of REIT requirements: A comparative analysis of hotel REITS and hotel C-Corporations. *International Journal of Hospitality Management*, 27(4), 614–622.