

The Effect of a Rise in Interest Rates on Hotel Capitalization Rates

by Jack Corgel

EXECUTIVE SUMMARY

Capitalization rates for all commercial real estate are affected by changes in the general level of interest rates. Hotel capitalization rates should respond more quickly to interest rate changes than those of other property types because hotels do not experience the “lease friction” found in other commercial properties, with their lengthy leases. This analysis estimates the statistical connection between interest rate changes and cap rates. Holding other important factors constant, the model estimates that at current levels a 100-basis-point increase in the 10-year U.S. Treasury rate will produce a 28-basis-point uptick in hotel capitalization rates. Continuing improvement in the U.S. economy should eventually result in higher interest rates, but any improvement should also bring both compression of the hotel risk premium and stronger NOI growth, each of which place downward pressure on capitalization rates. With hotel capitalization rates currently in a range of 7.0 to 8.5 percent and an expected slow pace of interest-rate changes, the modelled outcome suggests that hotel property values will remain stable for the foreseeable future. Hotel investors should therefore have ample time to ponder disposition decisions without fear of losing gains while new investors will need to rely on the strong dividend flows currently being produced by hotels for a greater shares of total returns.

ABOUT THE AUTHOR



John B. (Jack) Corgel, Ph.D., held the Robert C. Baker Professorship in Real Estate at the Cornell University School of Hotel Administration until January 2016, when he began a sabbatical leave and phased retirement. He was also Director of Graduate Studies for the Baker Program in Real Estate, and earlier was the first director of the Center for Hospitality Research. After receiving a Ph.D. degree from the University of Georgia in real estate and corporate finance, he held faculty positions in several business schools at major universities before joining Cornell. He remains at Cornell in a half-time capacity.

Corgel is affiliated with CBRE Hotels' Americas Research, where he helps the firm develop products for the hotel industry based on property-level financial and real estate performance information, including Hotel Horizons econometric forecast of U.S. hotel market. His work extends to a variety of advisory assignments related to hotels and real estate.

Corgel has published 80 articles in academic and professional journals, mainly on the subjects of real estate finance, investment, valuation, and hospitality real estate. His research appeared in the most prestigious journals in real estate (*Real Estate Economics*), urban economics (*Journal of Urban Economics*), insurance (*Journal of Risk and Insurance*), business law (*Journal of the American Business Law Association*), and hospitality management (*Cornell Hospitality Quarterly* and *International Journal of Hospitality Management*). In addition, he has written for nearly every national journal read by real estate professionals. His textbook, *Real Estate Perspectives* (with Smith and Ling), was used throughout the nation for introductory real estate courses. He co-edited and wrote chapters for *The Cornell School of Hotel Administration on Hospitality: Cutting Edge Thinking and Practice*. Corgel's current research interests include the relationship between the macro-economy and hotel markets and real estate price and capitalization rate forecasting.

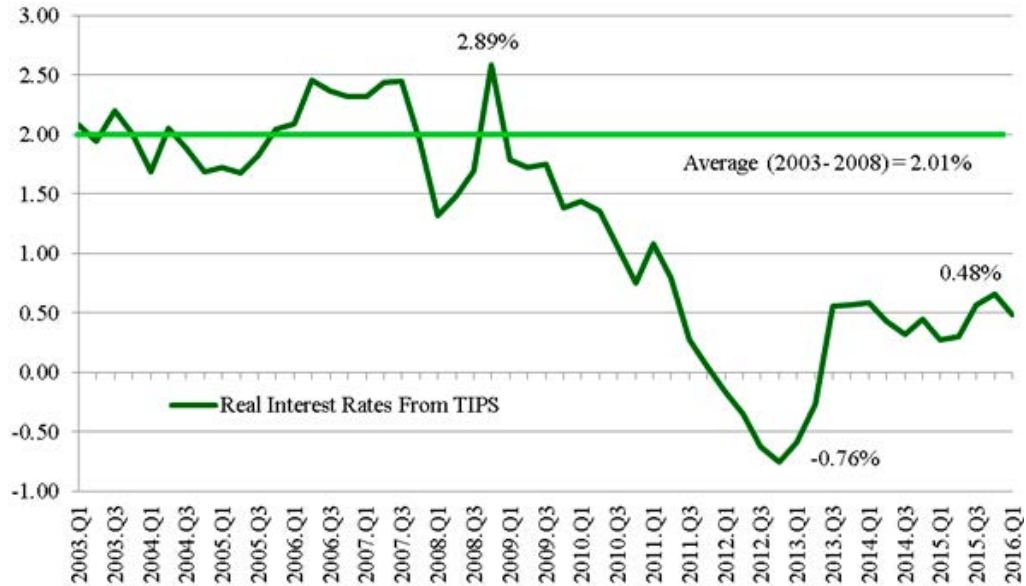
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In this report, I statistically derive estimates of the interest rate elasticity of hotel capitalization rates holding other factors constant. The sensitivity of capitalization rates to the long-anticipated upswing in interest rates factors into the timing of many hotel acquisition and disposition decisions. The Federal Reserve has remained coy regarding interest rate increases, and a debate continues as to how much a Federal Reserve policy change directly affecting the short end of the yield curve will influence rates on the long end. Nevertheless, it seems clear that 10-year U.S. Treasuries will rise at some point in the foreseeable future. The model estimates that if this interest rate does rise by, say, 100 basis points from current levels, investors should expect approximately a 28-basis-point increase in hotel capitalization rates after taking into consideration changes in risk premiums and NOI growth, assuming no unexpected inflation. The timing of the interest rate movement is, of course, difficult to peg but likely will be gradual.

Real interest rates from 10-year U.S. Treasury inflation protected securities (TIPS), Q1 2003 to Q1 2016



Notes: Constant maturity, not seasonally adjusted. Source: Federal Reserve Economic Data (FRED)

At current levels of hotel capitalization rates—in a range of 7.0 to 8.5 percent—and an expected slow pace of interest rate changes, the model prediction does not indicate that property values and investor sentiment will be compromised.¹ Hotel owners ought to have ample time to ponder disposition decisions without fear of losing gains. Hotel investors entering the market will need to rely on the strong dividend flows currently being produced by hotels for greater shares of total returns.

Speculation seems endless regarding whether or when the Federal Reserve might act to increase the Federal Funds rate. Despite the difficulty of pinpointing interest rate levels over the next 12 to 24 months, increases appear inevitable. Holding other factors constant, heftier capitalizations of incomes from capital assets, such as commercial real estate, will exert downward pressure on values. This downward pressure will be slight if the increases in interest rates are small and well-spaced and the sensitivity of capitalization rates is weak. It is true that other important determinants of capitalization rates typically do not remain constant as economic conditions change, but I anticipate

¹ For an analysis of the current state of the hotel market, see: Crocker H. Liu, Adam D. Nowak, and Robert M. White, Jr., “Third Quarter 2016: Hotels Exhibit Positive Momentum,” *Cornell Hotel Indices*, Vol. 5, No. 4 (October 2016), Cornell Center for Real Estate and Finance.

that they also will adjust to changing risk preferences and asset-specific income growth rates.² Coincidental adjustments in both risk premiums and income growth will offset some or all of the anticipated rise in risk-free rates during even modest economic expansions.³ The net effect on capitalization rates from a steepening yield curve either could be neutral or result in additional compression, and not necessarily the anticipated increase.

While each type of commercial property has its own idiosyncrasies, hotels arguably represent a distinctive segment that allow analysis of the relationship between interest rates and capitalization rates. While long-term leases create friction that slows the response of most commercial real estate ratios to interest-rate changes, hotels can change room rates in response to economic realities (but at the same time see greater risk due to the lack of long-term leases). Thus, hotel real estate, absent

² The standard expression following Gordon is $R = (r_f + r_p) - g$, where R is the capitalization rate, r_f is the risk-free rate and r_p is the risk premium; and g is the constant growth rate in net income. See: M.J. Gordon, *Dividends, Earnings, and Stock Prices*, *Review of Economics and Statistics*, 1959, 41:2, 99-105.

³ Yeatts argues that upward movements of NOIs will come as the result of lease renewals at higher rents. See: T. Yeatts, *Interest Rate Growth Will ‘Substantially Cancel Out’ NOI Growth over the Next 12 to 24 Months*, *Experts Say*, *S&P*, October 15, 2013.

of lease frictions, resembles equities more than it does bonds.⁴ Controlling for the varied provisions of leases by eliminating them from empirical analyses allows for the generation of pure, contemporaneous responses of capitalization rates to changes in interest rates. The absence of lease friction also minimizes delays in the recognition of property income growth as the economy expands. Finally, because hotel real estate risk premiums historically exceed those of other property types, variations in hotel risk premiums may be more observable and measurable as risk preferences change.

Interest Rates and Fed Policy Changes

Assuming that inflationary expectations remain low, the real rate of interest appears to be the likely component of the risk-free rate that would immediately be affected in a meaningful way from the combination of continued economic growth and decreased Federal Reserve accommodation. This thesis is conditional on there being room for upward movement in the real rate using the historical long-run average as a benchmark. Exhibit 1 presents the pattern of real interest rates measured as constant maturity yields on 10-year U.S. Treasury Inflation Protected Securities (TIPS) since these securities began trading in 2003. Prior to the Great Recession, the average real rate was 2.01 percent. Since 2013 until quite recently the real rate has hovered around .5 percent as measured from TIPS trading. If this series mean reverts to and stabilizes at the pre-Great Recession mean, then without unexpected inflation the ceiling on near-term interest rate increases is approximately 150 basis points.⁵

⁴ This is because during economic expansions both interest rates and hotel net operating incomes increase.

⁵ Analyses involving TIPS security yields have come under criticism because of the need to account for the difficult-to-measure liquidity premium. As a robustness check on the TIPS analysis, I recreated the data prepared for a *New York Times* article by Paul Krugman in 2013, which shows the 54-year history of real rates computed as the 10-year U.S. Treasury rate minus the previous year core personal consumption expenditures. The history of this series since TIPS began trading in 2003 closely resembles the TIPS series in Exhibit 1 ($r = .82$). The long-run average covering the period 1960 to present indicates a real rate of almost exactly 3 percent. The average real rate using the Krugman series during the period 2003 through 2008 is 2.34 percent, which favorably compares to the TIPS average rate for the same period of 2.01 percent. While the TIPS real rate has hovered around .5 percent since mid-2013, the real rate from the Krugman series temporarily moved up after mid-2013 to 1.35 percent. By mid-2015, the series settled back to .69 percent, which is only a dozen or so basis points higher than the recent real rate from TIPS trading. Again assuming reversion to the 2003 through 2008 mean, the ceiling estimate for the 10-year U.S. Treasury rate considering both methods appears to be about 150 basis points. Finally, CBRE Econometric Advisors' base-line forecast has the 10-year U.S. Treasury rate moving up between 134 and 189 basis points to a steady state, which coincides with my estimate. See: P. Krugman, 54 Years of Real Interest Rates, *New York Times*, August 22, 2013; and S. Chervachidze, Identifying Market Risk for Cap Rate Increase under Fed Tightening. *CBRE Research, About Real Estate*, U.S. Office Investment, September 2, 2015.

Current Inflation and Inflationary Expectations

Despite fears about accelerating inflation, the inflation rate has remained low and is expected to be in the range of 1 to 2 percent for the foreseeable future. Support for this conclusion comes from a number of sources including studies by Federal Reserve economists. The Federal Reserve has the stated goal of maintaining the inflation rate at the 2-percent level, as measured by the personal consumption expenditures price index (PCE). Yet, the reported PCE has trended below 2 percent for the past several years.

Economists at the Federal Reserve Bank of Cleveland use a sophisticated method for measuring inflationary expectations that relies on inflation rate swaps.⁶ In a fairly recent analysis, their model indicates that investors expect a 1.7-percent inflation rate over the next decade. The difference between the 10-year constant maturity Treasury and TIPS index rates over the next decade places expected inflation at approximately the same percentage.⁷ Regardless, the comparison of current and expected inflation rates does not support the conclusion that the U.S. will experience a meaningful near-term interest rate increase based on current expectations for rising inflation.

Interest Rate and Hotel Capitalization Rate Relationships

Numerous studies of commercial real estate capitalization rates have been conducted over the past decade. The findings from this research stream apply almost equally across all property types, including hotels. Most published studies have sought a better understanding of the determinants and changes of property capitalization levels, often while using the Gordon growth model as the foundation.⁸

A recent round of studies extends the variable set for explaining variation in reported capitalization rates beyond the Gordon model variables to include investor sentiment and credit availability.⁹ Both of those variables demonstrate statistical significance for explaining variation in property capitalization rate levels. As in earlier studies, recent research confirms that the general level of interest rates is a dominant variable for explaining variation in commercial property capitalization rates.

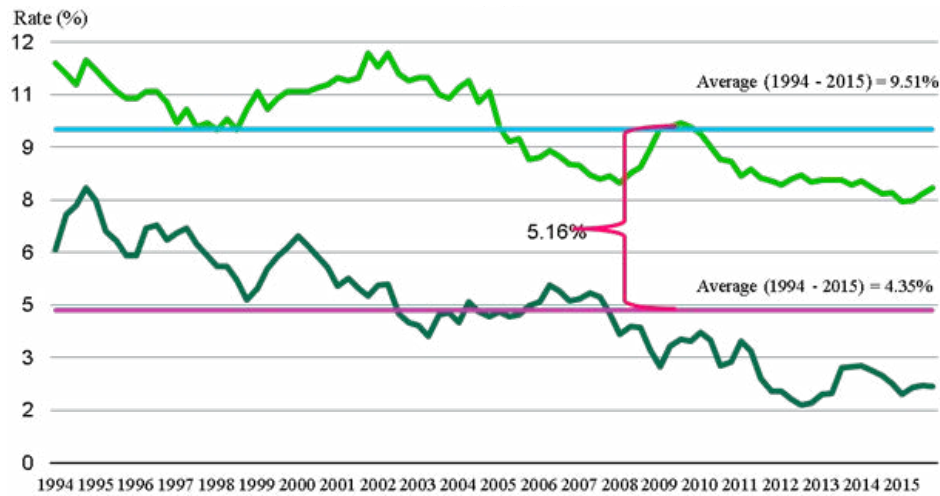
⁶ See: J.G. Haubrich, G. Pennacchi, and P. Richken. Inflation Expectations, Real Rates, and Evidence from Inflation Swaps, Federal Reserve Bank of Cleveland, working paper, March, 2011 (www.clevelandfed.org).

⁷ These data are available through the Federal Reserve Bank of Saint Louis (FRED, 2016).

⁸ I outline the Gordon model variables in the context of this analysis. See: Gordon, *op.cit.*

⁹ J. Clayton, D.C. Ling, and A. Naranjo. Commercial Real Estate Valuation: Fundamentals Versus Investor Sentiment. *Journal of Real Estate Finance and Economics*, 2009, 38:1, 5-37; and S. Chervachidze, J. Costello, and W. Wheaton. The Secular Cyclic Determinants of Capitalization Rates: The Role of Property Fundamentals, Macroeconomic Factors, and Structural Changes. *Journal of Portfolio Management*, 2009, Special Real Estate Issue, 50-69.

Historical pattern of 10-year U.S. Treasuries and hotel capitalization rates



Notes: Average of hotel capitalization rates from Real Estate Research Corporation (RERC) and Real Capital Analytics (RCA).
Sources: FRED, RERC, RCA.

Statistical Analysis

Exhibit 2 offers the opportunity to make a side-by-side visual comparison of the historical capitalization for hotels and the 10-year U.S. Treasury rate series from Q1 1992 through Q1 2016. The exhibit indicates a common trend and a strong correlation ($r = .75$). The average spread between hotel capitalization rates and 10-year Treasuries equals 516 basis points.

To better understand the statistical relationship between interest rates and hotel capitalization rates, I calculated the correlation between the 10-year U.S. Treasury rate and the hotel capitalization rate to produce an elasticity estimate from the first quarter of 1997 through the first quarter of 2015, with the following results:¹⁰

- Correlation between hotel capitalization rates and the 10-year U.S. Treasury rate over the period equals .68.
- Elasticity of hotel capitalization rates to the 10-year U.S. Treasury rate over the period equals .25. This means that for every one-percentage-point change in the 10-year U.S. Treasury rate, hotel capitalization rates would move by one quarter of one percent.

An important extension for enhancing the estimation precision of the hotel capitalization rate and interest rate elasticity involves recasting the analysis on a multivariate platform to allow for any offsetting effects from fluctuations in risk premiums and NOI growth rates within the same model over time. This

¹⁰ The hotel capitalization rate is a blend of Real Estate Research Corporation (RERC) survey data and Real Capital Analytics (RCA) transaction data. Estimations use data from Q1 1997 instead of from Q1 1992 because certain variables in the multivariate analysis to follow begin in Q1 1997.

approach also offers the opportunity to control for possible influences of investor sentiment and credit availability. The conventional wisdom is that during economic expansions interest rates move upward, and coincidentally, risk premiums compress and NOI growth increases. In the regressions, the hotel capitalization rate, HR, is the dependent variable and the model includes the following explanatory variables:

Gordon Growth Model Variables

- r_f —The constant maturity 10-year U.S. Treasury rate (FRED).
- r_p —The spread between Moody's Baa corporate bond yield index and the 10-year U.S. Treasury rate (FRED).
- g —The expected NOI growth rate for the next five years (RERC).

Controls

- ic —Sentiment, measured by an investment conditions rating specified by survey respondents using a one-through-ten scale (RERC).¹¹
- ca —Credit availability, measured as the quarterly change in commercial bank real estate loans divided by GDP (FRED).
- dyr —Yearly dummy variables for trend.

(Data are from Federal Reserve Economic Data, FRED, and Real Estate Research Corporation, RERC; time subscripts are omitted.)

¹¹ Estimated with a three-quarter lag.

Regression results regarding interest rates and hotel capitalization rates

Variable/Period	Dependent Variable - HR (Natural Log) Q1 1997 - Q1 2016	
	OLS (t-stat, p-value)	Newey-West (t-stat, p-value)
Intercept	2.63 (17.37, .00)	2.63 (18.90, .00)
r_f (Natural Log)	.06 (1.86, .07)	.06 (1.81, .08)
r_p	2.49 (2.93, .01)	2.49 (4.07, .00)
g	-1.69 (-3.05, .01)	-1.69 (-2.47, .02)
ic	-.01 (-2.19, .03)	-.01 (-2.04, .05)
ca	-.77 (-1.10, .28)	-.77 (-1.22, .23)
d_{yr}	✓	✓
Adj R^2	.97	Not Reported
F-Stat.	104.67	2748.14
p-value	.00	.00
Elasticity HR/ r_f	.073	.073
N	73	73
Sources: FRED, RERC		

The results from estimating equations containing these variables and using the sample taken from Q1 1997 through Q1 2016 appear in Exhibit 3. The estimation initially was performed with ordinary least squares (OLS) regression. However, I detected some econometric problems in the error terms and applied the Newey-West estimator as a corrective measure.¹² The differences across the errors from estimating the model in these two different ways are small. All of the Gordon and control variables are correctly signed and statistically significant at the .10 level or better. The extended model resulted in nearly all of the variation in hotel capitalization rates being explained by the included variables. Importantly for purposes of this article, the interest rate elasticity of hotel capitalization rates declines from .25 to .07 with the addition of Gordon and control variables. The intuition for this change mainly comes from recognition of the simultaneous changes of risk premiums and income growth in the same equation as the risk-free rate.

If, for example, the 10-year U.S. Treasury rate were to increase from 2.0 percent to 3.5 percent (in the spirit of the 150-basis-point increase discussed above), the adjustment represents a 75-percent change. Then using the elasticity estimate of 7 percent, hotel capitalization rates would increase by 5.25 percent

¹² See: Whitney K. Newey and Kenneth D. West (1987). "A Simple, Positive Semi-definite, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix," *Econometrica*. 55 (3): 703–708.

(.75 x .07). If hotel properties were trading at 8.0-percent capitalization rates, that hypothetical change in the 10-year U.S. Treasury rate would translate to an 8.42 percent hotel capitalization rate (8.0 x 1.0525). Indeed, the combination of an approximate 3.5-percent 10-year Treasury rate and a hotel capitalization rate in the range of 8.25 to 8.50 percent occurred in the recent past both before and after the Great Recession, starting in Q2 2008 and continuing through Q2 2011.

Extensions and Robustness

The main result from this analysis directly applies to the upper-price segments of the hotel market spectrum—that is, upscale, upper upscale, and luxury—since RERC survey respondents primarily invest in institutional-grade hotels. While the hotel capitalization rate generating process varies across types of hotels and geographies, the time series tend to be highly correlated, and therefore by extension their interest rate sensitivities should not be markedly different. Hotel capitalization rate data for lower-price or limited-service properties is available from a couple of sources. However, none of these sources provides sufficient detail or a long enough time series to perform a comparable analysis to the one presented here. For instance, I obtained data from Korpacz PWC reports for both full- and limited-service hotels, but these data are semi-annual and run for only 27 periods. The average difference between limited-

and full-service capitalization rates equals 146 basis points, with a correlation coefficient of .91. While a formal robustness check with limited-service hotel data is desirable, it is not possible in part because some of the Gordon and control variables come from the RERC survey and don't extend to limited-service hotels. Further, the high correlation between these series suggests that meaningful differences may not arise, and the RERC data cover arguably the most important market segments for investors.

The same conclusion applies to different MSAs in the U.S. The RERC survey includes nearly 50 MSAs spanning different time periods. A check of the data for selected MSAs finds that, similar to the case of full- and limited-service hotel capitalization rates, these rates across geographies differ in their scales, although they are highly correlated.

Summary and Conclusion

The likelihood continues that the real rate of interest will begin to revert to the mean sometime during the next 24 months. If this occurs the 10-year U.S. Treasury rate has room to move upward by 100 to 150 basis points by my estimate and those of others, assuming no unexpected inflation. Some increase in hotel real estate capitalization rates logically would ensue following changes in the general level of interest rates. The multivariate analysis performed here incorporates potential cross-current components of the Gordon growth version of the capitalization rate model—that is, spread compression and NOI growth—and includes controls for sentiment and credit availability found to be important determinants of commercial real estate capitalization rates from prior studies. The potential rise in hotel capitalization rates from a 100-basis-point increase in the 10-year U.S. Treasury rate from current levels is about 28 basis points. This relationship of 1.00-to-0.28 is a good approximation for changes in hotel capitalization rates for both less

than and greater than a 100-basis-point change in the 10-year U.S. Treasury rate.¹³ At this writing, it appears that the pace of the upward movement in the general level of interest rates and capitalization rates likely will be slow, thus giving investors the time needed to plan before making disposition, renovation, and acquisition decisions.

World events may intervene to alter these expectations. One can spin the problems from other parts of the world into a positive or a negative outcome for U.S. real estate. On the positive side, there is a train of thought that foreign investors are seeking to place money in a stable political and economic jurisdiction for the long run. This view assumes long-run investment in U.S. real estate is a good result. China-based insurance firm Anbang, for example, has indicated that they plan to hold the Waldorf-Astoria property for much longer than the usual holding period. It seems unlikely therefore that we are about to see foreign owners calling their brokers to sell hotels. It does not appear that desperation has set in among the major foreign investment sources.

On the negative side, foreign investors may be inflating U.S. real estate well above fundamental values. That said, I am unable to find reliable evidence that this effect is endangering hotel price stability. The Waldorf was estimated to be worth \$2 billion in 2007 when Blackstone bought Hilton, and the hotel sold for just under \$2 billion last year. It is hard to handicap how foreign investors will behave if U.S. interest rates rise somewhat, with the operative term here being “somewhat.” In the absence of compelling evidence that we are experiencing a structural shift in the profile and sentiment of hotel real estate market participants, I am not concerned that the findings reported in this paper will change meaningfully for the foreseeable future. ■

¹³ This statement holds because the elasticity is estimated at the means of both series and neither rate is expected to drift in a meaningful way from its mean in the near term.

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