WHY INVEST IN REAL ESTATE: AN ASSET ALLOCATION PERSPECTIVE

by Petros S. Sivitanides

At the aftermath of the poor performance of real estate during the late 1980s and early 1990s, institutional investors question whether there is any justification to include real estate in their portfolios. Inflation hedging capabilities and diversification benefits have been the most commonly cited rationales for such inclusion. Within this context a relevant question is whether the diversification argument still holds. In order to answer this question, the study presented in this article uses the NCREIF data to explore the implications of historic patterns of returns.

The potential problems of the NCREIF return series, especially when used for mixed-asset portfolio allocations, have been extensively discussed in the literature. Such problems, primarily attributed to appraisal-smoothing, include downwardly biased real estate risk estimates and potential distortion of interasset correlations.[1] The magnitude of such biases, however, is questionable.[2] Furthermore, any distortions of interasset correlations because of appraisal-smoothing may not necessarily favor real estate since they may overstate the strength of its correlations with other investment vehicles. The rationale here is that removal of the appraisal-smoothing effect may introduce more randomness in the real estate return series thereby contributing to lower correlations between the returns of real estate and other asset classes. While this article does not correct for appraisal-smoothing biases, it attempts to gain a preliminary understanding of what the up-to-date NCREIF return series implies when compared to the returns of other popular asset classes, such as stocks and bonds, for different holding periods.

The Data And Methodology

For the purpose of this analysis, annual returns for stocks, bonds and real estate were drawn from the NCREIF Property Index for the period 1978-1995. The index is set to 100 for the fourth quarter of 1977, and it is based on before-management-fee quarterly returns of individual properties held by the voting members of the National Council of Real Estate Investment Fiduciaries (NCREIF). As such, the individual properties that compose the NCREIF portfolio may change overtime either because of changes in the NCREIF membership or changes in member portfolios.

To examine the issue, historic returns are reviewed and three series of average return, risk and

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Table 1

Annual Historic Returns

Year	Stocks	Bonds	Real Estate
1978	6.60%	1.20%	16.00%
1979	18.39%	2.27%	20.78%
1980	32.41%	3.00%	18.06%
1981	−4.90%	7.32%	16.63%
1982	21.58%	31.09%	9.44%
1983	22.43%	7.99%	13.31%
1984	6.10%	15.00%	13.04%
1985	31.57%	21.33%	10.10%
1986	18.21%	15.60%	6.63%
1987	5.17%	2.30%	5.49%
1988	16.50%	7.59%	7.04%
1989	31.43%	14.24%	6.21%
1990	−3.19%	8.28%	1.47%
1991	30.55%	16.13%	−6.07%
1992	7.68%	7.58%	−4.34%
1993	9.99%	11.03%	0.57%
1994	1.33%	−3.50%	6.85%
1995	37.50%	19.24%	8.93%
Average	16.08%	10.43%	8.34%
Standard Deviation	16.83%	10.97%	7.89%

Source: NCREIF

correlation measures are derived for each of the three asset classes. The first series assumes an 18-year holding period, the second a 5-year holding period and the third a 10-year holding period. Notice that the data allow for 14 five-year periods and for 9 ten-year periods. For each period efficient frontiers are derived using the standard mean-variance model. Ten optimal portfolios, at equally spaced return intervals between the lowest and highest return portfolio, are calculated for each efficient frontier. The composition of these optimal portfolios, as it pertains to real estate allocations, is then closely examined and the ex-post strategic implications are identified.

Optimal Asset Allocations Based On The 18-Year History

The performance of the three asset classes from 1978-1995 is portrayed in Table 1. According to the information in this table, in the past 18 years stocks provided the highest average return, that is, 16.1 percent, followed by bonds with a 10.4 percent average return. Real estate provided the lowest average return, that is 8.3 percent. It is interesting to note the smooth cyclical movement of real estate returns from the high teens in the late 1970s and early 1980s, down to the lowest levels in 1991, and their gradual return back to more healthy levels by year-end 1995. This pattern reflects the slow pace in which real estate markets adjust toward equilibrium and suggests that real estate may be more predictable than stock and bond markets whose returns do not appear to follow any pattern.

As expected, the risk levels of these three asset classes, as measured by the standard deviation of their historic returns, are inversely related to their average returns. Thus, real estate appears to be the least risky asset with a standard deviation of 7.9 percent. On the contrary, stocks are the most risky with a standard deviation of historic returns of 16.6 percent. Bonds fall in-between with an 11 percent standard deviation of historic returns.

The optimal portfolio mix depends not only on the return and risk characteristics of these assets, but also on the extent to which their performances, over time, fluctuate in a dissimilar way. Put differently, the inclusion of real estate in the optimal portfolio also depends on how its returns correlate with the returns of stocks and bonds. According to modern portfolio theory, inclusion of minimally, or even better, negatively correlated assets in a portfolio can minimize overall portfolio risk. Although portfolio expected return is equal to the weighted average of expected returns of individual assets, its variance is actually the weighted sum of the covariances of the individual assets. As such, the standard deviation of portfolio returns can be less than the weighted sum of the standard deviations of individual assets if these are not perfectly correlated.[3] On the basis of this rationale, it is arguable that real estate should be part of institutional portfolios, since it has an almost zero correlation with stocks, that is 0.04, and a negative correlation with bonds, that is −0.21. The relatively high positive correlation between stocks and bonds (0.49) provides further validity to this argument.

To demonstrate this proposition, an asset allocation model including these three asset classes was optimized and the efficient frontier was derived. The latter is defined as the set of combinations of the three asset classes that provide the highest return at different levels of risk; or, vice versa, the set of portfolios that can achieve given levels of return at minimum risk. Table 2 provides the composition of ten optimal portfolios on the efficient frontier spaced at equal intervals between the lowest and highest return portfolio. As seen, real estate is included in 9 out of 10 optimal portfolios. Its percentage allocations range from a maximum 63.3 percent in the lowest risk portfolio, which would have provided a 9.1 percent return, to 10.1 percent in the second highest return portfolio, which would have provided a 15.3 percent return. Furthermore, the most efficient portfolio, that is the portfolio that provides the highest return (in excess of the risk-free rate[4]) per unit of risk is portfolio D with a 43.7 percent allocation to real estate.

Table 2

Efficient Frontier Assuming an 18-Year Holding Period

Portfolio	Portfolio Composition: Stocks	Bonds	*Real Estate*	Return	Risk	Efficiency[1] Ratio
A	—	36.7%	*63.3%*	9.07%	5.73%	0.54
B	11.2%	32.3%	*56.5%*	9.85%	6.04%	0.64
C	22.5%	27.3%	*50.1%*	10.63%	6.78%	0.68
D	33.9%	22.4%	*43.7%*	11.41%	7.82%	0.69
E	45.2%	17.4%	*37.3%*	12.19%	9.07%	0.68
F	56.6%	12.5%	*31.0%*	12.98%	10.45%	0.67
G	67.9%	7.5%	*24.6%*	13.76%	11.91%	0.65
H	79.3%	2.5%	*18.2%*	14.54%	13.43%	0.64
I	90.0%	—	*10.1%*	15.32%	14.99%	0.62
J	100.0%	—	—	16.10%	16.60%	0.61

[1]Calculated as the ratio of the portfolio return minus the risk-free rate of return (assumed to be 6%) over the portfolio risk.
Source: Westmark Realty Advisors

These results suggest that in the past 18 years real estate's inclusion in mixed-asset portfolios would have significantly improved their risk/return profile. It also appears that even for high return investors with minimal concerns about risk, it would be optimal to include some real estate in their portfolios. These results, however, should be viewed with some skepticism because they implicitly assume an 18-year holding period, well over the typical holding period for real estate which is 3-10 years.

Optimal Asset Allocations For Five-Year Holding Periods

In order to explore whether modern portfolio theory provides any basis for real estate's inclusion in mixed-asset portfolios with shorter holding periods, we calculated returns, standard deviations and correlations for each of the three asset classes for 5-year intervals. Given the 18-year span of the data under consideration, it was possible to calculate such measures for 14 five-year periods. The correlations of annual returns during each of these

Table 3

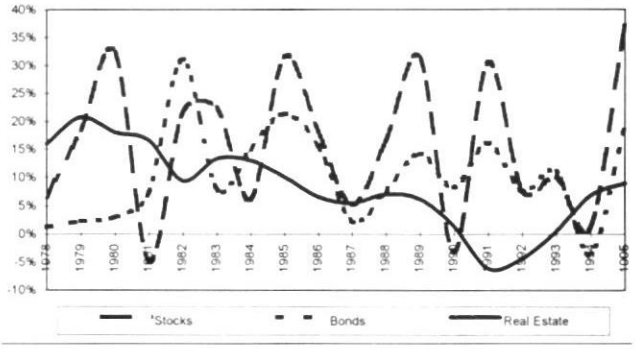
Interasset Correlations Based on Five-Year Average Returns

Beginning of Period (Year-end)	End of Period (Year-end)	Correlations: Real Estate and Stocks	Real Estate and Bonds	Stocks and Bonds
1977	1982	−0.01	−0.90	0.16
1978	1983	−0.08	−0.89	0.04
1979	1984	−0.04	−0.91	0.00
1980	1985	−0.84	−0.89	0.53
1981	1986	−0.27	−0.44	0.25
1982	1987	0.22	0.27	0.61
1983	1988	0.06	0.63	0.71
1984	1989	0.62	0.77	0.87
1985	1990	0.76	0.25	0.66
1986	1991	−0.24	−0.57	0.80
1987	1992	0.05	−0.24	0.84
1988	1993	0.04	0.01	0.92
1989	1994	−0.73	−0.84	0.70
1990	1995	0.07	−0.16	0.90

Source: Westmark Realty Advisors

Graph 1

Annual Real Estate Returns vs Annual Stock and Bond Returns



Source: NCREIF

five-year periods are presented in Table 3. As this table indicates, the pattern of correlations between five-year average stock returns and five-year average real estate returns, has been very volatile ranging from −0.84 to +0.76. Similarly, the correlation coefficient between real estate and bonds ranges from −0.91 to 0.77. Both coefficients, however, have been fluctuating around zero or significantly below it most of the time. The few occasions during which real estate is positively correlated with stock and bond returns are rather coincidental. As indicated in Graph 1, the time-path of real estate returns is quite smooth with an identifiable cyclical pattern, while the time-paths of both stocks and bonds are very volatile with no systematic co-movements with real estate.

Using the estimated returns, standard deviations and correlations, 14 efficient frontiers were generated, each described again by ten optimal portfolios spaced at equal intervals between the lowest and highest return portfolio. Thus, a total of 140 optimal portfolios was derived. Table 4 summarizes how many of the ten optimal portfolios, describing each of the 14 efficient frontiers have a non-zero allocation to real estate and its minimum allocation.[5] Also presented is the comparative risk level of the portfolio with the minimum non-zero allocation to real estate. This column expresses the risk level of this portfolio as a percent of the difference between the maximum and the minimum risk

Table 4

Real Estate Allocations in 5-Year Period Portfolios

Beginning of Period (Year-end)	End of Period (Year-end)	Number of Optimal Portfolios with a Non-Zero Real Estate Allocation	Portfolio with Minimum Non-Zero Real Estate Allocation: Real Estate Allocation	Portfolio Return	Comparative Risk Level[1]
1977	1982	10	76.0%	14.5%	0%
1978	1983	9	17.3%	17.6%	80.4%
1979	1984	9	13.1%	15.3%	85.8%
1980	1985	9	8.9%	16.2%	88.4%
1981	1986	9	0.7%	19.1%	70.3%
1982	1987	9	3.7%	16.0%	85.4%
1983	1988	8	10.0%	14.0%	71.1%
1984	1989	9	11.1%	19.1%	88.2%
1985	1990	5	12.2%	9.2%	24.7%
1986	1991	4	7.2%	9.5%	21.4%
1987	1992	4	4.0%	10.4%	7.7%
1988	1993	5	5.8%	10.8%	4.3%
1989	1994	8	0.4%	7.9%	48.9%
1990	1995	7	2.9%	13.1%	60.0%
	Total	105			
	Average	8	12.4%	13.8%	52.6%

[1]This was calculated as $(R_p - R_{min})/R_{max} - R_{min})$, where R_p is the risk level of the optimal portfolio with the minimum non-zero allocation to real estate, R_{min} is the risk level of the minimum-risk optimal portfolio and R_{max} is the risk level of the maximum-risk optimal portfolio.

Source: Westmark Realty Advisors

Table 5

Real Estate Allocations in 10-Year Period Portfolios

Beginning of Period (Year-end)	End of Period (Year-end)		Number of Optimal Portfolios with a Non-Zero Real Estate Allocation	Portfolio with Minimum Non-Zero Real Estate Allocation		
				Real Estate Allocation	Portfolio Return	Comparative Risk Level[1]
1977	1987		9	13.6%	15.4%	81.5%
1978	1988		9	11.3%	16.2%	84.1%
1979	1989		9	3.3%	17.3%	85.7%
1980	1990		7	11.3%	12.9%	39.3%
1981	1991		7	6.1%	15.2%	43.9%
1982	1992		4	7.2%	11.5%	12.9%
1983	1993		5	4.9%	11.5%	9.9%
1984	1994		6	5.7%	10.9%	41.1%
1985	1995		5	8.9%	10.1%	30.7%
		Total	61			
		Average	7	8.0%	13.4%	47.7%

[1]See note in Table 4.
Source: Westmark Realty Advisors

level characterizing each efficient frontier. The measure was calculated as follows:

$$\text{Comparative Risk Level} = (R_p - R_{min})/(R_{max} - R_{min})$$

where,

R_p = Risk level of the portfolio with minimum non-zero real estate allocation
R_{min} = Minimum risk level of efficient frontier
R_{max} = Maximum risk level of efficient frontier

Given the above formula, a comparative risk level of 50 percent would indicate that the risk born by the portfolio with the minimum non-zero real estate allocation would lie exactly in the middle of the risk span of the efficient frontier.

As seen in Table 4, 105 optimal portfolios, representing 74 percent of all optimal portfolios, include an allocation to real estate. Real estate shows up in at least 8 of the 10 optimal portfolios in each of the first 8 efficient frontiers. These efficient frontiers refer to five-year periods beginning at any year from 1977-1984. The comparative risk level of the optimal portfolio with the minimum non-zero real estate allocation is above the 70 percent mark in any of the 8 efficient frontiers. This suggests that even for investors with low risk aversion and high targeted returns it would be optimal to include real estate in their mixed-asset portfolios during the period 1977-1984.

During the subsequent four years, the number of optimal portfolios including real estate decreased to 5 or less. At the same time the comparative risk level of the portfolio with the minimum real estate allocation fell significantly, ranging from 4.3 percent (for the five-year period 1988-1993) to 24.7 percent (for the five-year period 1985-1989). This suggests that during those four years the inclusion of real estate in mixed-asset portfolios would be optimal only for low-risk investors. Notice, however, that, for the five-year periods beginning in 1985 and 1988, there are five portfolios with a non-zero real estate allocation. This indicates that for investors willing to accept a return equal to the midpoint of the return range, encompassed by the efficient frontier, it would still be optimal to include real estate in their mixed-asset portfolios.

Finally, the number of optimal portfolios that include real estate during the periods 1989-1994 and 1990-1995 increases to 7 and 8, respectively, while the comparative risk level of the portfolios with the minimum real estate allocation increases to 49 percent and 60 percent, respectively. These results, again, point to the appropriateness of real estate's inclusion in mixed-portfolios by investors with at least moderate risk concerns.

In Table 4, looking at the summary statistics for the 14 five-year efficient frontiers, it appears that over the past 18 years, medium-term institutional investors holding stocks and bonds would, *on average*, improve the return/risk profile of their portfolios and earn a 13.8 percent return at above-

moderate risk levels if they allocated 12.4 percent of their funds in equity real estate.[6] The important conclusion here is that medium-term investors, willing to settle for the midpoint of the return range of the efficient frontier, would have included real estate in their portfolios in 12 of the 14 five-year holding periods or 86 percent of the time. Furthermore, investors with at least moderate risk concerns (roughly a 50 percent comparative risk level) would have included real estate in their mixed-asset portfolios in 10 of the 14 five-year periods, or 71 percent of the time. These statistics suggest that medium-term investors with at least moderate concerns about risk should think hard before making any decision to exclude real estate from their portfolios.

Optimal Asset Allocations For 10-Year Holding Periods

In order to obtain some strategic insights regarding the inclusion of real estate in the portfolios of institutional investors with longer holding periods, the same analysis was repeated for 10-year holding periods. Again, given the 18-year span of the data, it was possible to calculate return, risk and correlation measures for 9 ten-year periods. Table 5 summarizes how many of the ten optimal portfolios, describing each of the 9 efficient frontiers, have an allocation to real estate, its minimum non-zero allocation and the return and comparative risk level of the portfolio with the minimum real estate allocation. As indicated in Table 5, 61 optimal portfolios, representing 68 percent of all optimal portfolios, include an allocation to real estate. Real estate shows up in at least 7 of the 10 optimal portfolios in each of the 5 ten-year efficient frontiers for holding periods starting at any year within 1978-1991. The comparative risk level of the portfolios with the minimum real estate allocation in these 5 efficient frontiers, ranges from 39.3 percent to 85.7 percent with two portfolios being below and three above the moderate risk level of 50 percent.

Optimal allocations to real estate for the ten-year holding period 1982-1992 decrease significantly as it appears in only 4 optimal portfolios. The percentage of optimal portfolios including real estate during the three subsequent periods ending in 1993, 1994 and 1995, increased to 50 percent, 60 percent and 50 percent, respectively. The comparative risk level of the portfolios with the minimum real estate allocation in these 4 efficient frontiers ranges from 9.9 percent to 41.1 percent.

Looking at the summary statistics for the 9 ten-year efficient frontiers in Table 5, it appears that over the past 18 years institutional long-term investors holding stocks and bonds would, *on average,* improve the return/risk profile of their portfolios and earn a 13.4 percent return at moderate risk levels by allocating 8 percent of their funds in equity real estate.

In sum, the analysis of optimal portfolios for the ten-year holding periods indicates that investors willing to settle for the midpoint of the return span of the efficient frontier would include real estate in their portfolios during 8 out of the 9 periods under consideration, or 89 percent of the time. Furthermore, in 7 of these 8 periods investors would assume lower-than-moderate risks. Overall, it appears that long-term risk averse investors, aiming at lower-than-moderate risk levels (representing a 30 percent comparative risk level), should have included real estate in their portfolios 7 of the 9 ten-year holding periods, or 77 percent of the time. Investors willing to assume higher-than moderate risk levels should have included real estate in their mixed-asset portfolios 33 percent of the time. The important conclusion conveyed in Table 5 is that long-term investors who are willing to accept moderate return levels on the efficient frontier, or are unwilling to tolerate more than one-third of the diversifiable risk, should think hard before excluding real estate from their portfolios.

Conclusion

The historic patterns of real estate returns, as exemplified by the NCREIF return series, provide interesting strategic insights regarding the optimal structure of mixed-asset portfolios in the past 18 years. First, both short- and long-term investors who are willing to accept moderate returns, as signified by the midpoint of the return range on the efficient frontier, should have included real estate in their portfolios at least 85 percent of the time. Second, medium-term investors, willing to tolerate as much as 50 percent of the diversifiable risk, should also have included real estate in their portfolios 71 percent of the time. Finally, long-term investors who are willing to tolerate as much as 30 percent of the diversifiable risk in favor of the prospect of higher returns, should also have included real estate in their portfolios 77 percent of the time. The major implication of these results is that analysts advocating, short- and long-term investors with moderate target returns, medium-term investors with at least moderate risk concerns and long-term investors with serious risk concerns to exclude real estate from their portfolios, should demonstrate why the next five or ten years will present circumstances which have been rare in the past 18 years.

This study has by no means exhausted the issue of real estate's role in mixed-asset portfolios. Moreover, its findings should be viewed with caution as potential problems embedded in the NCREIF return series, due to appraisal-smoothing

biases, may have distorted the asset allocation results in favor of real estate. Further, analysis of optimal real estate allocations in mixed-asset portfolios is needed to correct for such potential biases.

NOTES

1. See Geltner (1989), Geltner (1991) and Giliberto (1993). Wheaton and Torto (1989) also suggest that appraised values may have been systematically biased because of consistently erroneous income growth expectations.
2. Geltner (1989) argued that appraised values may understate the volatility of real estate returns using an assumed appraisal process. The extent to which this assumed appraisal process resembles the appraisal process actually practiced by the majority of appraisers has been questioned by some analysts (Wang *et. al.*, 1992). Furthermore, Quan and Quigley (1991) point out that alternative assumptions regarding the appraisal process can result to more volatile appraisal-based returns. Finally, Webb, Miles and Guilkey (1992) present evidence indicating that estimated transactions-driven portfolio returns have approximately the same volability as appraisal-driven returns.
3. See Bodie, Kane and Marcus (1993).
4. A risk-free return of 6 percent was assumed.
5. Notice that the minimum allocation is a function of the number of optimal portfolios calculated. Calculation of a greater number of optimal portfolios would help identify smaller minimum allocations. The risk and return differentials between the portfolio with the smaller minimum allocation and the ones reported here would depend on the curvature of the efficient frontier. The greater the curvature the greater this difference.
6. This number should not be interpreted as the optimal minimum allocation to real estate. As indicated in Footnote 5, this is an artificial minimum as it strictly depends on the number of portfolios calculated per efficient frontier. Theoretically, this percentage can be driven very close to zero if an appropriately large number of optimal portfolios is calculated for each efficient frontier.

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