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Quantifying Market Relationships

WITH NATIONAL CAP RATES

MID-YEAR 2021

Quantifying Market Relationships
WITH NATIONAL CAP RATES

How do various metrics affect cap rates, and what can be learned from these relationships?

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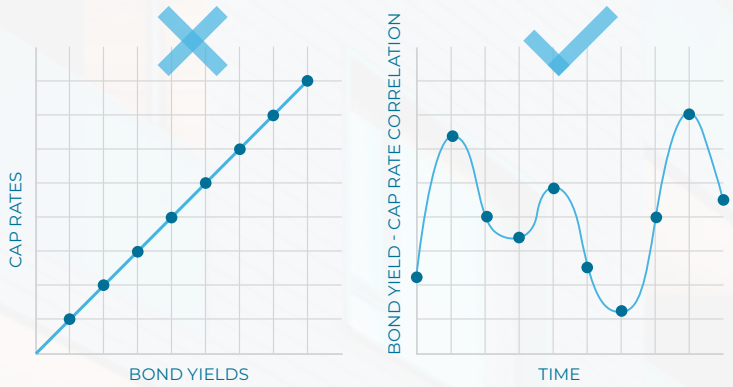
EXECUTIVE SUMMARY

Contrary to conventional wisdom, bond yields and cap rates do not have a one-to-one relationship.

The correlation between bond yields and cap rates varies over time.



NOMINAL TREASURY YIELD → 100 BPS
AVERAGE CAP RATE → 51 BPS

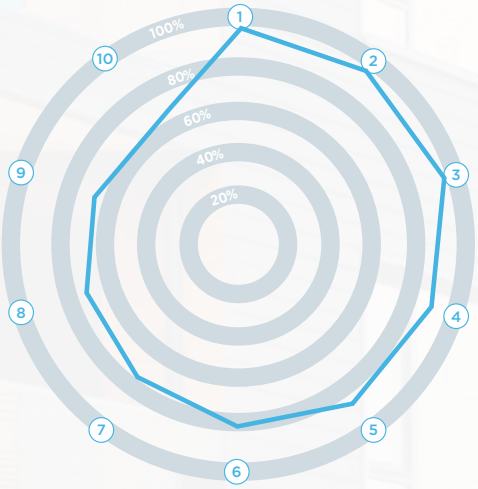
INFLATION-ADJUSTED TREASURY YIELD → 100 BPS
AVERAGE CAP RATE → 44 BPS

Post-GFC, a 100bps movement in nominal yields and inflation-adjusted yields is associated with **a movement in the average cap rate** of 51bps and 44bps, respectively.

Cap Rate Drivers

STRENGTH

- EFFECTIVE RENT
- PRICE PER UNIT
- NET OPERATING INCOME
- DOMESTIC VOLUME
- NOMINAL TREASURY YIELD
- U-6 UNEMPLOYMENT RATE
- TOTAL APARTMENT UNITS PURCHASED
- U-3 UNEMPLOYMENT RATE
- GLOBAL VOLUME
- CROSS-BORDER VOLUME
- INFLATION-ADJUSTED TREASURY YIELD



CORRELATION BETWEEN CAP RATES IN QUARTER (I) AND CAP RATES IN PREVIOUS QUARTERS

The statement "yesterday's cap rate is the best indicator of today's cap rate" is **empirically true.**

Correlation of 100% indicates perfectly linear positive relationship.

Preview of thoughts and conclusions

"The post-GFC era can be characterized by unemployment, the nominal Treasury yield, global apartment volume, domestic volume, and effective rent, moving up in rank as drivers of cap rates."

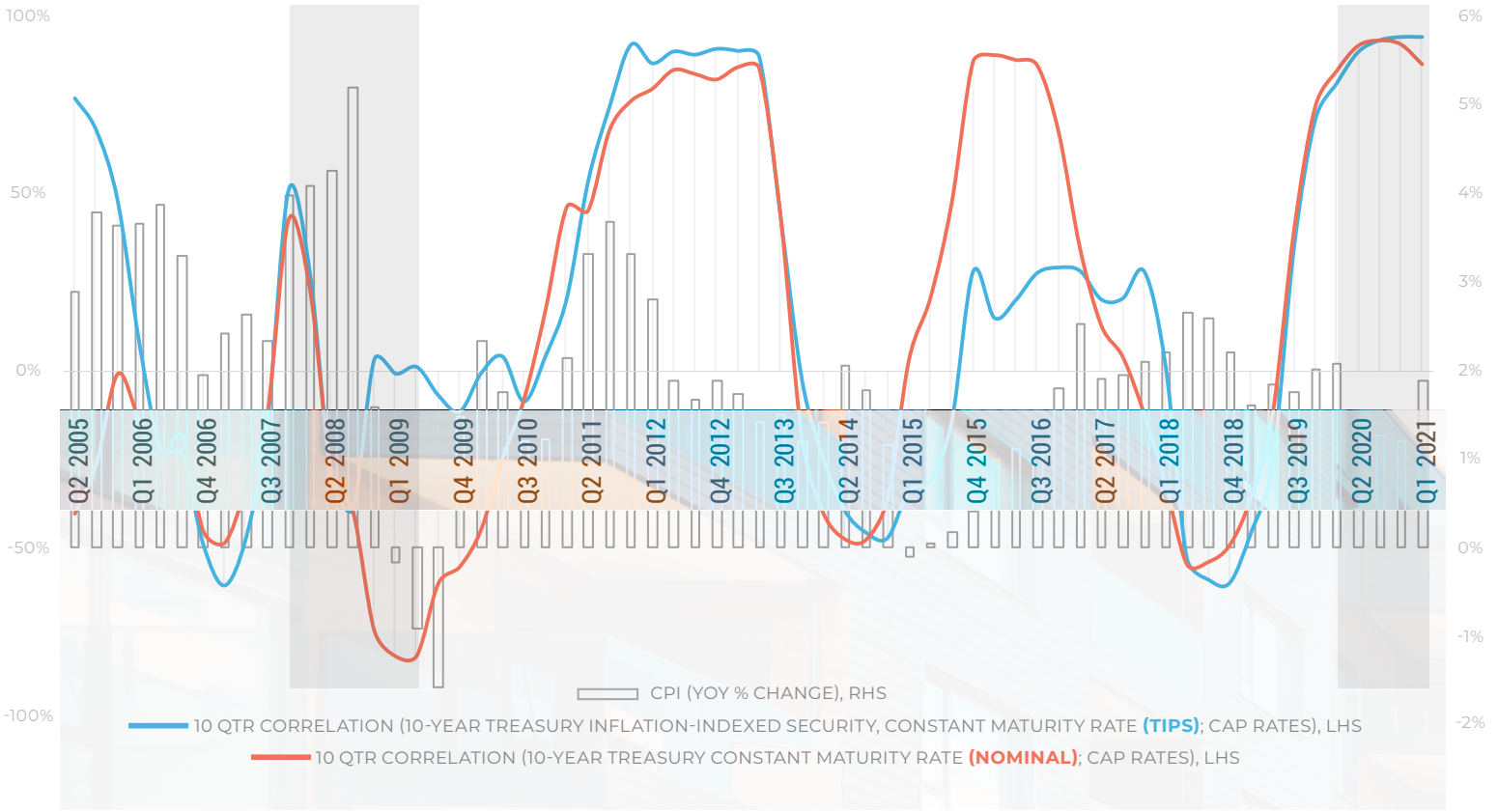
"Historically, the U-6 unemployment rate is 25% correlated with cap rates, but post-GFC the correlation is 67%.

TIPS yields were historically 66% correlated with cap rates, but the post-GFC correlation stands at 52%."

"Post-GFC, domestic volume drives cap rates more than total volume, and global volume drives cap rates more than cross-border volume."

MOVING CORRELATIONS, TREASURY YIELDS AND CAP RATES

Many multifamily market participants believe higher bond yields necessitate higher cap rates, and vice versa. This account is not only flawed, but it reduces the relationship to a rather myopic perspective. For a more exhaustive perspective, consider viewing the relationship through two main prisms: a moving relationship, and a static relationship over a significant time period. The chart below quantifies the former perspective on bond yields and cap rates, exposing the nonconstant nature of the relationship throughout time. The points on each curve represent the correlation between bond yields and cap rates considering the last 10 quarters, inclusive of the quarter in which the point is plotted. To uncover more detail, the chart includes both nominal 10-year Treasury yields, and inflation-adjusted 10-year Treasury yields—commonly referred to as Treasury Inflation-Protected Securities (TIPS).



Note: Shaded areas indicate U.S. recessions.

Moving through time, the correlation between nominal bond yields and cap rates, and the correlation between inflation-adjusted bond yields and cap rates, tends to fluctuate. Most of the time, nominal and inflation-adjusted yields are similarly correlated with cap rates, represented by how closely the two curves track each other. During the GFC, nominal bond yields became negatively correlated with cap rates, and inflation-adjusted bond yields became largely uncorrelated with cap rates. Deflation and disinflation help to distort the correlations between cap rates and bond yields, but the impact these forces have on bond yield-cap rate correlations varies. During the deflationary times of the GFC, nominal yields became negatively correlated with cap rates–higher nominal yields were associated with lower cap rates, and vice versa. During the disinflation experienced in 2015, somewhat the opposite occurred—with nominal and inflation-adjusted yields becoming more positively correlated with cap rates. Regardless of these micro-relationships between Treasury yields, cap rates, and inflation/deflation, post-GFC cap rates have remained on a steady downward trajectory along with Treasury yields, with no end in sight. Additionally, the extent to which quantitative easing during the GFC or negative swap spreads during 2015 impacted the distortion in bond yield-cap rate correlations is outside the purview of this paper. The takeaway from the above can be condensed to the following statement: bond yields and cap rates are not correlated in a one-to-one fashion, nor do they always have the same relationship throughout time.

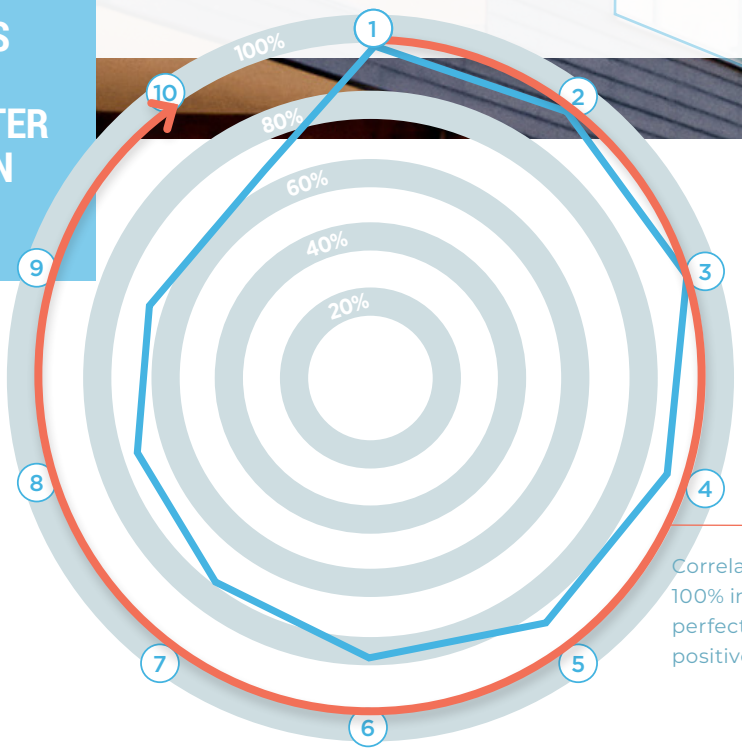
Do cap rates exhibit autocorrelation?

One of the most interesting qualities of cap rates is that they tend to be autocorrelated—past cap rates tend to be highly correlated with future cap rates. The statement "yesterday's cap rate is the best predictor of today's cap rate" is empirically true. Cap rates one quarter in the past tend to be 98% positively correlated with cap rates in the current quarter. In general, cap rates in quarter (i-k) are at least 85% positively correlated with cap rates in quarter (i) for values of k between one and five, inclusive. Cap rates in the previous quarter, two quarters ago, and three quarters ago are correlated with cap rates in the current quarter by a magnitude of 98%, 96%, and 94%, respectively. Low cap rates in one quarter tend to be followed by low cap rates in the next quarter, and vice versa. Therefore, cap rates tend to have a positive influence on themselves over time or carry with them a great deal of momentum.

The chart below shows the correlations between cap rates in the current quarter and cap rates in past quarters. For a given current quarter, cap rates one quarter in the past are nearly 100% correlated with cap rates in the current quarter.

Cap rates in earlier quarters, analogous to moving clockwise around the diagram below, tend to be less correlated with future cap rates.

CORRELATION BETWEEN CAP RATES IN QUARTER (I) AND CAP RATES IN QUARTER (I-K), FOR K BETWEEN ONE AND TEN



WHICH METRICS ARE MOST CORRELATED WITH CAP RATES?

Multifamily market participants tend to have an intuitive understanding of which metrics are most correlated with cap rates. Theoretically, effective rent, volume, and other related metrics should be highly correlated with cap rates, but the actual values and relative strengths of these correlations are largely unknown.

The table below contains the correlations between cap rates and each metric considered.

Metric	Historical Correlation Coefficient	Post-GFC Correlation Coefficient	Stronger (+) or Weaker (-) Correlation (Historical to Post-GFC)
10YCM Nominal Treasury Yield	67%	68%	1.7%
U-6 Unemployment Rate	25%	67%	42.4%
U-3 Unemployment Rate	30%	61%	31.5%
10YCM TIPS Yield	66%	52%	-13.8%
US Apartment Inst'l Vacancy Rate	68%	20%*	N/A
Cap Rate - 10YCM Yield Spread	-14%*	8%*	N/A
US Apartment Cross-Border Volume ($)	-63%	-54%	-8.6%
US Apartment Global Volume ($)	-62%	-55%	-7.2%
US Apartment Total Units Purchased	-66%	-66%	-0.4%
US Apartment Volume ($)	-81%	-80%	-1.0%
US Apartment Domestic Volume ($)	-80%	-80%	-0.1%
US Apartment Inst'l NOI ($/sq ft)	-89%	-93%	4.2%
US Apartment Top Quartile Price ($/Unit)	-93%	-95%	2.5%
US Apartment Price ($/Unit)	-93%	-96%	2.7%
US Apartment Inst'l Effective Rent ($/sq ft)	-90%	-96%	5.3%

* Statistically insignificant

A positive correlation indicates that the given metric and cap rates move in the same direction. A negative correlation indicates that the given metric and cap rates move in opposite directions. A correlation of zero indicates no relationship.

Notice the Cap Rate - 10YCM Yield Spread correlation is statistically insignificant both historically and post-GFC, and the institutional vacancy rate correlation is statistically insignificant post-GFC. In this context, statistical insignificance arises when it is likely the correlations occurred by random chance. All other metrics have statistically significant correlations with cap rates.

As expected, price per unit and cap rates tend to move in opposite directions more so than apartment volume and cap rates tend to move in opposite directions. Both price per unit and apartment volume are negatively correlated with cap rates, but price per unit is significantly more negatively correlated with cap rates than apartment volume. Likewise, institutional vacancy is most positively correlated with cap rates historically, while Treasury yields are a close second.

Some of the metrics most correlated with cap rates historically became significantly less correlated when only considering the post-GFC era. The Cap Rate - 10YCM Yield Spread switched from being negatively correlated to positively correlated with cap rates, but this is likely due to random chance. Institutional vacancy is 68% correlated with cap rates historically, but 20% correlated with cap rates post-GFC–again, the switch cannot be attributed to anything but random chance. Metrics with the most notable statistically significant switches in correlation include the U-6 unemployment rate and TIPS yields. Historically, the U-6 unemployment rate is 25% correlated with cap rates, but post-GFC the correlation is 67%. Similarly, TIPS yields were historically 66% correlated with cap rates, but the post-GFC correlation stands at 52%, a marginal difference of 14%. Switching perspectives from historical to post-GFC, the U-6 unemployment rate became more correlated with cap rates by the largest margin, and the TIPS yield became less correlated with cap rates by the largest margin.

WHAT DO ACTUAL MOVEMENTS IN A METRIC MEAN FOR CAP RATES?

Multifamily correlations only provide so much information. If a metric is 100% correlated with cap rates, then an increase in the metric is associated with a fixed proportionate increase in cap rates. Without researching further, that proportionate increase in terms of dollars, percentage points, or any other unit, is unknown. The table below details the movement both historically and post-GFC in the average cap rate for increases in each metric using the most appropriate unit and magnitude in each case.

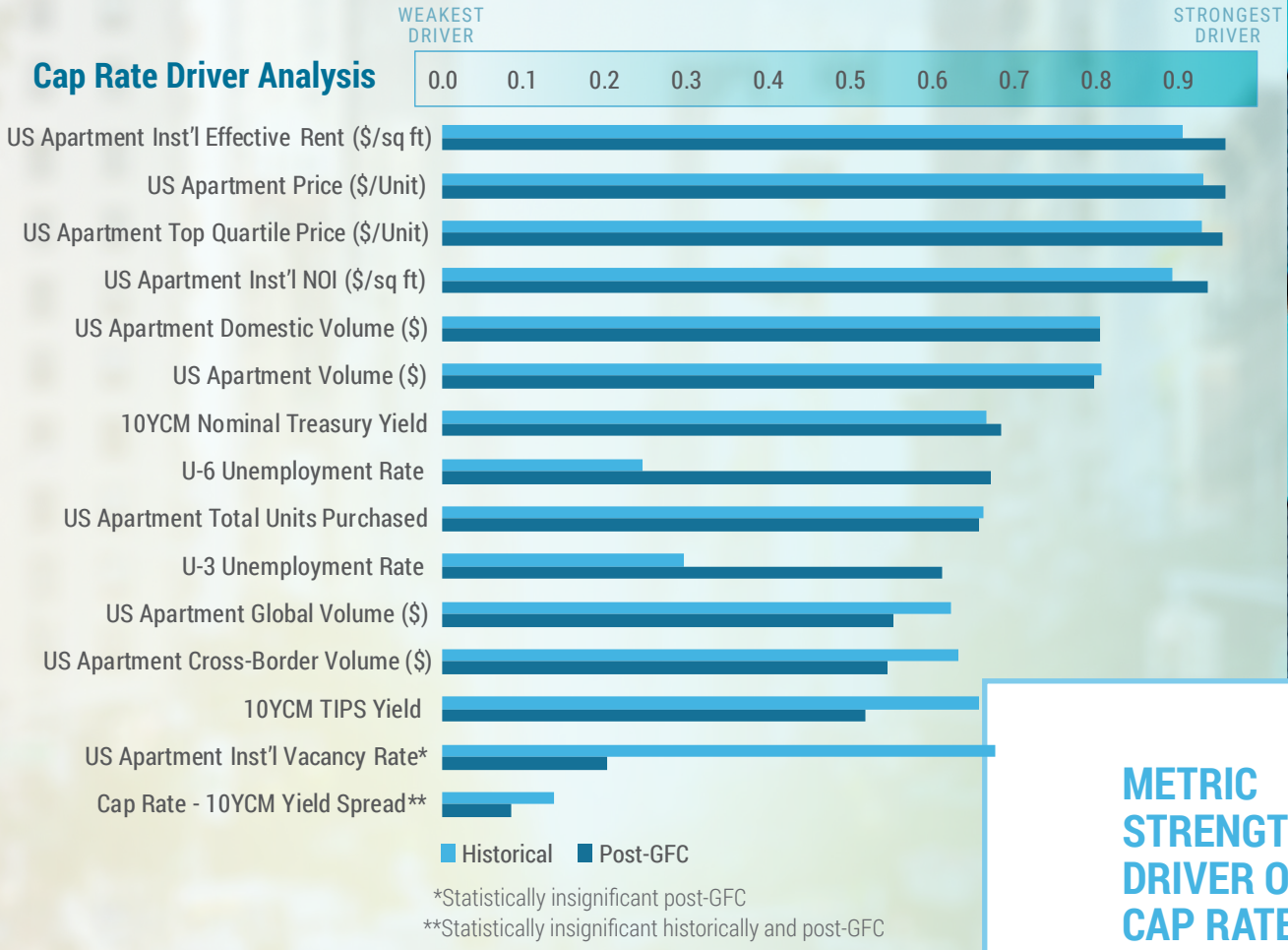
Metric	Marginal Movement in Metric	Historical Marginal Movement in Cap Rates (bps)	Post-GFC Marginal Movement in Cap Rates (bps)
10YCM TIPS Yield	1%	43.1	43.8
10YCM Nominal Treasury Yield	1%	37.4	50.8
U-6 Unemployment Rate	1%	4.7	9.9
U-3 Unemployment Rate	1%	9.2	14.0
Cap Rate - 10YCM Yield Spread	1%	-10.2*	8.6*
US Apartment Inst'l Vacancy Rate	1%	46.0	19.1*
US Apartment Inst'l Effective Rent ($/sq ft)	$1	-13.3	-14.6
US Apartment Inst'l NOI ($/sq ft)	$1	-20.4	-22.0
US Apartment Price ($/Unit)	$10,000	-18.5	-17.3
US Apartment Top Quartile Price ($/Unit)	$10,000	-12.1	-12.7
US Apartment Total Units Purchased	10,000	-4.9	-4.2
US Apartment Cross-Border Volume ($)	$100,000,000	-2.4	-1.6
US Apartment Domestic Volume ($)	$100,000,000	-0.4	-0.3
US Apartment Global Volume ($)	$100,000,000	-4.3	-3.1
US Apartment Volume ($)	$100,000,000	-0.4	-0.3

* Statistically insignificant

Over the next twelve months, pay close attention to cap rate movements given movements in the above metrics. Will the future relationships deviate from the historical and post-GFC relationships?

An increase in global apartment volume of $100MM is associated with a depression in cap rates of 4.3bps historically and 3.1bps post-GFC; an increase of 1% in the U-3 unemployment rate corresponds to an increase in cap rates of 9.2bps historically and 14.0bps post-GFC, and so on. Both historically and post-GFC, an increase of $1 per square foot in net operating income is associated with a greater depression in cap rates than an increase of $1 per square foot in effective rent. With the above relationships quantified, one can better gauge the likelihood of witnessing certain swings in cap rates given expected increases in one of the considered metrics.

Cap Rate Driver Analysis



*Statistically insignificant post-GFC
**Statistically insignificant historically and post-GFC

METRIC STRENGTH AS DRIVER OF CAP RATES

"Post-GFC, domestic volume drives cap rates more than total volume, and global volume drives cap rates more than cross-border volume."

An increase of $100MM in global apartment volume may correspond to a 3.1bps depression in the average cap rate, but how does global volume as a driver of cap rates compare to other cap rate drivers like domestic volume, bond yields, cross-border volume or effective rent?

The chart above describes the strength of each metric as a driver of cap rates, ranking each driver from strongest to weakest post-GFC.

The closer each value is to one, the stronger the driver of cap rates. To gauge strength and not direction, each value represents the absolute value of each correlation coefficient from before. Every insight mentioned under "Which metrics are most correlated with cap rates?" applies to this driver analysis. In this context, however, each value represents how many standard deviations cap rates move given a one-standard-deviation movement in the metric. Each standard-deviation movement is unitless, ensuring the soundness of cross-metric comparisons.

The table below compares each historical rank with the post-GFC rank. **Historically, price per unit is the strongest driver of cap rates, but post-GFC effective rent is the strongest driver.** The U-6 unemployment rate is the second weakest driver of cap rates historically, but post-GFC it is the eighth strongest driver, ahead of total units purchased, cross-border volume, TIPS yields, and others. Post-GFC, domestic volume drives cap rates more than total volume, and global volume drives cap rates more than cross-border volume. The post-GFC era can be characterized by unemployment, the nominal Treasury yield, global apartment volume, domestic volume, and effective rent, moving up in rank as drivers of cap rates.

Metric	Historical Rank	Post-GFC Rank	Change in Rank
US Apartment Price ($/Unit)	1	2	-1
US Apartment Top Quartile Price ($/Unit)	2	3	-1
US Apartment Inst'l Effective Rent ($/sq ft)	3	1	2
US Apartment Inst'l NOI ($/sq ft)	4	4	0
US Apartment Volume ($)	5	6	-1
US Apartment Domestic Volume ($)	6	5	1
US Apartment Inst'l Vacancy Rate	7	14*	-7*
10YCM Nominal Treasury Yield	8	7	1
US Apartment Total Units Purchased	9	9	0
10YCM TIPS Yield	10	13	-3
US Apartment Cross-Border Volume ($)	11	12	-1
US Apartment Global Volume ($)	12	11	1
U-3 Unemployment Rate	13	10	3
U-6 Unemployment Rate	14	8	6
Cap Rate - 10YCM Yield Spread	15*	15*	0*

* Statistically insignificant

STRENGTH AS DRIVER OF CAP RATES, RANKED HISTORICALLY

CLOSING THOUGHTS

At times, bond yields and cap rates have a counterintuitive micro-relationship: sometimes they move together, sometimes they move apart, and sometimes the two are largely uncorrelated. Nonetheless, bond yields tend to move in the same direction as cap rates considering historical and post-GFC periods. Investors should recognize this variable relationship and be careful to assume that higher bond yields imply higher cap rates.

Investors should pay close attention to unemployment, particularly the U-6 unemployment rate, the nominal Treasury yield, and global and domestic apartment volume.

Post-GFC, not all volume metrics are equal in their strength as cap rate drivers. Domestic volume drives cap rates more than total volume, and global volume drives cap rates more than cross-border volume.

Market relationships with cap rates are complex and telling. From macroeconomic data to apartment fundamentals, every metric plays a role in the interconnected space of multifamily real estate.

Reach out for more thoughts and insights.

Quantifying Market Relationships with National Cap Rates

About Berkadia Research

Berkadia Research leverages proprietary models and analytics to deliver actionable insights to the commercial real estate industry. Covering markets and submarkets across the nation, our experts monitor and interpret market fundamentals and utilize data science to uncover hidden trends. Through a combination of curiosity and expertise, we aim to augment client decision-making by providing data-driven and unique research not found elsewhere.

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Contact Us

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Sources: Berkadia Economic Research, Federal Reserve Economic Data, Bureau of Labor Statistics, Real Capital Analytics

Methodology: Proprietary statistical model