

REAL ESTATE RETURN CYCLES AND THE CONTRIBUTIONS TO A MIXED ASSET PORTFOLIO

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Abstract

Real estate has cyclical returns in both public and direct/private investment vehicles. Using data over the past 40 years which represents both high and low interest rate and return cycles, we examine real estate's contribution to a mixed asset portfolio. Previous research has studied the inclusion of public real estate in a mixed asset portfolio of stocks and bonds or private real estate in a mixed asset portfolio and some studies have include both public and private/direct real estate in a mixed asset portfolio, but usually for short time periods (Maximum 15 years). With 40 years of data now available in both of public REITs and direct "private" real estate (NCREIF), we use the mean/variance Markowitz efficient frontier methodology, to analyze changing allocations during different cycles in the last 4 decades.

Introduction

Investors are searching for more stability in their investments after the technology bubble burst in 2001 and the great recession of 2008/9. The majority of stock investment returns come from capital gains, while the majority of bond returns come from interest income. Real estate has proven to be a different asset class with a mix of 60-70% income return and 30-40% capital gains return, in addition to a low correlation with the stock and bond markets. Higher income investments have provided less return volatility for investors and should receive a larger allocation in portfolios, especially in tax advantaged accounts such as IRAs, 401Ks and defined benefit pension plans.

Real Estate has been a favored investment of the wealthiest in most societies for centuries, but only recently available during the last part of the 20th century to the average investor through public and private pooled vehicles (such as limited partnerships, non-listed REITS, Delaware Statutory

Trusts and publicly traded REITs). While history is not a guarantee of the future, it is instructive to study the contributions and optimal levels of inclusion that different asset class investments have played in a return-maximizing portfolio in the past investment environments.

The year 2018 now provides a 40-year history of returns for direct private real estate (through the NCREIF index) and a 46-year period for public real estate (through the NAREIT equity index) and thus allows for a more complete study of return contributions in a mixed asset portfolio. The 40-year time period is long enough to include five economic expansion and recession periods as well as stock market and real estate cycles. We perform a 40 year return analysis and 10 year breakdowns with some surprising results.

Literature Review

Gilberto (1990) compared public and private real estate returns and found that equity REITs were heavily influenced by stock and bond movements and had little direct correlation with conventional unleveraged real estate (using the NCREIF Property Index). However, after controlling for financial asset market influences in the equity REIT series, the previously uncorrelated NCREIF and equity REIT series showed significant positive correlations that may explain a “pure real estate” effect shared by both series.

Mueller, Pauley and Morrill (94) looked at the inclusion of REITs in a mixed asset portfolio and found that while REITs had similar returns to small cap stocks, they were located in the lower risk portion of a Markowitz efficient frontier due to their return volatility being 1/3 that of small cap stocks. Using the same methodology, Ibbotson (2001) found that REITs provided positive and significant diversification benefits to a mixed asset portfolio of stocks and bonds.

Miles and Tolleson (97) reviewed and updated the size of different public and private, debt and equity investment alternatives. Their study found that real estate had shrunk in the mid 90’s as a result of the rise in stock market values. They concluded that real estate represented approximately 10% of the investable universe for institutional investors but believed that it was still under weighted by a factor of at least 2, due to the inability to get accurate data and properly classify all real estate investments.

Ziering and McIntosh (97) studied the benefits of adding both REITs and core real estate (using NCREIF returns) in a mixed asset portfolio of stocks and bonds from 1972 to 1995. The empirical results showed that core real estate had low correlations with stocks and bonds and lower volatility. They concluded that real estate provided diversification benefits as well as effective inflation hedging capabilities.

Gordon, et al (98) studies the portfolio diversification effects of international real estate securities on mixed asset portfolio of U.S. stocks, corporate bonds, real estate securities, and international common stocks. They find that the addition of international real estate securities provides diversification benefits for portfolios over the 13-year period studied from 1984 to 1997 over the entire risk reward efficiency frontier.

Chua (99) studies the role of international real estate in a mixed asset portfolio while attempting to control for higher taxes, transaction costs, and asset management fees incurred when investing in real estate as well as the appraisal smoothing in real estate return indices. Chua finds that even after adjusting for additional costs associated with real estate, the optimal portfolio has allocations to real estate range from 3.7 % to 20.7 % depending on an investor's appetite for risk and return.

Gilberto, et al (99) test the predictive powers of an optimal diversification strategy within a mixed-asset portfolio using a threshold autoregressive conditional heteroskedasticity model (QTARCH). They find that knowing the "state of the economy" from macro-economic variables can help model a better portfolio for the subsequent period. They used major stock, bond and public real estate indexes in both the U.S. and U.K.

Ling and Naranjo (99) found that public market real estate returns were integrated with the stock market between 1978 and 1994, however when un-smoothed real estate returns represented by NCREIF and ACLI data were compared they were not integrated with stock market returns. They also found that the growth rate in per-capita consumption is consistently priced in both commercial real estate markets and stock markets.

Quan and Titman (99) found that the price changes in direct real estate (office) and stocks was not statistically significant between 1984 and 1996 in 16 of 17 different countries studied. However, when they pooled data

across countries and use longer time intervals, a significant relation between stock returns and both rents and value changes become apparent. They find that economic fundamentals, especially GDP, affect both real estate and stock prices with certain lags.

Ziering, Liang and McIntosh (99) found that REIT performance has been disconnecting from other stock market indices. The NAREIT equity Index correlation to the S&P 500 index has declined from correlations as high as 0.8 in the late 1970s and early 1990s to below 0.2 in 1996 and 1997, but not quite as dramatic declines with other stock indices such as the Russell 3000 and 2000 Value and Growth indices.

Fu and NG (01) find that direct real estate returns that are reported on a quarterly basis do not incorporate the full effect of market news. They develop a cumulative price adjustment model that recovers lost information in real estate returns due to market inefficiency in the Hong Kong markets. Their modeled returns restores the real estate return volatility and the correlation between real estate and stock returns.

Ciochetti, Craft and Shilling (02) using data from 1993 and 1998, find that institutional investors (pension funds, endowments, advisors, insurance companies, mutual funds and bank trust departments) have a preference for liquid investments like REITs and a declining preference for illiquid assets like real estate. There is also a bias for large liquid REITs in their portfolios. Thus, how REITs and real estate fit into the portfolio is important.

Feldman (03) is the first published study to analyze both public and private real estate in a mixed asset portfolio with stocks and bonds (note that NAREIT hired Ibbotson Associates in 2001 to look at REITs in a mixed asset portfolio, however this study was produced in a PowerPoint presentation, available on NAREIT's web site as opposed to a published paper – this research constrained REIT allocations to 20% of the portfolio). Feldman manipulated the NCREIF data to increase private direct real estate volatility as a way of acknowledging the higher risks of illiquidity in direct real estate. Because REIT and S&P 500 returns were exceptionally high over the 1985-1986 period he ran the study from 1987 to 2001 – a 15-year period. His study found a maximum real estate allocation of 44.5% was possible in this time period with 15% allocated to REITs and 30% allocated to direct unleveraged real estate.

Mueller & Mueller (03) performed correlation, risk/return, and efficient frontier analysis on stocks, bonds and both public and direct real estate and found inclusion of both real estate investment forms to improve portfolio performance dramatically.

Data

Because public REIT and direct real estate investments are different from other financial assets, the inclusion of each separately or together in a mixed asset portfolio could influence performance. Furthermore, if direct and public real estate have low correlations with each other, then the inclusion of both types of real estate in a mixed asset portfolio is also warranted to increase the performance of the overall portfolio. To examine the inclusion of public and private real estate in a mixed asset portfolio we construct efficiency frontiers over 5 time periods, 40 years, and each 10-year decade using annual returns. Private real estate is represented by the NCREIF index, public real estate is represented by the FTSE/NAREIT Equity index. Real estate is compared to bonds represented by the Barclays Bond Index, S&P Investment Grade Corporate Bonds; and stocks represented by the S&P 500, small-cap stocks represented by the Russell 2000 index, growth stocks represented by the NASDAQ composite, and inflation by the Consumer Price Index (see Exhibit 1).

NCREIF Transaction Based Index

Many investors believe that the appraisal based NCREIF index provides an inaccurate estimate of return volatility due to the smoothing or returns produced from the appraisal process necessary to price assets that are not traded. To overcome this criticism NCREIF developed a transaction-based index (TBI) that started in 1984. Using actual transaction data for the 35-year history on quarterly returns produced a higher average quarterly return of 2.25% (9% annual) versus NCREIF appraisal-based return of 1.98% (7.92% annual). The standard deviation increased from 2.06% on the appraisal based to 5.80% in the TBI return. This is an increase in volatility of 2.8 times.

We expand the TBI to 40 years by using the “Unsmoothing” methodology developed by Geltner and add the missing 5 years of return data. During this 35-year time frame the NCREIF TBI showed very low or negative correlations to all the stock and bond indexes and only a 0.05 correlation the NAREIT Index. Stock and bond indexes had strong correlations, while

the NAREIT index had 60% and 65% correlations to the Russell 2000 and S&P 500.

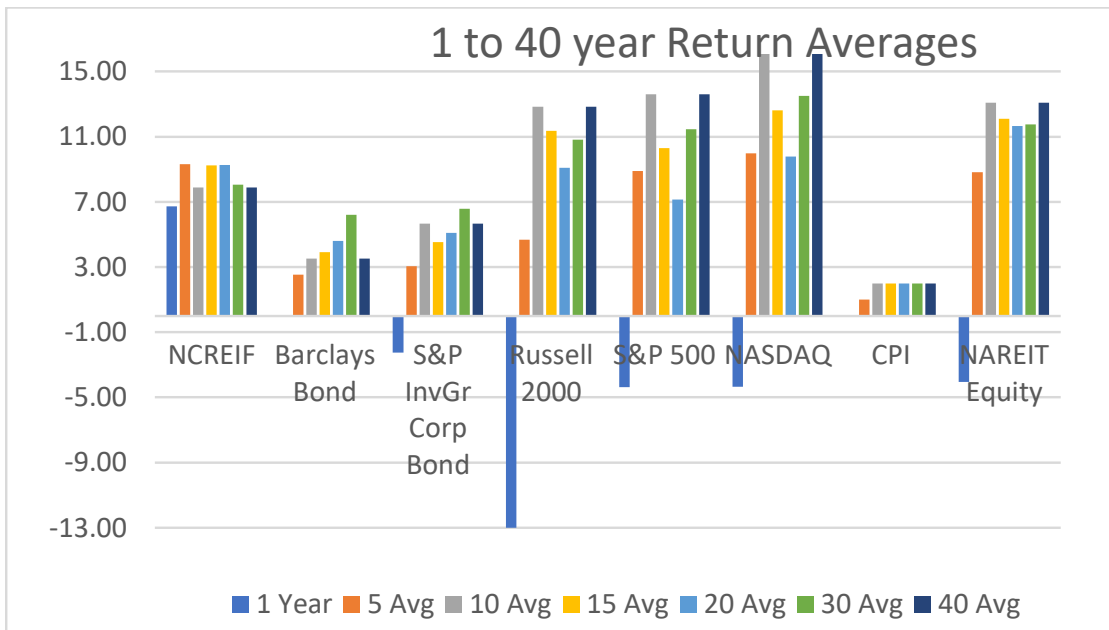
Exhibit 1

	NCREIF	NTBI	Barclays Bond	Bond S&P	Russell 2000	S&P 500	NASDAQ	NAREIT
NCREIF	1.00	0.37	-0.02	-0.12	0.06	0.16	-0.03	0.16
NTBI		1.00	-0.14	-0.21	0.07	0.13	-0.03	0.05
Barclays Bond			1.00	0.90	-0.09	-0.02	0.17	0.20
Bond S&P				1.00	0.09	0.17	0.28	0.33
Russell 2000					1.00	0.84	0.48	0.65
S&P 500						1.00	0.52	0.60
NASDAQ							1.00	0.24
NAREIT								1.00

Analysis

Direct real estate has consistently performed between the stock and bond indexes while REITs have usually performed in the middle range the stock indexes.

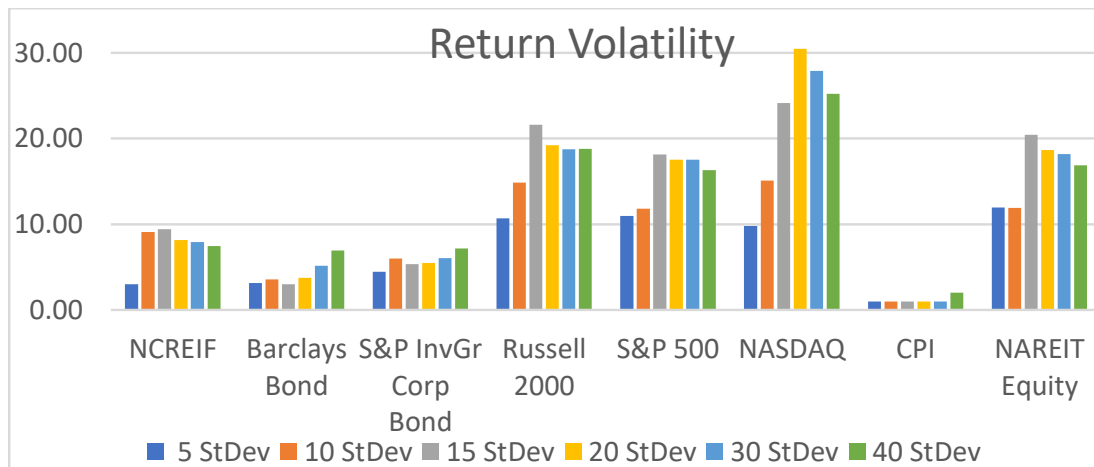
Exhibit 2



Volatility

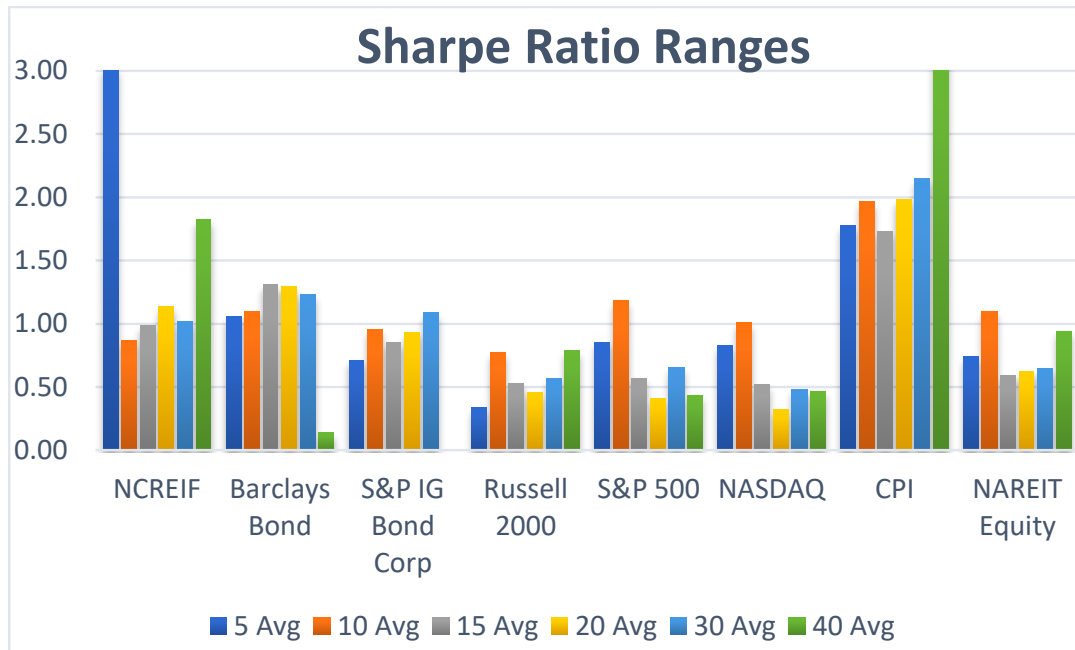
Standard Deviations have declined over the last 5 and 10 year time frames, mainly due to the lower returns in these time frames, but relatively consistent over the 15 to 40 year time frames. (Exhibit 3). Direct real estate had higher volatility than bonds, while REITs fell in the middle of the volatility range of stocks.

Exhibit 3



While NASDAQ had the highest overall return over most time periods its high volatility made it less desirable in a mixed asset portfolio based upon Sharpe Ratios. Direct real estate's return performance and relatively low volatility in private form made it a popular investment in poor economic conditions. Real Estate's value as both an income provider and inflation hedge have made real estate a positive allocation asset class for many investors, for at least part of their portfolios. On an annual basis over the last 40 years, the indexes with the highest Sharpe ratios were NCREIF, both bond indexes, and then REITs. (Exhibit 3) NCREIF Sharpe Ratios average above all other equity investments and are similar to bond investments over most time frames.

Exhibit 4



Correlations

Correlations for the various time periods are shown in Exhibit 5 with correlations above 0.50 in bold.

Exhibit 5

1979-2018 40 Years	NCREIF	Bardays Bo	Bond S&P	Russell 200	S&P 500	NASDAQ	CPI	NAREIT Equity
NCREIF	1.00	-0.12	-0.18	0.07	0.14	-0.01	0.40	0.13
Barkley Bond		1.00	0.93	0.10	0.20	-0.01	-0.05	0.19
Bond S&P			1.00	0.24	0.35	0.11	-0.02	0.35
Russell 2000				1.00	0.82	0.77	0.36	0.69
S&P500					1.00	0.84	0.23	0.49
NASDAQ						1.00	0.17	0.31
CPI							1.00	0.28
NAREIT								1.00
1979-1988 Decade 1	NCREIF	Bardays Bo	Bond S&P	Russell 200	S&P 500	NASDAQ	CPI	NAREIT Equity
NCREIF	1.00	-0.49	-0.47	0.45	0.03	0.32	0.83	0.52
Barkley Bond		1.00	1.00	-0.01	0.26	0.06	-0.64	0.10
Bond S&P			1.00	-0.01	0.26	0.06	-0.64	0.11
Russell 2000				1.00	0.78	0.96	0.52	0.73
S&P500					1.00	0.89	0.10	0.60
NASDAQ						1.00	0.39	0.63
CPI							1.00	0.44
NAREIT								1.00
1989-1998 Decade 2	NCREIF	Bardays Bo	Bond S&P	Russell 200	S&P 500	NASDAQ	CPI	NAREIT Equity
NCREIF	1.00	-0.17	-0.16	-0.33	0.40	0.02	-0.30	-0.32
Barkley Bond		1.00	1.00	0.55	0.65	0.59	0.29	0.18
Bond S&P			1.00	0.55	0.64	0.60	0.24	0.16
Russell 2000				1.00	0.64	0.78	-0.20	0.85
S&P500					1.00	0.82	-0.15	0.37
NASDAQ						1.00	-0.29	0.46
CPI							1.00	-0.27
NAREIT								1.00
1999-2008 Decade 3	NCREIF	Bardays Bo	Bond S&P	Russell 200	S&P 500	NASDAQ	CPI	NAREIT Equity
NCREIF	1.00	-0.20	0.30	0.52	0.68	0.36	0.91	0.56
Barkley Bond		1.00	0.81	-0.48	-0.58	-0.79	-0.21	0.06
Bond S&P			1.00	-0.01	-0.09	-0.42	0.29	0.51
Russell 2000				1.00	0.95	0.78	0.58	0.72
S&P500					1.00	0.85	0.75	0.60
NASDAQ						1.00	0.53	0.19
CPI							1.00	0.48
NAREIT								1.00
2009-2018 Decade 4	NCREIF	Bardays Bo	Bond S&P	Russell 200	S&P 500	NASDAQ	CPI	NAREIT Equity
NCREIF	1.00	-0.13	-0.58	-0.29	-0.39	-0.59	0.09	-0.32
Barkley Bond		1.00	0.84	-0.05	-0.04	-0.06	0.39	0.73
Bond S&P			1.00	0.31	0.35	0.40	0.30	0.83
Russell 2000				1.00	0.91	0.82	0.39	0.40
S&P500					1.00	0.95	0.26	0.41
NASDAQ						1.00	0.17	0.40
CPI							1.00	0.42
NAREIT								1.00

The most interesting correlation observed is that the 40 year direct real estate to REIT correlation of only 0.13 – even though many studies have found strong cointegration over shorter periods of time. Analyzing further we find two decades when the correlations were exactly -.032 and two decades where the correlations were +0.53&+0.56. The decade correlation swings of these two real estate investment vehicles makes a stronger case

for both direct and public real estate inclusion in a mixed asset portfolio during some but not all periods and the two real estate investment vehicles' ability to diversify each other at certain times. The long term low correlation of these two investment vehicles may be explained by the fact that the underlying real estate property types have changed over the decades. In the 1980s NCREIF was mainly office and retail, while in the 2010s NCREIF has all 5 major property types. In the 1980s NAREIT was mainly retail and apartment and in the 2010s the 5 major property types make up only 50% of the index with many alternative property types like healthcare, senior housing, timber, self-storage, cell towers, manufactured homes and other income producing real estate. Thus, the 2010s composition of NAREIT now includes almost 50% in property types not represented in the NCREIF five core property types. Thus, dissimilar property types may have contributed to the low correlations. One reason the public and private capital markets have not always moved in harmony, is shown in 1998 and 1999 when the direct real estate market was experiencing strong demand, rising rents and occupancies and increasing property prices and total returns, while public REITs were experiencing a sector rotation out of REIT stocks and into technology stocks, creating negative price returns at a time when REIT earnings were growing strongly.

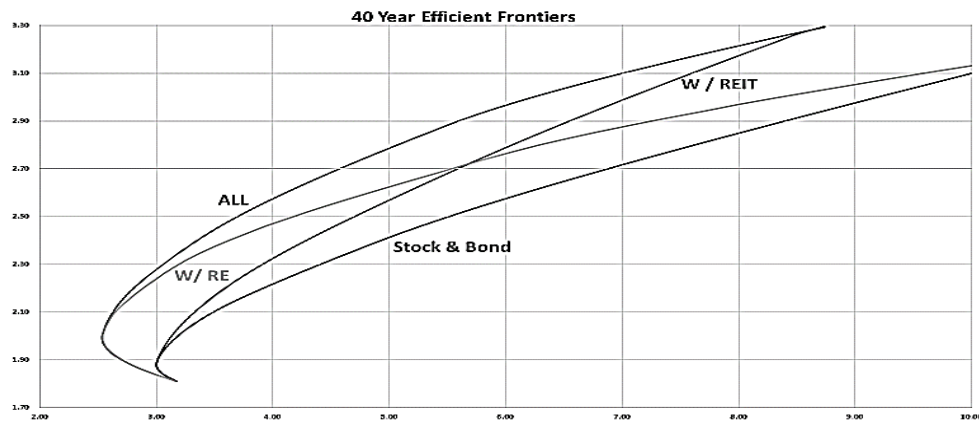
Over the full 40 years the NCREIF Index has seen low (below 0.20) correlation with all other asset class indexes, but a moderate 0.40 correlation with inflation. Looking decade by decade NCREIF had no correlations over 0.50 in Decade 1 and 2, then 0.52 and 0.68 correlations with Russel 2000 and S&P 500 in Decade 3, then negative -0.58 and -0.59 with S&P Bond and NASDAQ in Decade 4. This points to high diversification potential a majority of the time and in all different economic and market cycles.

NAREIT exhibited a high 0.69 correlation with the Russell 2000 but a low 0.28 correlation with inflation over the full 40 years. Looking decade by decade NAREIT saw 0.60 to 0.73 correlation with all 3 stock indices in decade 1, then 0.85 with Russell 2000 in decade 2, then 0.60 to 0.72 correlation with 2 stock indices in Decade 3 and 0.40 correlation with all 3 stock indices in Decade 4 but also high 0.73 to 0.83 correlation with both bond indexes! This points to less diversification benefits with both stocks and bonds a majority of the time and in different economic and market cycles.

Efficient Frontier Analysis

A Markowitz Efficient Frontier analysis is developed for the total 40 years and each decade. Exhibit 5 shows the forty-year efficient frontier of quarterly returns.

Exhibit 5



Previous studies using public or private real estate show diversifying effects. 40 years shows stock & bond portfolio had the lowest risk/return performance. Adding REITs alone improved the curve (higher returns for same risk). Direct real estate (NCREIF TBI) improved the efficient frontier at the lower end of the risk/return spectrum while REITs were better at the high end of the Markowitz Curve. When both NCREIF and REITs were added to stock & bond portfolios the best performance was achieved. We do NOT artificially constrain any asset allocation to a maximum percentage in this study.

We next look for the most efficient portfolios on each curve and find very interesting results. Calculating the Sharpe ratio for each portfolio combination on the four efficient frontier graphs allows us to find the highest risk adjusted return for each strategy. Exhibit 6 shows the results. The returns are very similar ranging from 1.95% (7.8% annual) to 2.08 (8.32% annual) which are realistically achievable returns and represent the left most tangent portfolio in all four curves. A 7% REIT allocation added to stock & bonds improved the return by 0.04% and increased the standard deviation by 0.04%. A 28% allocation of Direct real estate added to stocks & bonds produced a 2.06% (8.24% annual) return (a 6% increase in return) and lowered the standard deviation to 2.6% (a 16% reduction in volatility)! A

28% allocation to Direct Real estate and a 3% allocation to REITs produced a 2.08% (8.32% annual) return. Note that stocks always received a low allocation and bonds the highest, this would most likely change in a rising interest rate environment as bond returns decline.

Exhibit 6

	Sharpe	Return	StDev	Bond%	Stock%	REIT%	RE%
Stock & Bond	0.64	1.95	3.08	83%	17%	X	X
S+B+REIT	0.64	1.99	3.12	80%	13%	7%	X
S+B+RE	0.8	2.06	2.59	64%	7%	X	28%
S+B+REIT+RE	0.8	2.08	2.60	63%	6%	3%	28%

We next analyze each of four 10-year decades to see if there have been allocation shifts over time.

Decade 1 Performance

The Markowitz Efficient Frontier analysis for the 10-year period 1979-1988 is shown in Exhibit 7.

Exhibit 7

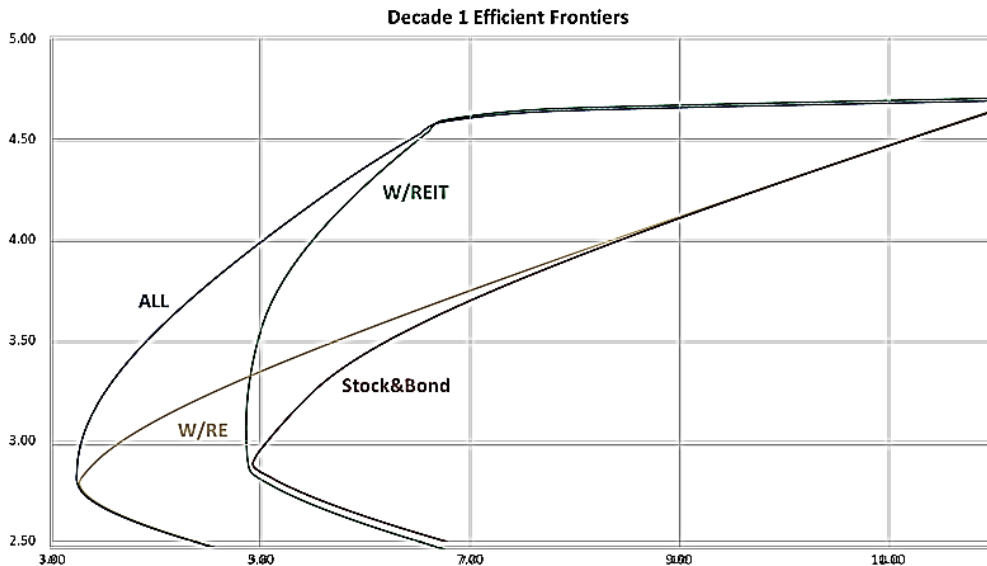


Exhibit 8

Decade 1	Sharpe	Return	StDev	Bond%	Stock%	REIT%	RE%
Stock & Bond	0.59	3.09	5.21	77%	23%	X	X
S+B+REIT	0.73	3.87	5.3	43%	0%	57%	X
S+B+RE	0.86	2.81	3.26	56%	0%	X	43%
S+B+REIT+RE	0.93	3.20	3.45	41%	0%	22%	37%

This first decade was a period of high inflation, high interest rates and high returns. The efficient frontier was substantially improved by the addition of REITs. Allocating 57% REITs to a portfolio of stock and bonds increased the Sharpe ratio 24% and overall return 28% while increasing risk 2%. Adding private real estate to a portfolio of stocks, bonds and REITs increased the Sharpe ratio 46% mainly by reducing standard deviation 37%. Direct real estate and REITs produced the most efficient portfolio mix in this decade with a 58% increase in Sharpe ratio. This leads to the conclusion that real estate outperformed stocks & bonds in a high inflation and interest rate economy. This dispels the myth that real estate underperforms in a high interest rate environment.

Decade 2 Performance

The Markowitz Efficient Frontier analysis for the 10-year period 1989-1998 is shown in Exhibit 9.

Exhibit 9

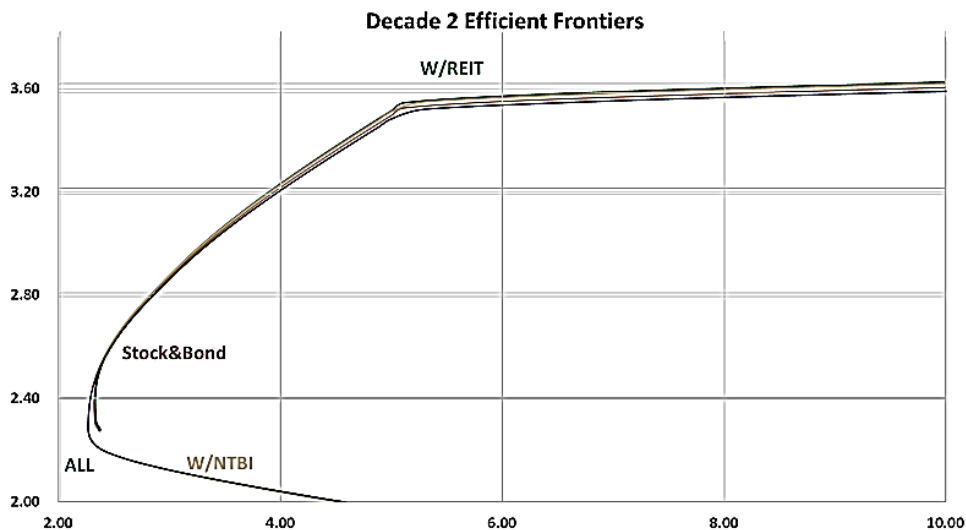


Exhibit 10

Decade 2	Sharpe	Return	StDev	Bond%	Stock%	REIT%	RE%
Stock & Bd	1.06	2.52	2.38	80%	20%	X	X
S+B+REIT	1.06	2.52	2.38	80%	20%	0%	X
S+B+RE	1.07	2.49	2.34	78%	18%	X	4%
S+B+REIT+	1.07	2.49	2.34	78%	18%	0%	4%

The second decade began with a recession that lowered both interest rates and returns. High but declining interest rates still drove a high 80% bond allocation. REITs did not add any value to any portfolio. Adding 4% real estate did improve the Sharpe ratio by 1%, but that was composed of a 0.03% reduction in return and a 0.04% reduction in risk. Thus, direct real estate only garnered a 4% allocation through a recession, recovery and expansion period.

Decade 3 Performance

The Markowitz Efficient Frontier analysis for the 10-year period 1999 to 2008 is shown in Exhibit 11.

Exhibit 11

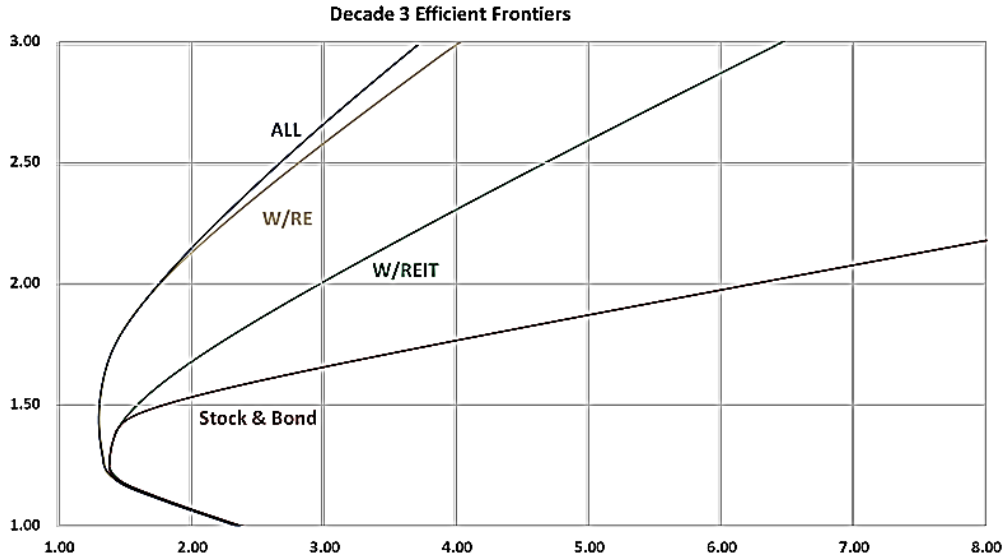


Exhibit 12

Decade 3	Sharpe	Return	StDev	Bond%	Stock%	REIT%	RE%
Stock & Bond	0.97	1.40	1.44	90%	10%	X	X
S+B+REIT	0.97	1.42	1.47	89%	11%	1%	X
S+B+RE	1.22	1.74	1.43	72%	7%	0%	22%
S+B+REIT+RE	1.22	1.74	1.43	72%	7%	0%	22%

The third decade went from economic peak to bottom to peak. This decade was somewhat unique. High volatility in stocks with the technology “dot.com” boom then bust, REITs and direct real estate prices were volatile as well, which drove capital to the safe alternative of bonds with allocations to bonds in the 70% to 90% range in all four of the most efficient frontier points. The efficient frontier return improved slightly with a 1% allocation to REITs, but no change in Sharpe ratio. A 22% allocation to direct real estate improved the Sharpe ratio 26% and return by 22% with a 2% reduction in volatility. The flight to safety in bonds, drove bond prices up and bond yields down to a 60-year low in the 2% range. Direct real estate performed well as a return enhancer and portfolio diversifier during this volatile economic and stock market decade in a period with declining interest rates.

Decade 4 Performance

The Markowitz Efficient Frontier analysis for the 10-year period 2009 to 2018 is shown in Exhibit 13.

Exhibit 13

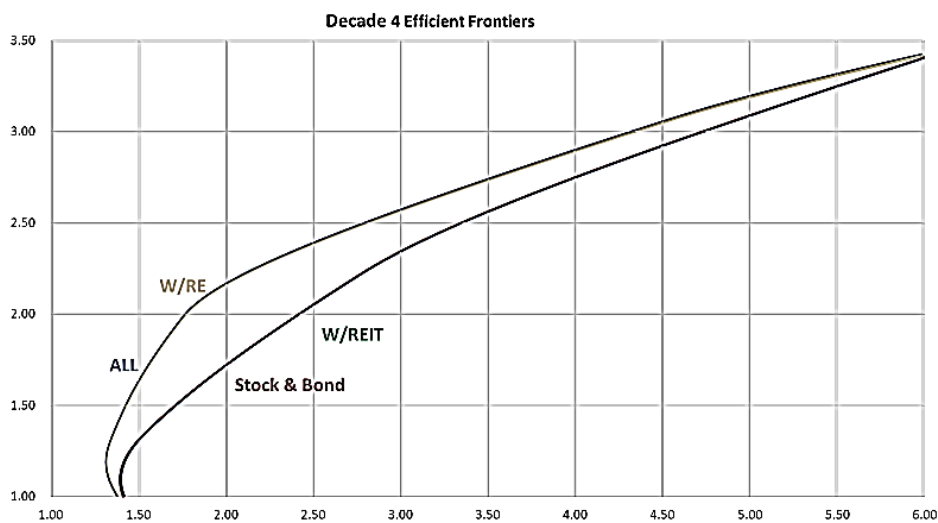


Exhibit 14

Decade 4	Sharpe	Return	StDev	Bond%	Stock%	REIT%	RE%
Stock & Bond	0.88	1.4	1.59	80%	20%	X	X
S+B+REIT	0.88	1.4	1.59	80%	20%	0%	X
S+B+RE	1.13	2.03	1.79	55%	19%	X	26%
S+B+REIT+RE	1.13	2.03	1.79	55%	19%	0%	26%

The fourth decade started with the great recession and was a period of low inflation, very low interest rates and high stock market volatility. Interest rates went from low to lower producing strong bond returns and a high 80% allocation to bonds. REITs were now included in most stock market indexes which gave them similar volatility to stocks, resulting in no allocation to REITs in any scenario. Adding 26% direct real estate increased the Sharpe ratio by 28% which was composed of a 83% increase in return and a 13% increase in risk. The most valuable risk reduction contribution direct real estate made in any of the four decades. That real estate allocation came mainly bonds (Real estate returns have historically been 2/3 “bond like” income and 1/3 appreciation).

Conclusion

The ability to improve a mixed asset portfolio’s efficient frontier by adding either direct private real estate or public real estate has been studied individually over shorter time periods and found to provide risk return improvements. We build on previous research and find direct real estate has had low or negative correlations to stocks & bonds over most periods except decade 3 (1999-2008). Therefore, portfolio managers should consider the strong historic returns and low volatility of both public and private real estate when making their portfolio asset allocations.

Based upon all the Markowitz Efficient Frontier analyses, direct private real estate could have played a major role in providing better risk adjusted return in investor portfolios. A direct real estate allocation of 28% over 40 years provided the best risk adjusted return and that allocation varied from 4% to 43% over the four decades. REITs played a lesser role with a 3% allocation over 40 years, but a zero % allocation in two of the four decades and a 22% allocation in the first decade and a 1% allocation in the third decade.

As stock market returns and bond yields have declined over the last four decades, institutional and individual investors have expanded their search

for alternative investments to produce better yields and risk adjusted returns. This study suggests adding substantial allocations of direct real estate and small allocations of REITs to meet those goals. The unique characteristics of real estate are unlikely to change in the future allowing a major improvement to portfolio risk adjusted returns. Achieving the NCREIF index return used to be very difficult, but now that Real Estate Interval Funds (that track the NCREIF index) are available, it is possible for small and large investors to receive the NCREIF index returns with a moderate amount of liquidity as well.

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