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Modeling Strategic Office Allocations in Institutional Real Estate Portfolios

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Abstract

Here we explore how institutional investors allocate real estate investments in the United States across various strategies, sectors, and geographic regions. We note the evolving nature of core office allocations, particularly a historical bias towards major gateway cities.[1] We question the categorization of such assets as high-quality core as the empirical high volatility and low relative returns do not generate the presumed better risk-adjusted returns. We argue that institutional portfolios still have too much office exposure, despite recent declines, which are a result of a combination of office dispositions, foreclosures and office value write-downs. We suggest a reevaluation of core allocations based on empirical data and sector performance, particularly in the context of post-COVID work patterns and the importance of suburban locations in the US economy. While the higher volatility in office investment returns detract from its attraction as a core holding it does at the same time make office investments more suitable for opportunistic strategies that astutely time market bottoms and tops for entry and exits to produce outsized returns.

**Disclaimer: All errors are ours. The views expressed herein are solely those of the authors and do not necessarily represent the views of Principal Real Estate or the University of San Diego School of Business or the Burnham-Moores Center for Real Estate.*

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[1]The definition of what constitutes office properties is in the process of being refined with life science and medical office in the process of becoming its own category. However, the size of these sectors is still small relative to overall office sector and for the purposes of this paper are treated as part of the office sector.

1 Introduction

1.1 Institutions commonly allocate their real estate investments along one or more of the following dimensions:

- ✓ Strategy - Core, value-add and opportunistic
- ✓ Geographic – aGlobal regions, country, region, metro, suburb, city
- ✓ Sector – Residential (rental apartments), office, retail, industrial, healthcare, niche (e.g. student, senior housing, data centers)
- ✓ Real estate quadrant – Equity, debt, public REITs, CMBS
- ✓ Vehicle – Open end funds, closed end funds, fund of funds, JVs, club deals, separate accounts, direct holdings, ownership stakes in real estate operating company (REOCs)

1.2 In general, institutional investors often begin with higher portfolio weights to home country / regions, core strategies, commingled fund vehicles, the private equity real estate quadrant[1], and across multiple property sectors and multiple metros, and with control over investment decisions delegated to an advisor or fund manager. This may be particularly true for investors that have limited in-house staff to evaluate and execute real estate investments. As they gain experience and scale while adding real estate staff, investors typically become more granular in their capital deployments by investing in specific property sectors or geographies as well as by taking on higher risk strategies beyond core. With more staff resources and experience investors tend to delegate less allocation decisions to advisors. Some investors employ a tactical allocation strategy to take advantage of shorter-term market dislocations through the use of public market equity (primarily listed REITs) and debt quadrants (primarily CMBS).

1.3 At certain times, public real estate equity and debt quadrants experience material divergences between how real estate values are imputed by public markets versus how they are valued in private markets. Investors use tactical allocations that seek to invest when material divergences between private and public market implied real estate values occur and then reversing their positions as values reconverge. For example, when REITs are valued at 110% to 120% of the net asset values (NAV), based on private market valuations, it might be time for an investor to sell or underweights REITs and shift to a higher allocation towards private real estate, and when REITs are valued at 80% to 90% of NAV based on private valuations it might be time to consider buying or moving to an overweight in REITs (all else being equal).

[1]Some investors opt to invest in real estate through public REITs due to liquidity and ease of execution while treating public REITs as a proxy for private real estate

1.4 Market practice has traditionally defined core real estate as substantially leased properties in the four main property sectors (office, retail, industrial and residential) located in major gateway cities. These have historically been perceived to offer relatively higher stability of returns and relatively greater liquidity[1] thereby satisfying the premise of lower risk core strategies. Office assets in major cities tend to be large in size and historically traded at significant prices per square foot compared to other property types. Large institutions, in particular, sought to own gateway office as it was more efficient to deploy capital given the large transactions sizes and the commonly held belief that they were strategic long term core holdings. Some academics have suggested the benefits of gateway markets are overpriced[2]. As a result, office sector weights including gateway office became significant. The NCREIF index, which represents institutionally owned real estate in the US reported that the office composition of the index averaged 36% over the past 40 years. *(Whenever referenced in this paper NCREIF refers to the National Council of Real Estate Investment Fiduciaries)*

1.5 This paper examines the definition of core real estate by using empirical data to compare risk adjusted returns by sector i.e. total returns factoring the volatility of returns by sector. Stability of sector fundamentals such as demand, supply and vacancy impact volatility of returns. Importantly, sectors differ in the frictional cost or spread between rental revenues and net income by virtue of operating expenses as well as tenant procurement costs and other capital expenditure items. Operating expenses that are passed through to the tenant vary greatly by individual lease and property type. Concessions like free rent, tenant improvement packages and leasing commissions, tenant retention and turnover also impact cash flows and returns. Lower frictional costs imply more resilient net income streams.

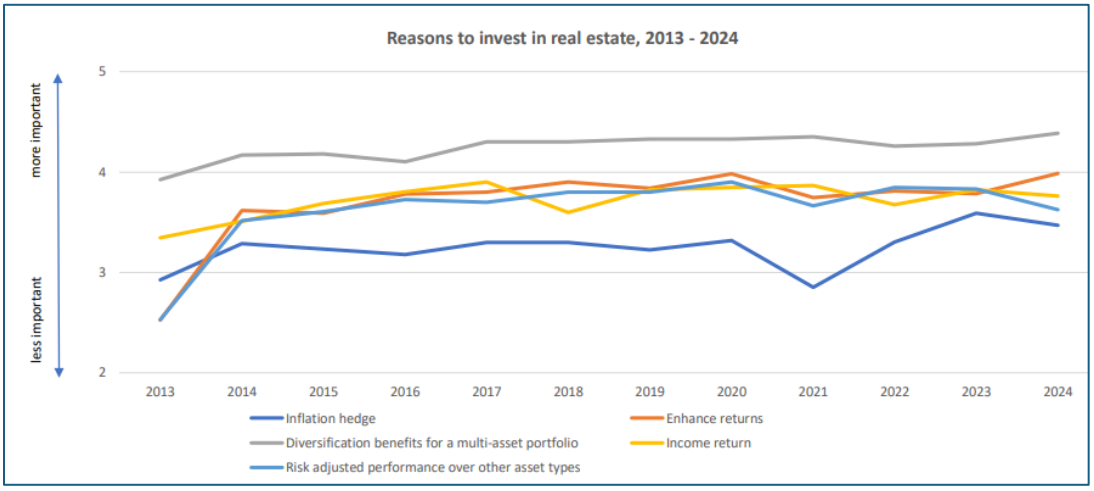
1.6 A strategic sector allocation for core U.S. real estate using long term risk adjusted return data is modeled below. This is compared to current sector weights of institutions in the NCREIF index as well as in the MSCI report on market size. We conclude that the long-term core exposure to office, and in particular, gateway office, is currently still too high even with the substantial decline in office sector weights over the last two years resulting from a combination of office dispositions, foreclosures and office value write-downs. This is true regardless of whether return to office (RTO) rates increase and how soon office physical occupancy reverts to pre-Covid norms.

[1]In general, private real estate investments have relatively limited liquidity compared to public market investments, but on a relative basis, properties in gateway markets have historically been regarded as having greater liquidity than (i) properties located in secondary or tertiary markets and/or (ii) specialty or niche properties

[2]Joseph L. Pagliari Jr. 2021. "Are the Gateway Markets Overpriced?" University of Chicago Booth School of Business Working Paper.

2 Real estate allocations in multi-asset portfolios

2.1 Allocations to real estate within multi-asset portfolios by institutional investors have gradually increased over time. Institutions such as pension plans, sovereign wealth funds and insurance companies currently have target real estate allocations averaging 10.4% of total assets under management (AUM) according to industry statistics gathered by PREA, INREV and ANREV[1]. The average of the institutional target allocations was 3 percentage points less at 7.4% of total AUM in 2019. Real estate's well-known attributes of low relative volatility and low correlation vis-a-vis other asset classes such as stocks and bonds, as well as its high-income component of total return and inflation hedging potential are reasons that institutions seek to invest in real estate. PREA's survey shows how these key attributes of real estate constitute the main reasons that institutions chose to invest in real estate.



2.2 The benefit of adding real estate to multi-asset portfolios can be modeled by applying Harry Markowitz's modern portfolio theory (MPT) mean return variance approach. With real estate, the risk / return profile of a multi-asset portfolio is enhanced as observed by achieving higher efficient frontiers (lower risk at a given target return). Numerous academic research studies support the inclusion of real estate in institutional multi-asset portfolios[2].

[1]2024 Investor Intentions Survey by Pension Real Estate Association (PREA)].

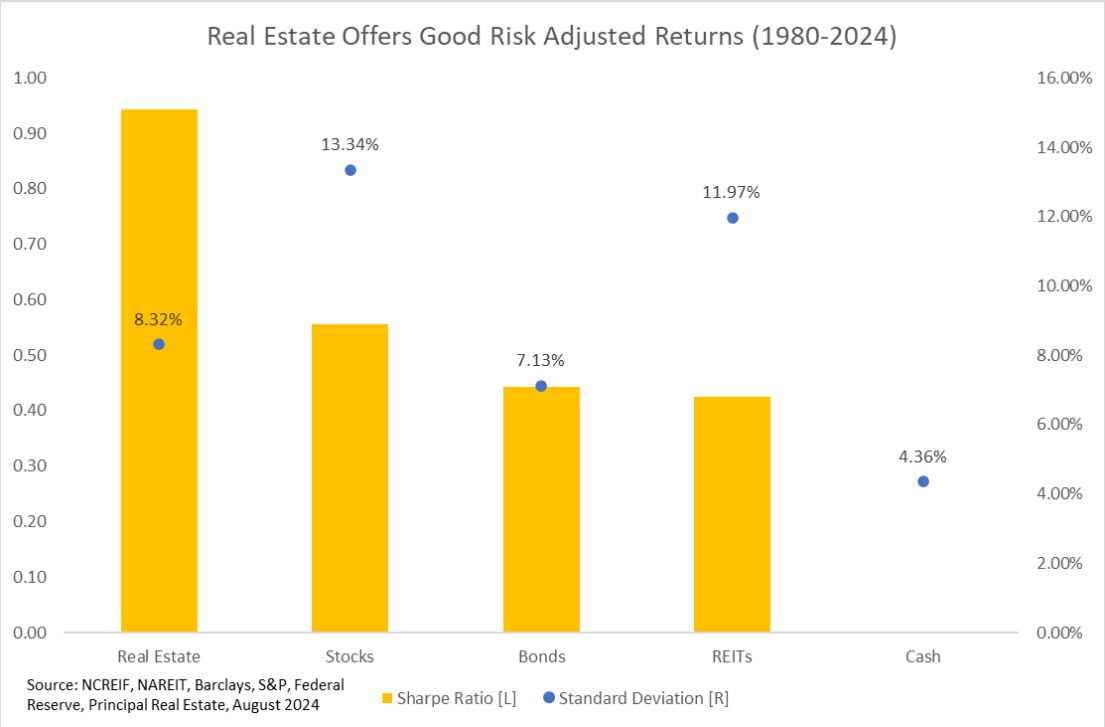
[2]Richard Gold (1996) The Use of MPT for Real Estate Portfolios in an Uncertain World, Journal of Real Estate Portfolio Management, 2:2, 95-106, DOI: 10.1080/10835547.1996.12089531.

2.3 Research by Brown and Schuck[1] suggests that optimal real estate allocations well support the observed allocation of investors which typically range between 4% and 15% of AUM. However, the researchers stressed the importance of property diversification to avoid unsystematic risk. They also emphasized that investors should seek supernormal returns by identifying underpriced properties while at the same time casting doubt on how effective superior stock selection could be in real life given their view on the efficiency of the market. However, private markets investments are generally viewed as less efficient, relative to public markets, thereby offering investors the ability to capture alpha through superior investment selection.

2.4 It has also been observed that real estate returns when overlaid on volatility, have proven superior to publicly traded stocks and bonds. The chart below shows real estate having the highest Sharpe Ratio vis-à-vis the other asset classes. The Sharpe Ratio is aimed at measuring how well a portfolio's return compensates the investor for risk. It is the excess return of an investment portfolio over the risk-free rate divided by standard deviation of the returns. Higher returns are not necessarily superior, if they are accompanied by higher variability in the returns. It is the return per unit of risk that the Sharpe Ratio measures. The higher the Sharpe Ratio the better the returns relative to risk, measured in this fashion.[2]

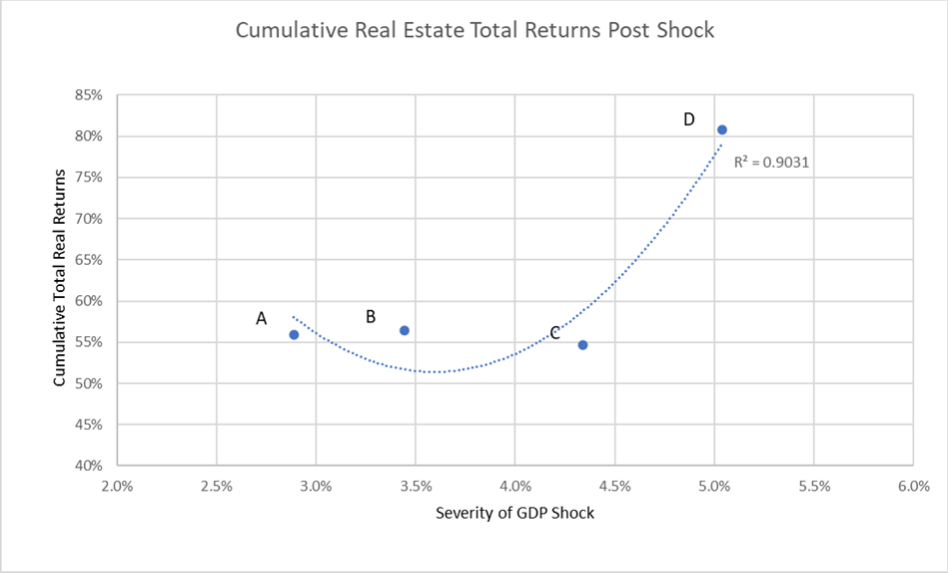
[1] Gerald Brown & Edward Schuck (1996) Optimal Portfolio Allocations to Real Estate, Journal of Real Estate Portfolio Management, 2:2, 63-73, DOI: 10.1080/ 10835547.1996. 12089527).

[2]Note that some analysts and academics like David Geltner, PhD, make the case that appraisal smoothing leads to reduced volatility, although this may change with time and the increased use of automated valuation. At the same time, the case can be made that appraisers reflect reality since owners do not sell during downturns and open-end funds put up exit gates on redemptions. This leads to a slow process of price discovery and reduced volatility. In contrast to private market real estate, public REIT values, which are marked to market by daily stock price changes, fall quicky in response to downturns. This has been used to imply that private market real estate value changes have lagged the market. However, there are times when public REIT values fall get repriced upwards after steep declines and eventually reconverge with private market values - implying that the so-called appraisal lags were justified. At other times, it is the private market values that gradually adjust downwards in the direction of public REIT valuation declines - implying that appraisal values were lagging the market. Or both public REIT market values and private market values move towards each other.



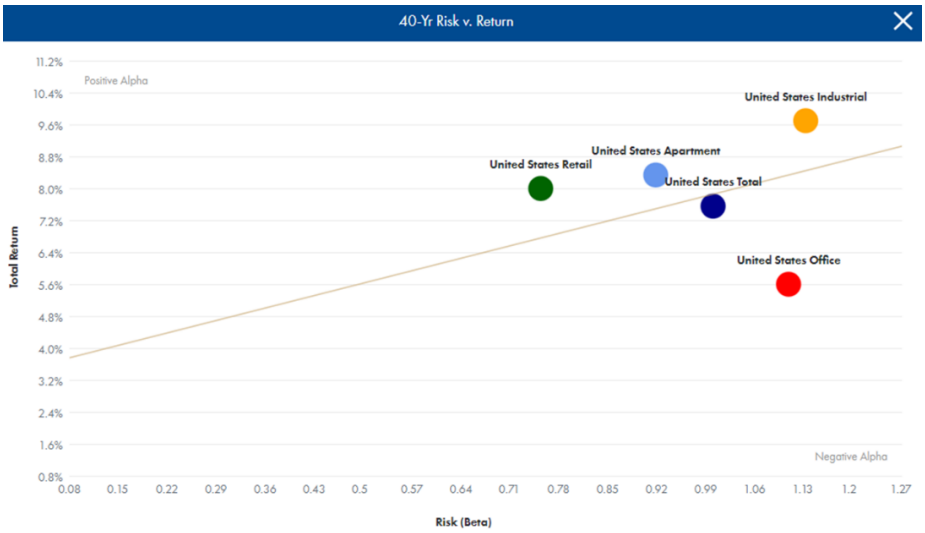
2.5 Another benefit of real estate as an investment asset class is its antifragility characteristics. Most investment asset classes are fragile meaning they suffer disproportionately to systemic shocks. In our research paper entitled *'Antifragility of Real Estate Investments in a World of Fat-Tailed Risk'*[1] we posited that Gaussian distributions used to model investment outcomes understate the frequency and magnitude of systemic shocks. Rather than focus on modeling shocks we questioned whether it was more useful to find antifragile investments, that is, investments that would not only be defensive to shocks but would benefit from shocks. We demonstrated from first principles and empirical data, that real estate had antifragility characteristics. We showed that real estate returns had investment convexity i.e. returns benefited from heightened volatility due to shocks. Investment convexity is a proof of antifragility.

[1]Antifragility of Real Estate Investments in a World of Fat-Tailed Risk by Guy Tcheau & Norman Miller. https://catcher.sandiego.edu/items/usd/Antifragility_Tcheau_Miller.pdf



3 Property sector performance track record

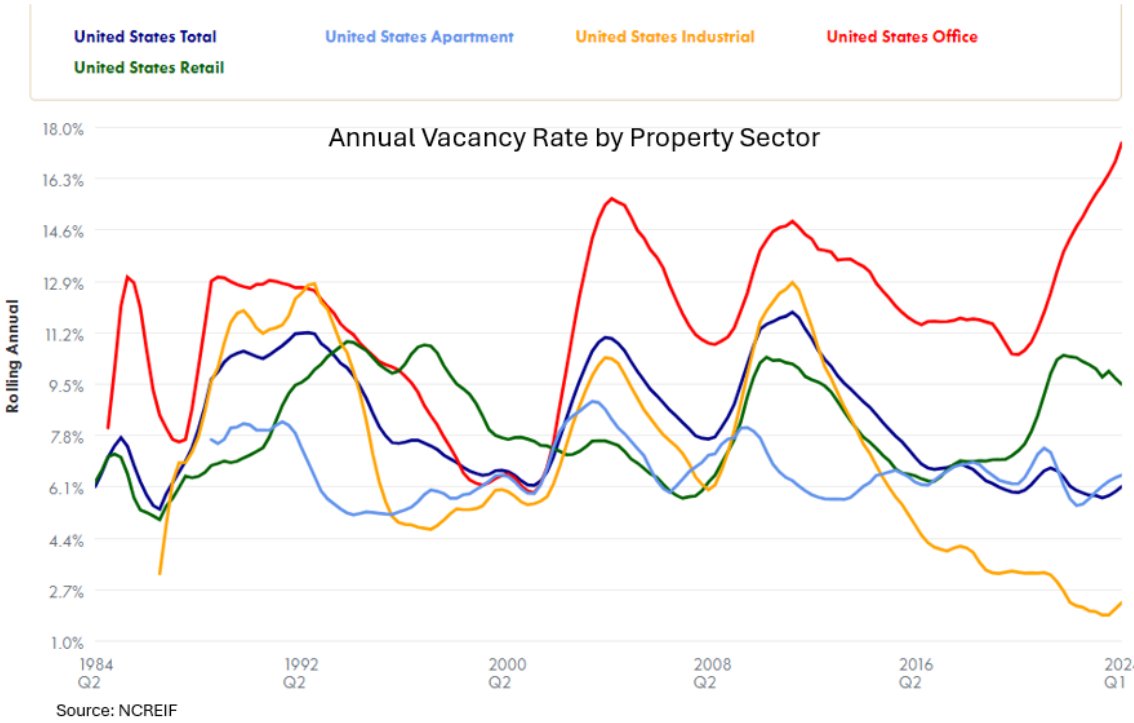
3.1 To compare performance across the different real estate property types one methodology is to do so on a risk or volatility adjusted basis. Looking at the 40-year track record of institutional owned real estate in the NCREIF NPI index we can see that the office sector had the lowest risk adjusted returns due to a combination of the lowest annualized return of 5.6% and near highest standard deviation of 9.6%. While industrial had a slightly higher standard deviation than office, annualized returns were materially higher well compensating for the marginally higher volatility.



3.2 Another way to quantitatively compare performance on a risk adjusted basis is to look at the Sharpe Ratio which measures performance of an investment compared to the risk-free return, after adjusting for volatility. The Sharpe Ratio represents the incremental return over the risk-free rate that an investor receives per unit of risk. The Sharpe ratios for each property type using 40 years of track record from NCREIF NPI data shows office significantly underperforming all other property sectors.

NPI (40 Year Period)	Apartments	Industrial	Office	Retail	All Property Types
Sharpe Ratio	0.62	0.62	0.25	0.63	0.52

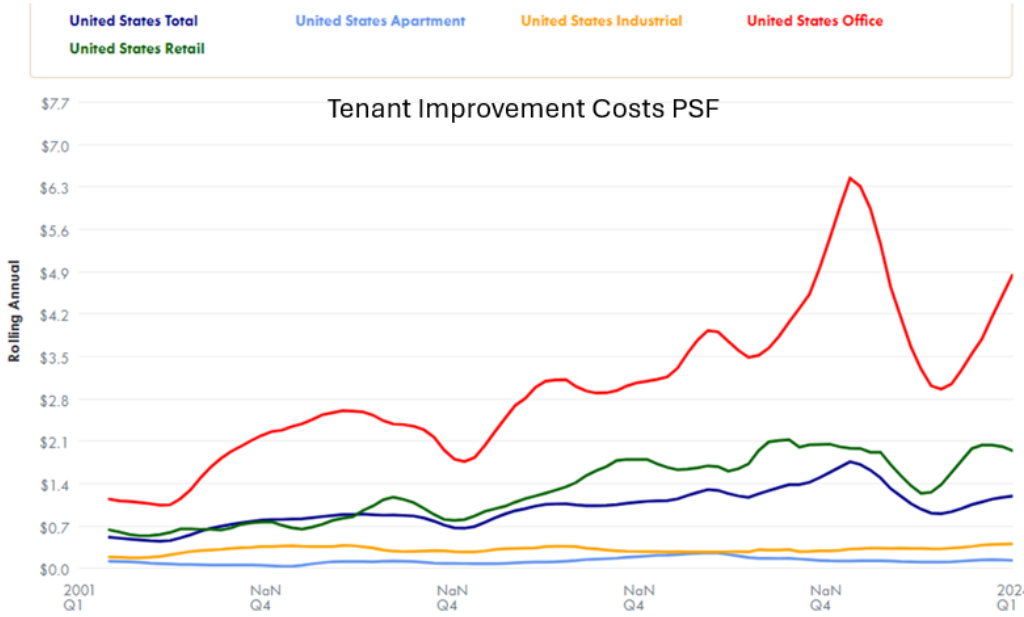
3.3 The fundamental challenge with office, particularly large office buildings in gateway cities, is the long lead times for new development. Office buildings typically require multiple years for site assemblage and securing governmental approvals necessary to commence construction. Physical construction and lease up to stabilized occupancy take an additional number of years. By the time new office buildings are well into construction, the space fundamentals that were supportive of new office development may well have turned negative. With construction underway it is too late for developers to shut down construction if the demand has waned. This results in unneeded new office space being delivered to the market at the wrong time. Furthermore, at the time office space markets are attractive (from a vacancy and rental rate perspective), multiple developers have historically proceeded simultaneously with plans for new development, especially if construction financing is available. Delivery of new office buildings tends to be lumpy, often with multiple new office towers being completed at the same time. Unless this surge in new deliveries is accompanied by a surge in demand for office space by tenants, vacancies tend to rise, reducing office landlord pricing power and leading to either rent concessions, higher than expected tenant improvement allowances to attract tenants, or some combination of both. These various space market dynamics have likely been a contributing factor to officing have the highest volatility as shown in the 40-year vacancy chart from NCREIF NPI. This construction delay induced volatility is also likely one of the primary factors for the office sector investment returns also having the highest volatility and lowest Sharpe Ratio.



Source: NCREIF

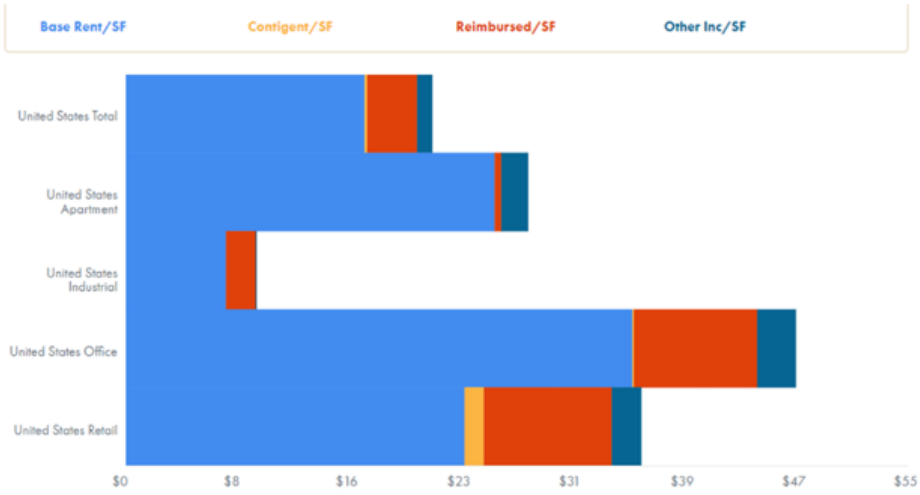
4 Office sector cash to income leakage

4.1 Different property types experience varying levels of tenant leasing commissions, tenant improvement packages and building improvement and recurring capital expenses in order to maintain tenant occupancy. For example, when a tenant vacates an apartment, owners typically professionally clean the units, shampoo carpets, and touch up paint in order to lease to the next tenant. In an office building, when large tenant leases roll, landlords generally have to demolish the prior tenant's fit out and provide a substantial tenant improvement package to construct the office space to the specifications of the new tenant. Office properties have very high tenant improvement costs compared to other property types.



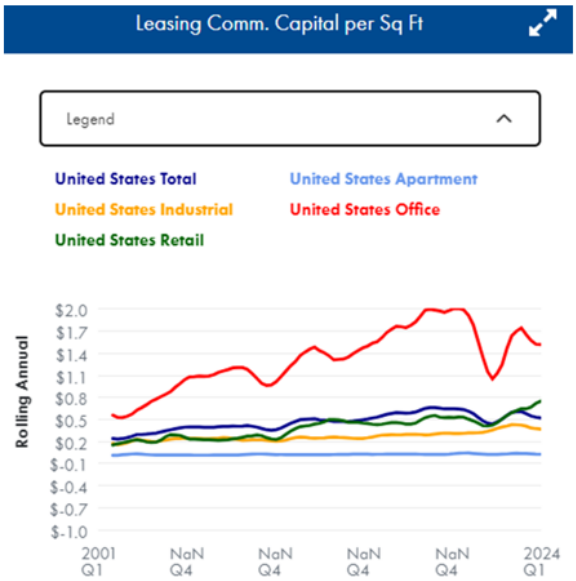
Source: NCREIF

4.2 The office sector has had the highest gross rents within the property sectors. In addition, it is common for mid to large cap office tenants to utilize a tenant representative to conduct a competitive search for prospective office locations, such costs (typically in the form of leasing commissions) typically being borne by the office owner in the building ultimately selected by the tenant. Leasing commissions charged by agents or tenant representatives to secure tenants are typically structured as a percentage of contractual rents to be paid by the tenant.



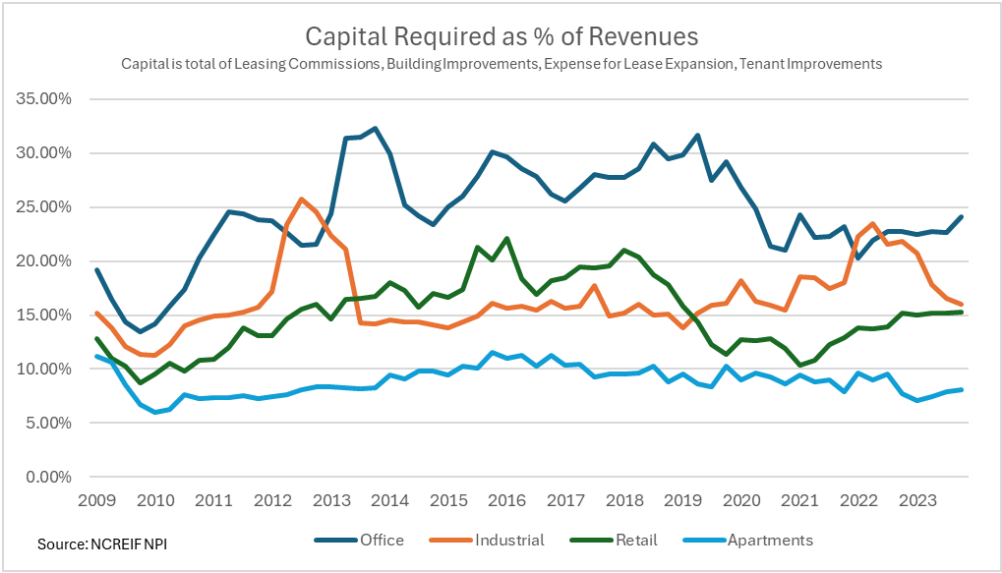
Source: NCREIF

4.3 As a result office leasing commissions are the highest of the property types as shown in this chart below by NCREIF. Note that the trendline decline for leasing commissions per square foot for office over the past few years is primarily a function of declines in office rents, as opposed to a decline in leasing commission percentages.



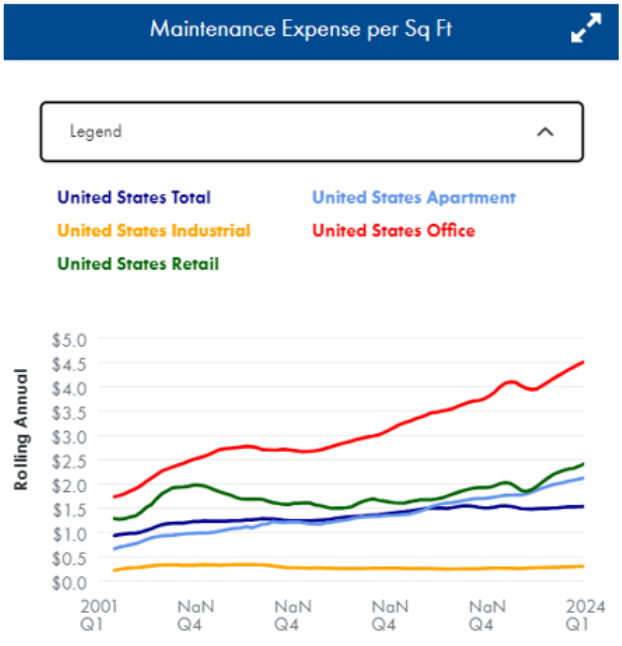
Source: NCREIF

4.4 The combination of capital spent as a percentage of revenues for tenant improvements, leasing commissions, building improvements and lease expansions are the highest in the office sector as shown in the NCREIF chart below. This means that owners experience considerable leakage in rent received from tenants and this reduces net cash flow.



4.5 Not only are tenant improvements, leasing commissions and recurring capital expenditures for office high, but likewise operating expenses for office are also high. Taxes and maintenance expenses per square foot as shown in the charts from NCREIF below, are highest for office properties relative to the other sectors.

Source: NCREIF



Source: NCREIF

4.6 The combination of high tenant improvement packages, high leasing commissions and tenant improvement packages, recurring capital expenses, taxes and maintenance costs in office sector property type leads to a highly undesirable outcome that negatively impact investment performance over time especially during periods of higher vacancy rates and thus reduced landlord pricing power to help offset these higher capital and operating expense line items. Since income returns account for 70% of the total property returns, cash flow leakage from transactional and operating costs needed to maintain tenancy has a profound impact on investment performance. As the NCREIF chart shows, office ranks at the bottom in terms of cash to income ratio. The greater the leakage from rental revenue attributable to tenant inducements, operating expenses and recurring capital expenses, the lower the net cash flow actually received by the owner.

Source: NCREIF

5 Office sector allocations by institutional investors

5.1 Although the office exposure as a percent of the NCREIF NPI index declined post-Covid reaching 21% as at 2Q2024, institutional investors historically allocated a significant percentage of their real estate portfolios to office. Over the past 40 years, the office composition in the NCREIF NPI index averaged

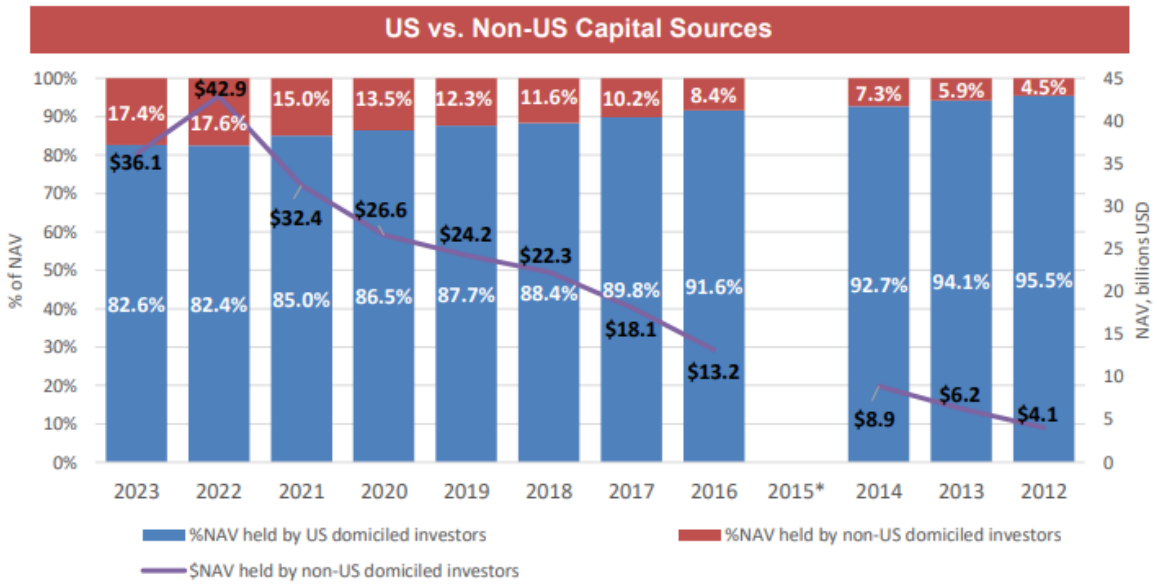
36% with a peak of 45%. The NCREIF NPI index comprises over 12,000 properties with a combined value of nearly $0.9 trillion of institutionally owned properties. As such, it offers a good representation of the average property sector weights in the real estate portfolios owned by institutions.

5.2 The reasons for the historically high office weights stem partly from a long-held view that office, particularly high-rise towers in gateway cities, were core investments. The definition of what constituted core was not empirically researched but rather was adopted by market practice. It was common for research reports to classify office as trophy, class AA, class A, B and C. Office was the only property sector to have trophy and class AA designations. This nomenclature reflected the belief that the highest quality office buildings were often viewed as strategic core holdings.

5.3 It is understandable that office was held in such high regard. Office buildings were designed by world renowned architects with features, heights, or scale dwarfing industrial, apartments and retail properties. Trophy office buildings boasted of high-end granite and marble finishes, state of the art curtain wall systems, as well as tenant amenities such as gyms, rooftop decks, aesthetic water design features, collaborative spaces, outdoor workspaces, cafeterias and coffee bars. Large well known multinational companies would anchor office buildings as marquee tenants with building signage or naming rights, bringing with them strong credit and secured revenue streams. In addition, as ESG factors gained prominence, office buildings that had achieved certain green or energy efficient designations also generated strong investor demand.

5.4 Another factor for high office institutional ownership demand stems from foreign investor bias towards this property sector. Foreign buyers of US property tend to be larger institutions seeking to diversify from their overweight to home country portfolio holdings. In general, foreign institutions (and private wealth/family office investors) have historically gravitated towards gateway cities in the US for their direct core real estate acquisitions. As their portfolios build out, and investors either had gained sufficient exposure to gateway markets or pricing began to favor consideration of non-gateway markets, non-US domiciled investors gradually began to transition to non-gate markets over time.

5.5 The PREA[1] July 2024 Survey below shows the increasing size of foreign investment in US real estate via core diversified open-end funds. demonstrates the significance of foreign capital for US real estate. According to MSCI[2], office represented the largest share of the global professionally managed real estate market at 29% and reinforces the global investors' desire for office holdings in their portfolios.

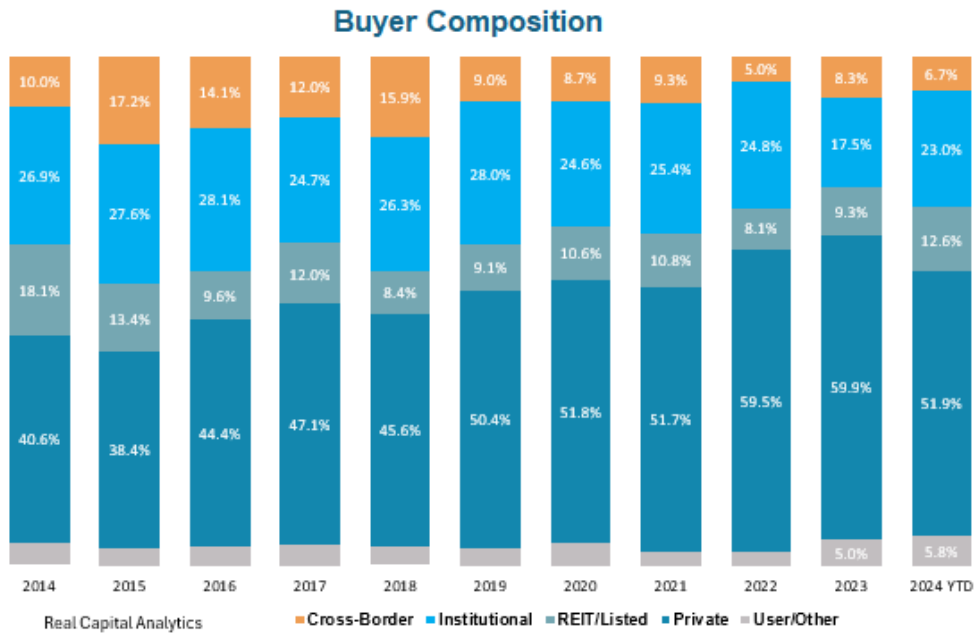


* Data is not available for 2015.
Data prior to 2023 is taken from past surveys. The sample of funds varies across years as some funds did not provide data for some years, and because of changes in the constituent funds in the index. Therefore trends over time should be interpreted

Source: Pension Real Estate Association (PREA) Investor Composition Survey, Core, Diversified Open-End Funds, Released July

5.6 Real Capital Analytics, now MSCI, tracks individual and portfolio property sales. MSCI (RCA) data in the chart below shows the share of cross-border i.e. foreign purchases of institutional property annually since 2014. As with the PREA Survey data, RCA data shows that foreign investment in US real estate has trended upwards over time.

[1]PREA – Pension Real Estate Association
[2]MSCI Real Estate Market Size report July 2024

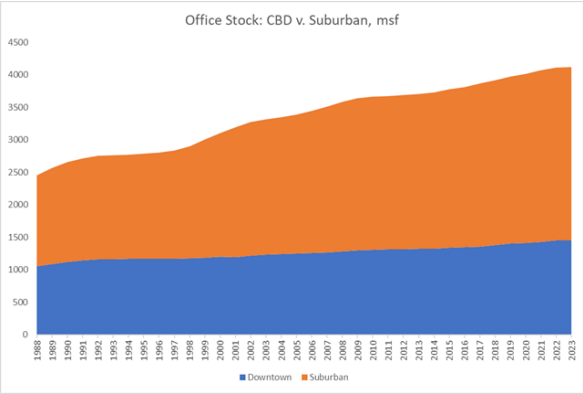


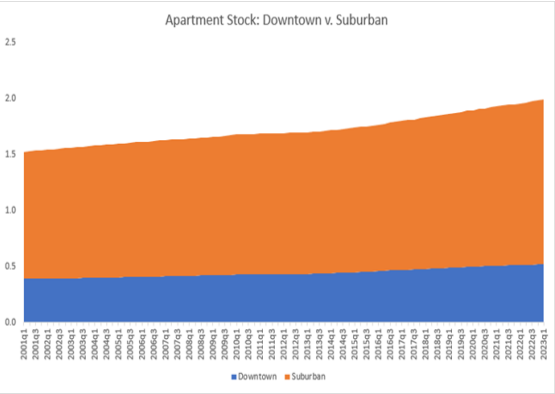
5.7 There are several reasons why foreign institutions have historically favored gateway central business districts (CBDs) for real estate investments. Firstly, in their domestic markets, the major CBDs are dominant since they are home to most of the large corporations e.g. the CBDs of Tokyo, Hong Kong, Seoul, Singapore, London, Paris and Sydney. It follows that when investing into the US, the foreign institutions regard US gateway CBDs of New York, Los Angeles, Boston, DC and San Francisco is similar vein. Secondly, as the foreign institutions seeking to make direct investments into the US tend to be larger in size they desire to make larger sized acquisitions, commonly referred to as large ticket sizes. It is more efficient for the foreign institution's limited people resources assigned to overseas investing to undertake fewer large ticket transactions than numerous small granular deals. When one combines gateway CBDs and large tickets with the notion that Class A office buildings constitute core investments the results was concentration of foreign buying of large gateway office buildings relative to their overall US real estate holdings. This crowding effect caused domestic institutions to have to compete for product, driving down capitalization rates further, unless higher pricing levels (including relative to reproduction costs) began to disaffect relative value and led to certain segments of the non-US domiciled investor market to begin to turn their attention to other segments of the US real estate market. Lower cap rates and high values created a somewhat self-reinforcing (herd type behavior) cycle that large office buildings were core and desirable as strategic core holdings.

5.8 The notion that the US parallels the foreign investors' home market where gateway cities are the bastion of domestic and international business activity and home to leading corporations is understandable. However, in some ways the US is not a CBD led economy but suburban led one, and perhaps even more so in the post COVID period. Based on Housing and Urban Development (HUD) data, over two thirds of the US household population reside in suburban vs urban locations. With the majority of the population living in suburbs, with better schools and lower crime, businesses establish their operations closer to where the employees want to live. Looking at the top 20 US corporations by market capitalization, only 3 can be said to be headquartered in CBDs, whereas 17 are headquartered in suburban locations.

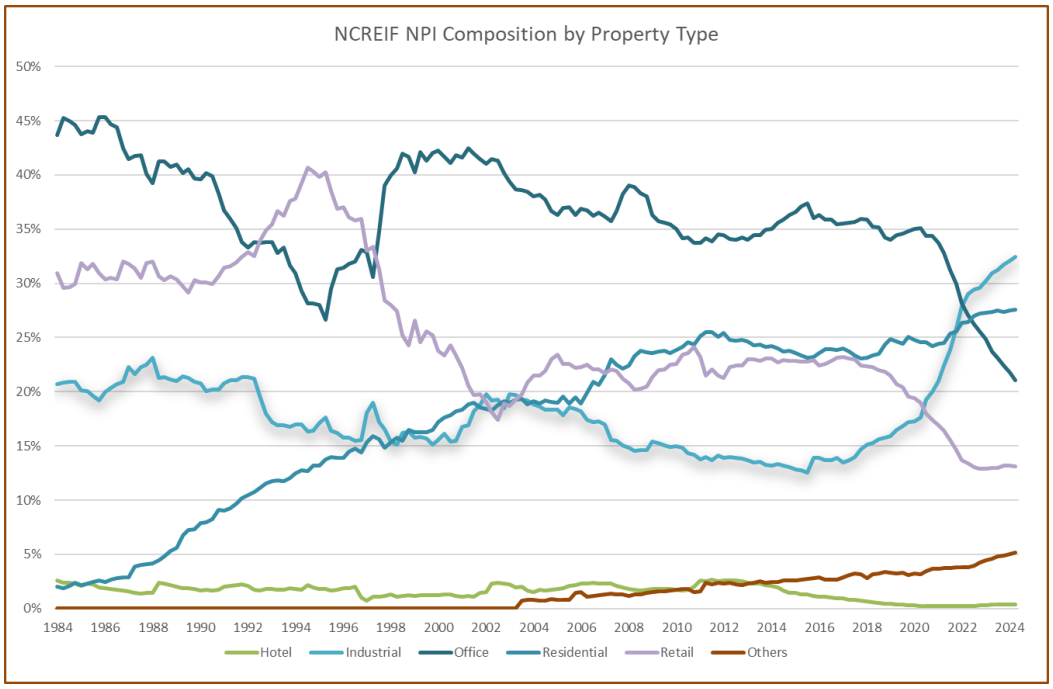
Company	Location	Company	Location
Microsoft	Suburban	Eli Lilly	CBD
Apple	Suburban	Exxon Mobil	Suburban
NVIDIA	Suburban	Johnson & Johnson	Suburban
Alphabet (Google)	Suburban	JPMorgan Chase	CBD
Amazon	Suburban	Walmart	Suburban
Meta Platforms (Facebook)	Suburban	Mastercard	Suburban
Berkshire Hathaway	CBD	Broadcom	Suburban
Tesla	Suburban	Procter & Gamble	Suburban
Visa	Suburban	Oracle	Suburban
UnitedHealth	Suburban	Home Depot	Suburban

5.9 The size of suburban office and multifamily apartments by rentable sq feet are significantly larger than for CBDs as shown in the charts below.





5.10 The NCREIF property type composition over the past 40 years is shown below. Not surprisingly, in most years, office represented the highest percentage within the index.



5.11 Starting in 2020, we see a substantial decline in the office weight in the NCREIF NPI index. This drop is driven by a material fall in the value of office properties nationwide as well as weakening investor sentiment regarding the office sector, with subsequent reduced capital commitments to the sector. Office properties in NCREIF produced a negative -12.02% annualized appreciation return over the past 3 years. In the same period industrial and residential sectors had positive annualized appreciation with retail having only a negative -2.75% annualized appreciation by comparison to office.

5.12 Prior to the Covid pandemic we had started to see some office tenants start to utilize desk sharing based on the observation that many workstations and office spaces were unoccupied for half the time or more during the day. Firms like Accenture, Proctor and Gamble, and others had started to encourage hot desking and space sharing, along with permitting alternative work locations.[1]

[1]Norm Miller "Downsizing and Workplace Trends in the Office Market" Real Estate Issues, 38:3, 2013.

5.13 The Covid pandemic necessitated work from home but even once employers re-opened offices, many more office workers expressed an ongoing preference to choose working from home instead of the office, a trend that has continued and likely will continue especially in light of lower unemployment rates in which employers had limited ability to enforce work from office policies. In the US, average physical occupancy by office workers stands at 63% according to Placer.ai. Miami has the highest return to office (RTO) rate of 88% with New York City at 73%. Unfortunately, these are the exceptions.

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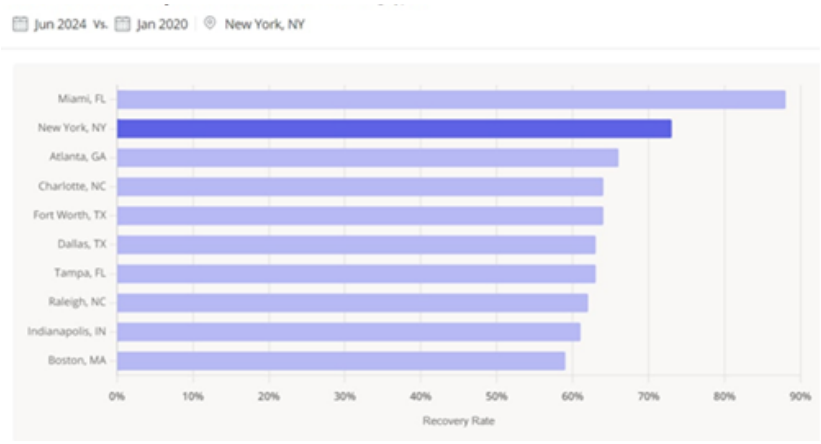
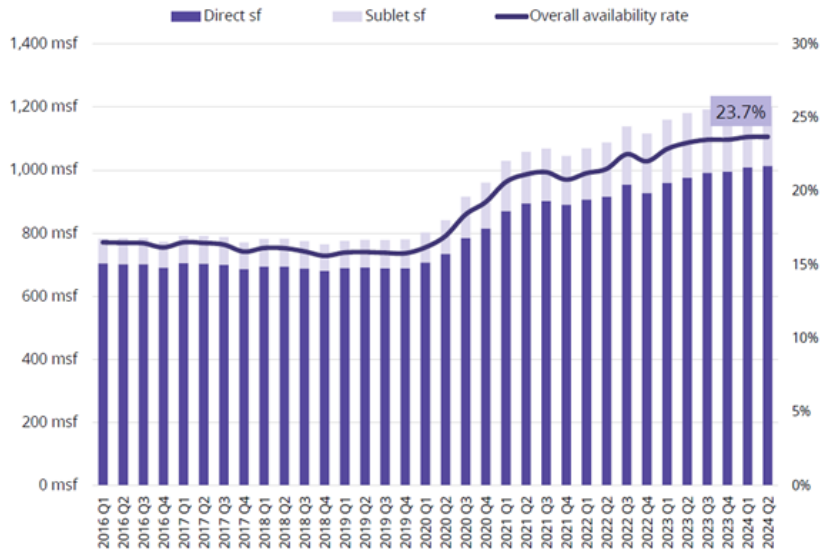


Source: Placer.ai

5.14 With lagging RTO trends, tenants delayed leasing decisions, downsized their footprints or made their unused space available for sublease. As a result, the vacancy rate for office rose sharply. According to Avison Young, the national office vacancy rate is 23.7%[1], including sublease space, with a staggering 1 billion sq ft of vacant office space.



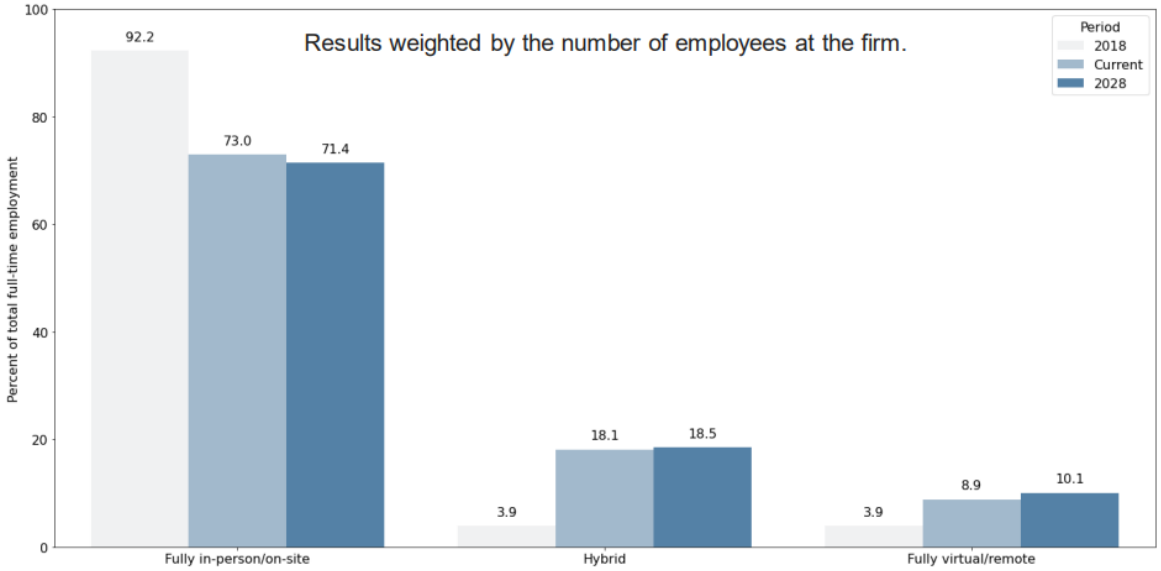
[1] Avison Young 2Q2024 National Office Market Research

5.15 The high vacancy rate and weak tenant demand conditions in the office market have impaired office owners' net operating income. In order to attract tenants, landlords have given hefty tenant improvement allowances and big upfront free rent concessions. The resulting high upfront capital commitment required for new leases have extended the payback periods for landlords. The net effect has been a decline in net cash flow from operations available for owners. This in turn stressed ownership's ability to meet debt service on their mortgaged office buildings which has been further challenged by lenders increasing required spreads on office loans, as the office credit curve has steepened sharply. Office loan defaults and foreclosures increased materially as a result. This in turn caused two negative impacts on office values. First, loan defaults and foreclosures forced lagging write downs in office values to be recognized as office holdings were liquidated. Secondly, banks and other providers of debt capital significantly scaled back their willingness to lend on office assets. Without financing, potential office buyers either withdrew from making acquisitions or adjusted pricing down to account increased risk aversion and the higher cost of financing.

5.16 It is likely that physical occupancy of office space in the US will gradually recover to higher levels especially if unemployment rates increase and/or employers are more successful in convincing the employee base of the incremental merits of in person meetings (vs virtual meetings) from a collaborative and cultural team and relationship perspective. However, hybrid work-from-home (WFH) trends are likely to remain to some degree, partially because increases in collaboration technology employed during Covid have demonstrated that remote working can be effective, and because work culture has become accustomed and accepting of WFH.

5.17 A survey[1] conducted jointly by the Atlanta Federal Reserve Bank, the University of Chicago, and Stanford University found that senior executives believe that both hybrid and full remote work will trend upwards with about 71.4% of full-time employees being 100% on-site by 2028. This compares with about 92% of full-time employees working on-site in 2018. Employee pushback might make these estimates a challenge, as discussed in the section 7.

[1]Federal Reserve Bank of Atlanta, Survey of business uncertainty August 2023



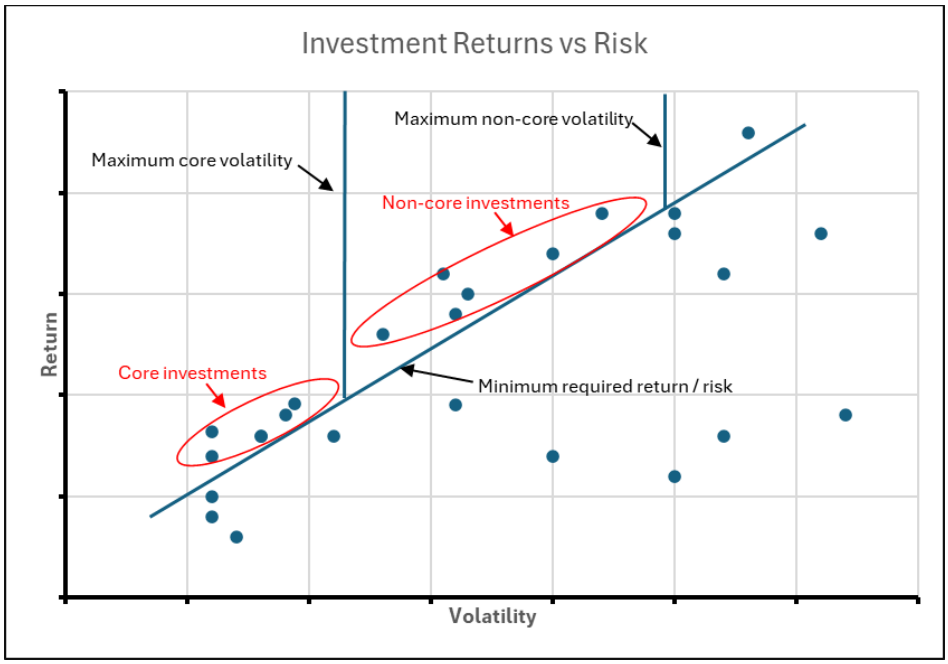
Federal Reserve Bank of Atlanta, Survey of business uncertainty August 2023

5.18 Having a view of the trajectory for RTO and investing in office buildings due to market mispricing may be a viable opportunistic strategy i.e. tactical versus strategic investment. As we noted in Section 3, the office sector has the highest volatility in space market fundamentals as reflected in the large vacancy rate gyrations. These boom-bust cycles offer investors the ability to profit through opportunistic or tactical investing by timing cyclical downturns for purchases and the recovery phase for dispositions. However, core allocations to real estate have historically not been tactical but rather, more strategic in nature, especially given the high historical weighting of office in the NCREIF index. The purpose of strategic real estate portfolio allocation is to establish portfolio weights by property sector based on risk tolerance, time horizon, and expected risk adjusted returns. Strategic allocations are intended for long term holds rather than active trading which is tactical or opportunistic. Core real estate is the central focus on strategic allocations given the long-term horizon. However, **the type of real estate that fits within the definition of core cannot be determined by visual aesthetics, qualitative attributes or conventional market practice. Investments need to be assessed solely based on their performance in terms of expected investment returns and risk, on both a standalone and portfolio level.** Core investments would encompass assets that produced

consistent returns with low to moderate volatility relative to non-core, the latter expected to provide higher returns albeit with higher volatility.

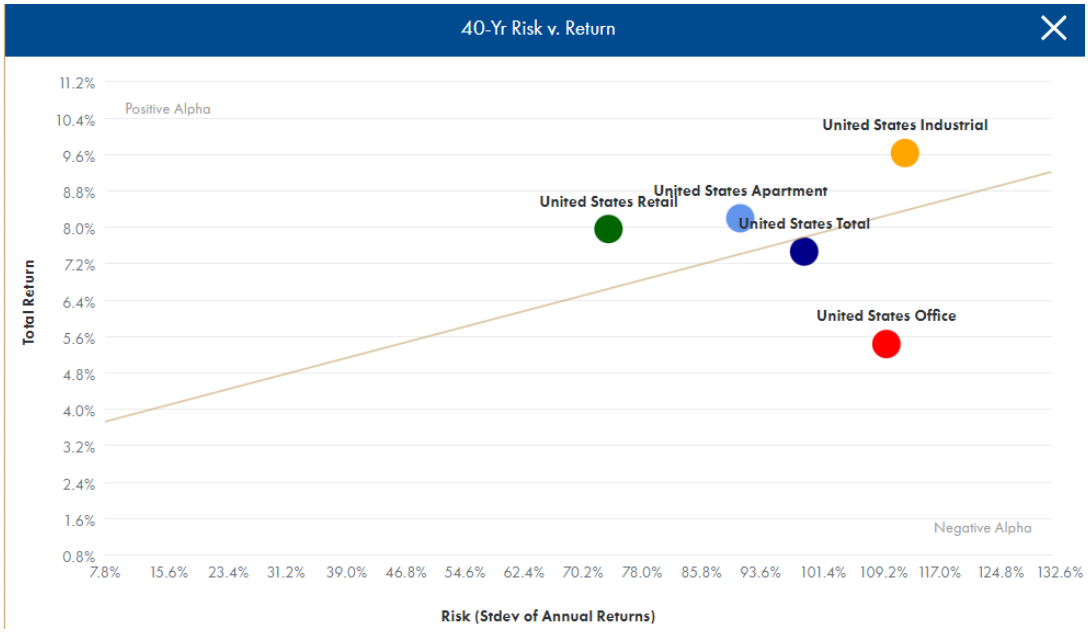
5.19 Strategic investment allocations ought to be evaluated on a relative basis using risk adjusted returns. Assuming a universe of alternative property investments, a maximum limit for volatility can be set for investments that meet the definition of core. A maximum volatility can also be set for all investments to be deemed acceptable for investment regardless of expected return, i.e. investments with very high expected returns but that involve excessive risk (relative to investor risk tolerance) are rejected or significantly underweighted from a broader portfolio mix perspective. A minimum return per unit of risk can then be established to set a floor for acceptable investments, i.e. investments that have low volatility but too low an expected return or investments with high expected return, but too high volatility may produce unsatisfactory risk-adjusted returns fall below the floor and are rejected or significantly underweighted from a broader portfolio perspective. Investments that offer acceptable risk adjusted returns with volatility below the maximum limit for core are classified as core investments. Similarly, investments that offer acceptable risk adjusted returns with volatility above the minimum for core investments are classified as non-core investments. This is illustrated in the investment returns versus volatility chart below. Note that the investment that is in the upper right corner is rejected (or significantly underweighted) even though it is above the minimum required return / risk line because its volatility exceeds the upper limit.

5.20 As we discussed in Section 3, the office property sector had the lowest Sharpe Ratio among the main property type. In fact, the office sector Sharpe Ratio based in NCREIF's 40 years of track records was less than half of the Sharpe Ratio's for industrial, apartments and retail. When using empirical data to determine property investments qualifying as core it will be hard for office to feature significantly given the low Sharpe Ratio which means that many office investments will fall below the minimum required risk adjusted return line.

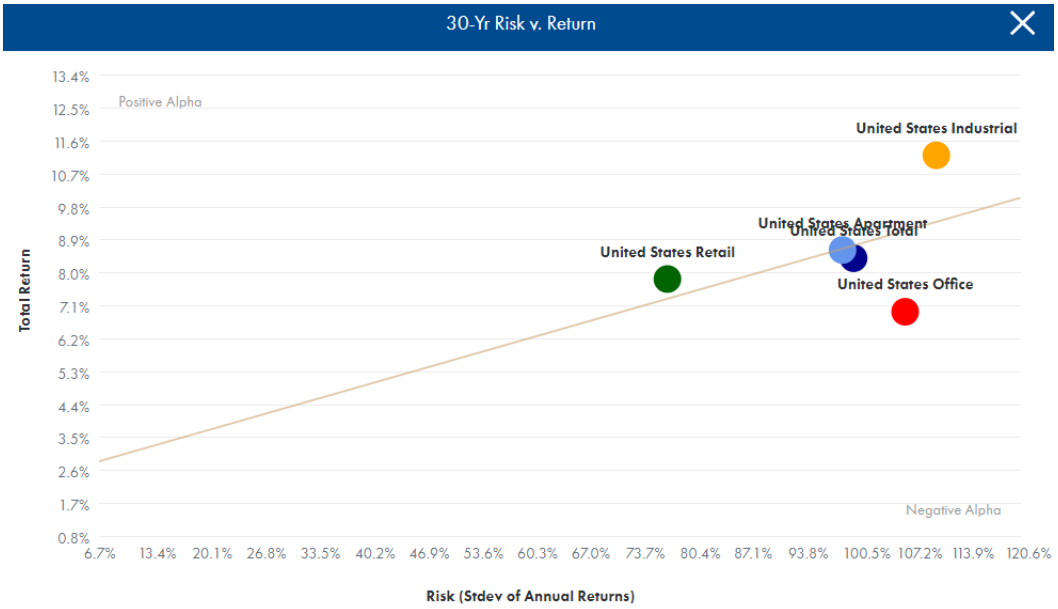


6 Modeling strategic property sector allocations

6.1 Using historical performance data from NCREIF NPI for the 40-year period from 1984-2024 the comparative return vs risk by property sector can be compared as shown in the following chart. Office was clearly to lowest performing sector.



6.2 To limit anomalies due to the starting point of the return vs risk analyses 20, 25- and 30-year time periods were also examined. The results were similar to the 40-year results with the office sector having the lowest performance. The 30-year risk versus return chart from NCREIF NPI data is shown below for comparison.

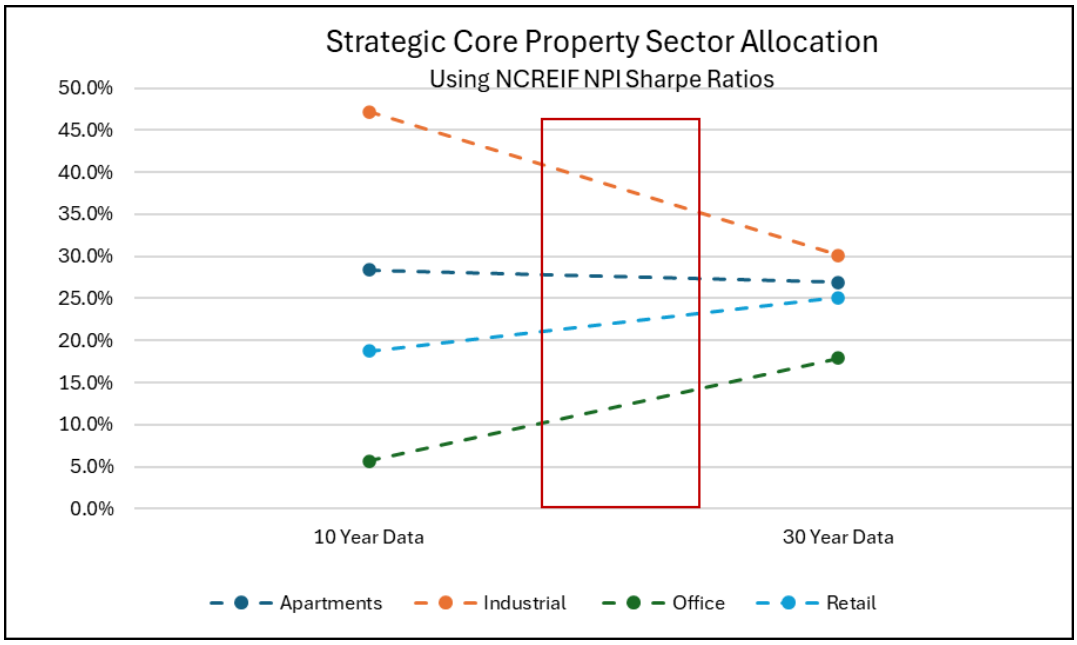


6.3 Sharpe ratios for NCREIF NPI property sectors are shown in the table below for 10-, 20-, 30- and 40-year periods. Office had the lowest Sharpe Ratio in every period relative to the other sectors. Properties experience changes in economic use over time as the macroeconomy, demographics, social and geopolitical factors shift over time (including ESG elements). The problem with relying solely on long-term performance measures is that it presumes that the economic utility of the various property sectors will remain unchanged going forward relative to the average conditions over the entire observed historical time period. For modeling purposes, it is instructive to use both long term and also shorter-term performance to better capture the effect of changes in property sector economic utility.

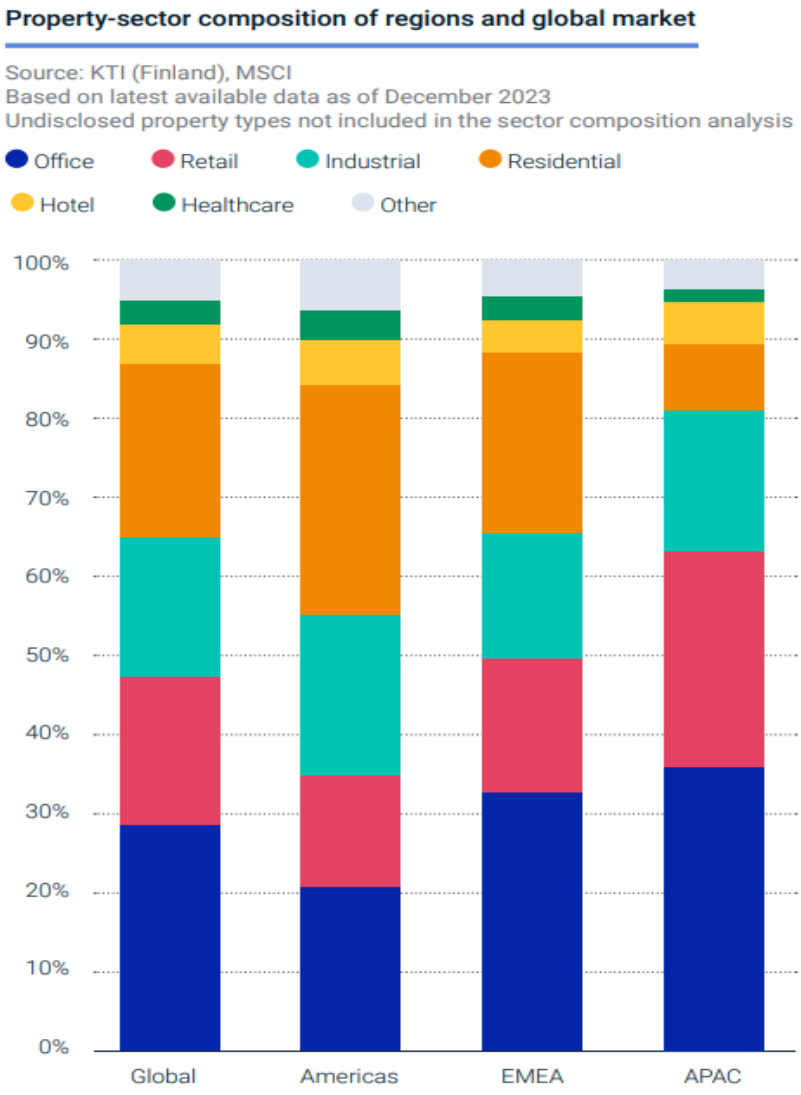
NCREIF NPI Sharpe Ratio by Property Sector				
Property Sector	**10 Years**	**20 Years**	**30 Years**	**40 Years**
Apartments	0.50	0.58	0.75	0.62
Industrial	0.83	0.75	0.84	0.62
Office	0.10	0.37	0.50	0.25
Retail	0.33	0.63	0.70	0.63
All Sectors	0.50	0.61	0.73	0.52

6.4 For the purposes of modeling strategic core real estate allocations using historical Sharpe ratios, the results from a 30-year time period and 10-year time period were blended. This approach sought to marry both a reasonably long-term performance track record with shorter term performance data. With short term performance data there is a risk that the results may be impacted by transitory / cyclical factors (as opposed to secular / structural factors). Selecting a midrange of allocations in between the results from the 10-year and 30-year return versus risk data should reduce noise from the short-term factors that may be transitory.

6.5 We used a simple model to weight sector allocations according to historical Sharpe ratios. Property sectors with higher Sharpe ratios receive higher percentage weights vs lower percentage weights for property sectors with lower Sharpe ratios. All four property sector weights sum to 100%. We did not use an efficient frontier optimizer model which would additionally consider correlations across property sectors. Since historical performance across property sectors exhibit a high degree of correlation, the gain from factoring correlations would be questionable. The results are shown in the chart below.



6.6 The strategic core office allocation modeled with NCREIF NPI Sharpe ratios blending 10-year and 30-year time series is 10%-15% with a mid-point of 12.5%. This is well below the current NCREIF NPI office weight of 21% which is already well down from the 36% average over 40 years. MSCI data shows the office share of professionally managed real estate in the US at just over 20% in 2023. The share of office in EMEA and APAC are notably higher as expected.[1]



MSCI Real Estate Market Size report July 2024

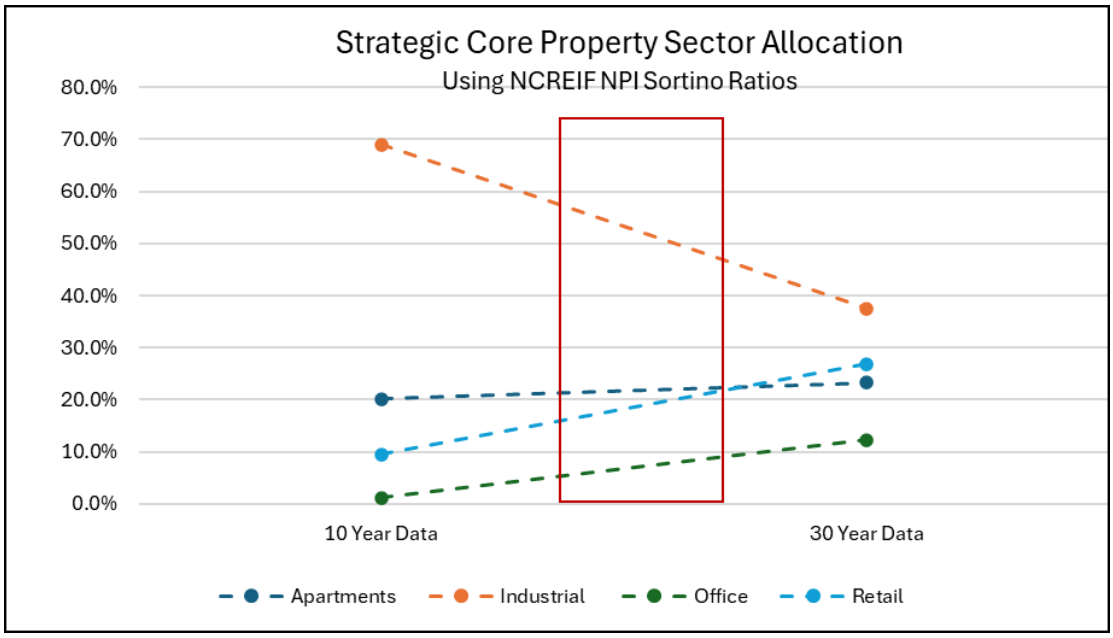
[1]MSCI Real Estate Market Size, The size of the professionally managed global real-estate investment market in 2023, AUTHORS, Rishikesh Patkar, Razia Neshat, July 2024

6.7 The Sortino ratios for NCREIF NPI property sectors are shown in the table below for 10-, 20-, 30- and 40-year periods. The Sortino ratio is similar to the Sharpe ratio, but measures volatility only on the downside when returns fall below the required rate of return. In contrast, the Sharpe ratio measures overall volatility both on the upside and downside. We used the 10-year treasury rate as the required rate of return. Office had the lowest Sortino ratio in every period relative to the other sectors just as was the case with the Sharpe ratio. As we did with Sharpe ratios, we modeled portfolio allocations with Sortino ratios using both long term and short-term performance data so as to capture potential changes in property sector economic utility.

6.8 As we did when modeling with Sharpe ratios, we used a simple model to weight sector allocations according to historical Sortino ratios. We did not use an efficient frontier optimizer model (which factors correlations across property sectors) as the property sectors exhibit a high degree of correlation. The results are shown in the chart below.

NCREIF NPI Sortino Ratio by Property Sector				
Property Sector	**10 Years**	**20 Years**	**30 Years**	**40 Years**
Apartments	1.65	1.19	1.57	1.17
Industrial	5.64	2.29	2.52	1.62
Office	-0.04	0.53	0.83	0.15
Retail	0.78	1.53	1.81	1.36
All Sectors	1.55	1.27	1.53	0.85

6.9 The strategic core office allocation modeled with NCREIF NPI Sortino ratios blending 10-year and 30-year time series is sub 10% with a mid-point of 7.5%. This range was lower than when modeled using Sharpe ratios. This is due to the office sector experiencing more magnified declines in bear markets. The implication for more conservative investors is to have core office allocations in below 10% as modeled with empirical data.



7 Covid-19

7.1 COVID-19, or coronavirus disease 2019, was a virus-caused global pandemic that originated in late 2019. The virus is called severe acute respiratory syndrome coronavirus 2 i.e. SARS-CoV-2. As news of the disease spread, it was common for media to report daily infection cases and ensuing deaths. Current reports show cumulatively over 770 million people infected and over 7 million deaths globally being attributed to Covid-19. The fear of contagion and death caused policy makers to respond with travel restrictions, vaccination protocols, testing, certification, masking, quarantining and social distancing. The office sector was severely impacted as office workers avoided mass-transit and working together in the office which would increase the proximity of one worker with another. As a result, physical office occupancy plummeted, and office workers opted to work from home (WFH). This catalyzed both employees and employer to adopt WFH, remote work, telework, and hybrid-work.

7.2 Although Covid-19 pandemic was formally declared over in May 2023, office workers in the US have been slow to return to office (RTO). According to the U.S. Census[1], the number of home-based workers doubled from 9 million in 2019 to 27.8 million in 2021. Pew Research Center[2] reports 35% of workers with jobs that can be done remotely being 100% remote. While this percentage has trended down from 55% in 2020 it is much higher than the 7% level reported pre-Covid.

7.3 When analyzing the office sector's track record by return and risk metrics we need to ensure that the impact of Covid-19 did not overly skew performance numbers to such an extent that it masked otherwise reasonable performance results prior to Covid-19. The office sector's Sharpe and Sortino ratios for the pre-Covid period were calculated to isolate the performance data from the effects of Covid-19. In the 10- and 20-year pre-Covid time series (i.e. ending 4Q2019) the office sector had the lowest Sharpe and Sortino ratios of the four main property sectors in the NCREIF NPI index. This was consistent with the results from the historical track record ending in 2Q2024, i.e. including Covid-19, that was covered in earlier. In short, the office sector was a sub-performer in risk adjusted returns both pre- and post-Covid.

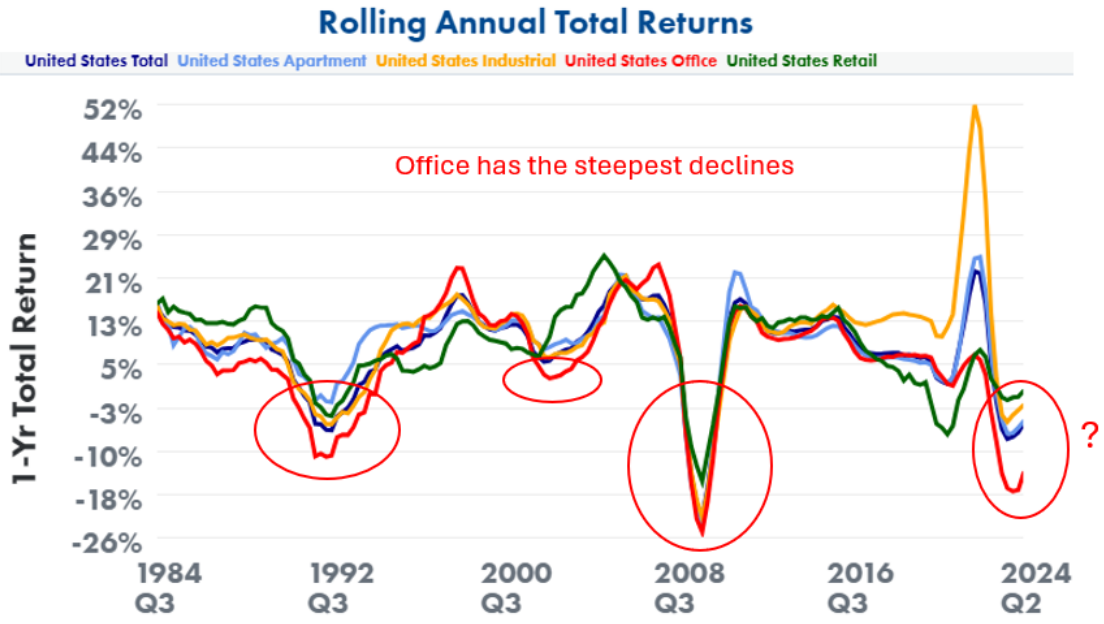
Pre-Covid (4Q2019) NCREIF NPI Property Sector Performance				
	Sharpe Ratio		Sortino Ratio	
Property Sector	20 Years	30 Years	20 Years	30 Years
Apartments	1.06	0.94	1.51	1.39
Industrial	1.36	0.90	2.00	1.40
Office	0.91	0.42	1.28	0.60
Retail	1.40	0.83	2.61	1.54
All Sectors	1.15	0.69	1.64	1.01

[1]https://www.census.gov/content/dam/Census/library/publications/2023/acs/acs-52.pdf

[2]https://www.pewresearch.org/short-reads/2023/03/30/about-a-third-of-us-workers-who-can-work-from-home-do-so-all-the-time/#:~:text=About%20a%20third%20of%20U.S.,do%20so%20all%20the%20time&text=Roughly%20three%20years%20after%20the,new%20Pew%20Research%20Center%20survey.

8 Tactial office investing

8.1 The contributing factors for the office sector having the lowest Sharpe and Sortino ratios are its high volatility and steep declines. The rolling annual returns by property sector chart from NCREIF shows the office sector having the most severe downturns. While volatility is not typically considered a favorable factor, the amplitude of the swings may suggest that tactical, opportunistic purchases and sales of office could provide interesting tactical opportunities, particularly if the peak and trough pricing represent overcorrections. While it is not clear whether the current significant pricing correction in office represents an overcorrection, and investments based on market timing can be challenging to execute, the historical data suggest that office offers the greatest potential to profit from market timing buys at market trough and exit at market peaks. However, investors must consider whether for example price correction dynamics are a result of cyclical factors or secular/structural factors. If the latter, the price recovery curve may not be as V-shaped going forward as has been the case historically.



Source: Rolling Annual Total Returns from NCREIF

8.2 Assuming astute timing of buy and sell decisions following the 3 real estate selloffs, as shown in the chart above, investors could have achieved the highest near to intermediate term “recovery from trough” returns from office versus industrial, retail and apartments with only one exception. That exception was apartments which outperformed office from 2009Q4 to

2011Q2. highest near to intermediate term “recovery from trough. Whether that office “recovery from trough” historical outperformance will be repeated in today’s environment (and it is not clear that office has completed reached its trough) is somewhat a function of the degree to which office cyclical recovery dynamics are offset by what could become secular office headwinds (and particularly work from home)

Property Sector	Buy Date	Sell Date	Appreciation CAGR	Total Returns CAGR
Office	1994Q3	1999Q3	5.73%	14.86%
Apartments	1994Q3	1999Q3	3.87%	12.73%
Industrial	1994Q3	1999Q3	4.04%	14.07%
Retail	1994Q3	1999Q3	-0.30%	8.14%
Office	2004Q1	2008Q3	8.93%	15.60%
Apartments	2004Q1	2008Q3	7.25%	12.77%
Industrial	2004Q1	2008Q3	7.00%	4.13%
Retail	2004Q1	2008Q3	8.32%	15.14%
Office	2009Q4	2011Q2	6.19%	13.20%
Apartments	2009Q4	2011Q2	11.19%	17.47%
Industrial	2009Q4	2011Q2	4.38%	11.69%
Retail	2009Q4	2011Q2	5.49%	12.71%

Source: Performance data from NCREIF

8.3 On the one hand, the low Sharpe and Sortino ratios in office implies lowering investors’ strategic core office real estate exposure than currently reported by NCREIF for institutional owned real estate or by MSCI for professionally managed US real estate. On the other hand, the steep downturns in office suggests the potential for adding non-core tactical office acquisitions to exploit distressed buying opportunities during market downturns and realizing gains at market tops, although such tactical acquisitions will need to be highly selective since it is not clear whether what has typically been historically strong cyclical office recovery from past troughs could be dampened by structural challenges including sustained work from home trends and limited financing available in the office sector. Since work from home dynamics will likely vary by market and industry, we anticipate a wider range of office recovery outcomes than in previous cycles and thus an even greater need for investor selectivity under such tactical investment initiatives.

8.4 During major real estate downturns, liquidity for large assets by dollar value becomes scarce[1]. This tends to accentuate value declines for large gateway office properties, unless anchored by strong tenancy and recurring income. This suggests opportunistic strategies in office focused on gateway high-rise class A+ assets will offer the greatest discounts and potential upside. It presumes the investors are able to time market entry and exit points well, engage in a high degree of selectivity, and price their tactical acquisitions to consider that ongoing structural headwinds (including work from home trends and limited financing available for office acquisitions) might well constrain the trajectory of what otherwise might have been a strong cyclical recovery of office prices/values.

9 Conclusions

9.1 Institutional allocations, in US real estate, to the office sector have historically been the highest relative to apartments, industrial and retail. Over the past 40 years the NCREIF NPI index average for office allocation was 36% with a high point of 45%. The NCREIF index is a good representation of the average real estate composition within the portfolios owned by institutional investors given the total value and number of properties in the index.

9.2 There are multiple reasons for office having such a prominent role in institutional real estate portfolios. High-rise gateway office buildings have for many decades been held in high esteem amongst institutional investors. The highest quality office towers in terms of architectural design, cost to build, size, tenant roster and location within central business districts of gateway cities were considered strategic core holdings. This notion that such 'high quality' office constituted the safest and best core property investments was a market perception rather than an empirically tested conclusion.

9.3 Foreign institutional buying of US real estate reinforced the preeminent position of gateway office towers. Unlike the domestic markets of these foreign institutions, the US real estate market is predominantly suburban rather than central business districts (CBD) dominated. As an example, of the 20 largest US corporations by market capitalization, 17 are headquartered in suburban locations. This is in stark contrast to major global gateway cities such as Tokyo, Seoul, Singapore, London, Paris and Sydney which are headquarters for many leading corporations.

[1]Portfolio Upside and Downside Risk – Both Matter! by Jeffrey D. Fisher and Joseph D'Alessandro, May 8, 2021, NCREIF Working Paper

9.4 Analyzing long term property sector performance in the NCREIF NPI showed that office was the worst performer in terms of return vs risk over 10-to-40-year time periods. This empirical evidence refutes the notion that office deserves the highest allocation in institutional real estate portfolios.

9.5 There are multiple factors that have impacted office investment performance negatively. Office has the highest leakage between rental revenue received and net cashflow due to high amounts of recurring capital required from building improvements and tenant concessions to procure and retain tenants. Operating expenses for office properties are also highest relative to apartments, industrial and retail. Moreover, office space market fundamentals exhibit the highest volatility in terms of vacancy rates leading to higher amplitude boom bust cycles.

9.6 Exacerbating office conditions are hybrid and work from home trends for office workers which were catalyzed by Covid-19. While RTO has been trending up it has been doing so slowly. There are some encouraging signs in Miami and New York City, but other cities like San Franciso and Washington DC are lagging in getting workers back to the office and they may never return fully. There is a segment of office employees that value full or partly remote work which suggests that hybrid work will play an important role in the future. The speed of RTO and the stabilized physical office occupancy levels are yet unclear.

9.7 The current NCREIF NPI office weight is 21% which is significantly below the 36% average over the past 40 years. It is conceivable that there will be further declines in the office weighting within NPI due to (a) investor trends to underweight traditional office and/or shift to medical office/life science and (b) potential for further write-downs as appraisers access additional office comparable sales, if lender loan extensions/restructures eventually become foreclosures or distressed office sales. The office exposure fell by 13 percentage points from the start of Covid-19 through a combination of office value write downs, foreclosures and investor dispositions. The strategic core office allocation modeled with NCREIF NPI Sharpe ratios blending 10-year and 30-year time series was 10%-15% with a mid-point of 12.5%. The modeled core office allocation using Sortino ratios was lower. This suggest that current institutional exposure to core office is likely still too high.

9.8 On the one hand, strategic core allocations to office within an institutional investors' portfolio modeled using return and volatility metrics suggest that most institutions are likely overweight to office. This implies that institutions still need to reduce their core office exposure. On the other hand, the deeper declines in office values during bear markets, suggests that astute market timing of office purchases during periods of distress and selling during market peaks could offer supernormal returns relative to industrial, retail and apartments, especially when deep discounts are possible subject to the aforementioned caveats of very high investor selectivity (given likely wide range of office recovery outcomes and possible sustained structural headwinds in the form of work from home and other factors). The same volatility that makes office less attractive as a strategic core holding may also lead to favorable opportunistic investment repositioning strategies.

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