Real Estate in the Portfolio

Summary and Conclusion

- In the 1978-82 period, real estate significantly and consistently outperformed financial assets. Since then, however, the stock and bond markets have rallied, while real estate returns have fallen because of widespread overbuilding and general weakness in most markets.

- In the pre-1982 and post-1982 periods, correlations of real estate returns and returns earned on stocks and bonds were negative, indicating that the portfolio risk can be reduced when the three asset classes are combined.

- The measurement of real estate returns uses appraisal-based data to calculate the appreciation component. This calculation substantially smooths the reported returns, leading to an underestimation of return volatility. Thus, real estate artificially dominates stock and bond performance. While the extent of the effect of the appraisal process on correlation coefficients is unknown, it is unlikely that actual correlations are as negative — or negative at all — as is commonly reported.

- Given the performance of stocks, bonds and real estate since 1978 and adjusting real estate volatility and correlations, efficient mixed-asset portfolios should currently consist of 3%-11% in real property.

The relative size of the equity real estate market is frequently cited as one reason for allocating increasing proportions of portfolios to real estate. For example, we estimate that the total value of commercial real estate equity is approximately $1.8 trillion, while the total value of domestic corporate equity outstanding is about $2.6 trillion. Given these figures, an index portfolio should hold approximately 60% of the amount committed to domestic corporate equity as real estate. Using this type of analysis, the allocation to real estate should be at least 25% in a value-weighted index portfolio.

This type of analysis is only appropriate for the large institutional investor whose strategy involves combining assets in weights proportional to the market value of those assets in the domestic wealth portfolio. This is also the case in the stock market, where investors are primarily institutional, because the structure of the investment vehicle lends itself well to institutional investors. In real estate, however, the market is mainly dominated by individual investors, not the institutional investors of the stock and bond markets. This phenomenon is changing, however, as institutions increasingly enter the domain of equity real estate investment and as the number of real estate investment vehicles broadens.
For the past five years, portfolio analysts have been arguing the merits of increasing the allocation in equity holdings of real estate in large investment portfolios for reasons not entirely related to index portfolios. Most of these recommendations arise and are generated from investment models, which use past information to provide the optimal allocations. Unfortunately, the bulk of these works utilizes information as of the early 1980s, after which time major real estate markets ceased outperforming financial assets. Furthermore, these models generally use information from the mid-1970s; thus, recommendations are based on an interval characterized by increasing rates of inflation and a general improvement in the real estate markets. Within this framework, it is not surprising that asset selection models prescribe large allocations to equity real estate, because on a return/risk basis, the asset has dominated stocks and bonds.

These analyses are flawed, however, because they are period-specific studies. Vacancies in the office market — the blue chip institutional real estate investment — have increased to an average 20% in nearly all markets from 5% in 1982. While reported values have not yet decreased in all markets, returns have as effective rents have fallen. Given this economic background, the previous recommendations of high real estate allocations may be upwardly biased. For those institutions currently investing in real estate, allocations should be at the low end of the policy range. However, for those not holding real estate, diversification benefits are achieved by adding the asset to portfolios of financial assets.

The overall holdings of pension funds in real estate have remained nearly constant, despite increased recommended allocations to the asset class. While pension funds have marginally increased their real estate holdings since 1980, their holdings still account for only 4% of the total portfolio (see Figure 1). Thus, there remains a wedge between actual holdings of pension funds and recommended holdings. In the context of the declining real estate markets, it currently appears that the wedge is appropriate. In real estate, as with other assets, however, efficient investment is a matter of timing; thus, normal weights should serve as benchmarks only, with policy weights determined with respect to current market conditions. Despite the stable asset allocation to real estate, however, the rapid growth of pension funds has led to absolute real estate commitments that have risen each year. For example, the 0.9% increase in the 1984-85 period represented a gain of $13 billion.

Figure 1. The Changing Role of Real Estate in the Pension Portfolio, 1981-85
(Top 200 Pension Funds)

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Real Estate Equity</td>
<td>3.7%</td>
<td>3.5%</td>
<td>3.3%</td>
<td>3.3%</td>
<td>4.2%</td>
</tr>
<tr>
<td>Stocks</td>
<td>40.6%</td>
<td>37.0%</td>
<td>44.2%</td>
<td>41.2%</td>
<td>41.6%</td>
</tr>
<tr>
<td>Bonds</td>
<td>37.5%</td>
<td>39.0%</td>
<td>34.9%</td>
<td>33.4%</td>
<td>33.3%</td>
</tr>
<tr>
<td>Cash</td>
<td>12.1%</td>
<td>10.5%</td>
<td>8.2%</td>
<td>10.4%</td>
<td>8.5%</td>
</tr>
<tr>
<td>Mortgages*</td>
<td>NA</td>
<td>4.0%</td>
<td>3.5%</td>
<td>2.2%</td>
<td>2.2%</td>
</tr>
<tr>
<td>Mortgage-Backed Securities</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>2.9%</td>
<td>3.1%</td>
</tr>
<tr>
<td>Guaranteed Investment Certificates</td>
<td>NA</td>
<td>3.0%</td>
<td>2.4%</td>
<td>3.0%</td>
<td>3.7%</td>
</tr>
<tr>
<td>Other</td>
<td>6.1%</td>
<td>3.0%</td>
<td>3.5%</td>
<td>3.6%</td>
<td>3.4%</td>
</tr>
</tbody>
</table>

* In 1981, mortgages are included in real estate totals.
NA Not available.
Source: Pension and Investment Age, various issues.

The Recent Performance of Real Estate

Average returns for the three major asset holdings of pension funds over three periods are shown in Figure 2. In the fourth-quarter 1977 to first-quarter 1986 period, real property returns averaged 13.95%, compared with the 16.73% and 10.70% earned by stocks and bonds, respectively. The variability of the real estate returns was only one quarter of the variability associated with the two financial assets. Low standard deviations result from the appraisal process employed by the commingled real estate funds that report to the Frank Russell Company. The use of appraisals smooths returns, creating a less variable return series.\(^2\) The extent of the low variability is shown in Figure 3, in which quarterly returns are plotted for real estate, stocks and bonds.

<table>
<thead>
<tr>
<th>Figure 2. Annualized Returns, Selected Asset Classes, Fourth Quarter 1977 - First Quarter 1986</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Real Estate</strong> (^a)</td>
</tr>
<tr>
<td><strong>4Q 77 - 1Q 86</strong></td>
</tr>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>Standard Deviation</td>
</tr>
<tr>
<td><strong>4Q 77 - 4Q 81</strong></td>
</tr>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>Standard Deviation</td>
</tr>
<tr>
<td><strong>4Q 81 - 1Q86</strong></td>
</tr>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>Standard Deviation</td>
</tr>
</tbody>
</table>

\(^a\) Returns calculated from the Frank Russell Company Property Index.

\(^b\) Returns calculated from the Salomon Brothers Broad Investment-Grade Bond Index.\(^*\)

\(^c\) Total returns earned by the S&P 500.

<table>
<thead>
<tr>
<th>Figure 3. Quarterly Returns, Selected Asset Classes, 1978-85</th>
</tr>
</thead>
</table>

The evidence from the fourth-quarter 1977 to fourth-quarter 1981 period shows the superiority of real property investment. The nominal annual return earned by the real estate portfolio over the period was 17.34%, compared with smaller returns for stocks and bonds. The performance of real estate over this period led many to argue for increased allocations to the asset class for institutional investors.

Since 1981, however, the relative performance of the assets has changed drastically. The FRC Index return fell to 60% of its average in the fourth-quarter 1977 to fourth-quarter 1981 period, to an average annualized return of 10.84%. Stock and bond returns rose substantially to annualized average rates of 20.46% and 19.06%, respectively, for the fourth-quarter 1981 to first-quarter 1986 period. Thus, the effect of the real estate market slowdown and the recent booms in the stock and bond markets are clear. In fact, the total effect may be even greater, because the FRC Index calculates the appreciation component of return from often-outdated appraisals. Because the reporting funds appraise properties at different intervals, the market values reported may be one to four quarters old. Thus, reported values may not be current with respect to a more widely declining market, and overall returns may be overstated. Even with this potential overestimation, the FRC Index shows a lower average return for the fourth-quarter 1981 to first-quarter 1986 period, compared with the first-quarter 1977 to fourth-quarter 1981 period.

The market performance of real estate in the past year is also interesting, compared with the overall performance of the stock and bond markets. The recent bond and stock market booms have generated significantly higher returns in these markets relative to real estate. For example, total rates of return on all property types were lower than the five financial assets surveyed in 1985 (see Figure 4). Stocks and bonds earned 31.1% and 30.3%, respectively, while the overall FRC Index registered only a 9.8% annual return. Office properties returned only 8.6%, but because of the appraisal methodology and the problems that arise from using appraisals to calculate returns, even that figure may be overstated. Therefore, from a recent return perspective, real estate is in a slump compared with other typically held institutional assets.

**Figure 4. Comparative Total Rates of Return, 1985**

<table>
<thead>
<tr>
<th>Comparable Assets Return</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>S&amp;P 500</td>
<td>31.1%</td>
</tr>
<tr>
<td>Long-Term Salomon Brothers Broad Investment-Grade Index</td>
<td>30.3%</td>
</tr>
<tr>
<td>Long-Term Treasury Index</td>
<td>31.5%</td>
</tr>
<tr>
<td>Medium-Term Salomon Brothers Broad Investment-Grade Index</td>
<td>20.0%</td>
</tr>
<tr>
<td>Medium-Term Treasury Index</td>
<td>18.2%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Real Estate Equity</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Frank Russell Company (FRC) Property Index</td>
<td>9.8%</td>
</tr>
<tr>
<td>Office</td>
<td>8.6</td>
</tr>
<tr>
<td>Industrial</td>
<td>11.8</td>
</tr>
<tr>
<td>Retail</td>
<td>11.5</td>
</tr>
<tr>
<td>Hotel</td>
<td>4.5</td>
</tr>
<tr>
<td>Apartment</td>
<td>8.0</td>
</tr>
</tbody>
</table>

The degree to which real estate correlates with other assets is described in Figure 5, which shows that real estate serves as an excellent diversifier when the asset class is combined with financial assets. When assets are combined into a portfolio, the portfolio return is simply a weighted average of the returns earned by the separate assets. The overall risk of the portfolio, however, is dependent not only on the separate asset risks, but also on the manner in which the separate asset returns move together. If there is perfect correlation among returns, there is no risk-reduction benefit from combining the assets. If correlations are less than perfect (correlation
coefficients are less than one), the portfolio risk is lower than that of the individual assets. Maximum benefits are obtained the closer the correlation coefficient is to minus one. Real estate correlations with common stocks over the 33-quarter period ended in the first quarter of 1986 are less than zero, indicating that total portfolio risk could be substantially reduced if both asset classes are combined. Furthermore, real estate and bond returns are even more negatively correlated, indicating even greater diversification potential. In contrast, stock and bond return correlations are strongly positive. Therefore, mixed-asset portfolios of stocks, bonds and real estate offer more superior risk/return profiles than portfolios held solely in stocks and bonds.

Despite the strongly negative correlations, there is currently some question concerning the appropriate correlation levels for real estate returns and returns on other financial assets. In particular, the usual caveat pertains in that the appraisal process biases correlations downward, although the extent of this occurrence is unknown. Although data are not available for longer intervals, the conventional wisdom is that correlations should be near zero, indicating the potential for diversification benefits.

As expected, real estate returns are highly correlated with inflation, consistent with the conventional wisdom that real estate provides an inflation hedge. In the recent period of disinflation, however, high correlations with inflation indicate declining nominal returns. Given the long-term risk of a return to higher inflation levels, real estate will continue to be an important component of institutional portfolios.

![Figure 5. Correlation of Asset Returns, Fourth Quarter 1977-First Quarter 1986](image)

<table>
<thead>
<tr>
<th></th>
<th>Real Estate</th>
<th>Bonds</th>
<th>Stocks</th>
<th>Inflation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real Estate</td>
<td>1.00</td>
<td>(0.48)</td>
<td>(0.25)</td>
<td>0.58</td>
</tr>
<tr>
<td>Bonds</td>
<td>1.00</td>
<td>0.52</td>
<td>(0.30)</td>
<td></td>
</tr>
<tr>
<td>Stocks</td>
<td></td>
<td>1.00</td>
<td>(0.16)</td>
<td></td>
</tr>
<tr>
<td>Inflation</td>
<td></td>
<td></td>
<td></td>
<td>1.00</td>
</tr>
</tbody>
</table>

**Portfolio Allocation Estimation**

While past performance serves as a useful guide in terms of analyzing investment strategies, future portfolio performance is a more important concern. In the face of continued declining returns and slowing inflation, it is instructive to reconsider the appropriate portfolio allocation to real estate, stocks and bonds utilizing information from the past, but adjusting real estate returns and risks to more accurately represent the current state of the market. Various allocation algorithms are available that utilize information concerning expected returns, expected standard deviations and expected correlation coefficients. The algorithm used in this study uses the concept of mean-variance efficiency, which was pioneered by Dr. Harry Markowitz. The algorithm is simple to employ and depends strongly on the estimates used as inputs. The output consists of several portfolios that lie along the efficient frontier, which is the set of portfolios that provides the maximum rate of return for a given level of risk, or equivalently, the minimum risk of a given level of return. In terms of portfolio performance, the Sharpe reward-to-variability ratio, a measure of relative portfolio performance, is used to analyze that portfolio of the efficient set that achieves the best performance (in terms of risk and return). Three scenarios are analyzed to determine the sensitivity of results to the potential underestimation of risk created by the appraisal process.
Simulation Inputs

Three different assumptions concerning real estate risk are assumed for the portfolio allocation model. Because there is no doubt that the volatility reported in Figure 2 is underrepresented, more realistic assumptions are required for meaningful allocation results. These assumptions are as follows: (1) Real estate risk is equal to historical stock volatility as reported in Figure 2; (2) real estate risk is equal to three quarters of historical stock volatility; and (3) real estate risk is equal to one half of historical stock volatility. Furthermore, because the extent to which the correlations are affected by the appraisal process is unknown, conservative estimates of zero correlation of bond and real estate returns and low but positive correlation (0.2) of stock and real estate returns are used. Finally, historical returns for the full period reported in Figure 2 are used for stock and bond return expectations, but real estate returns are assumed to be lower than those reported in Figure 2. Because of the current state of most real estate markets, the expected real estate return employed in the allocation algorithm is 7.5%.

Simulation Results

The extent to which the differing risk assumptions affect the portfolio allocations are shown in Figure 6. Intuitively, as the expected risk for real estate decreases, holding all else constant, a larger portfolio allocation to the asset class is indicated. In the worst-case scenario, where real estate risk is equal to full stock return volatility, the allocation to real estate is 3.01%, below the current portfolio holdings of the pension funds surveyed in Figure 1. For comparison purposes, when expectations of real estate risk are reduced to three quarters of stock volatility, the allocation increases to 10.81% of the portfolio. When real estate risk is reduced to one half of stock volatility, the portfolio share increases to 33.08%. Given our view that real estate volatility is higher than currently reported, the appropriate range of a current allocation to real estate is 3%-11%. Thus, despite the expectation of lower returns to real estate in the future, the asset class retains a significant allocation in efficiently constructed portfolios.

<table>
<thead>
<tr>
<th>Figure 6. Asset Allocation Results</th>
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<tbody>
<tr>
<td></td>
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<tr>
<td>Simulation A&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>-----------------------------</td>
</tr>
<tr>
<td>Expected Portfolio Return</td>
</tr>
<tr>
<td>Portfolio Standard Deviation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Allocations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real Estate</td>
</tr>
<tr>
<td>Bonds</td>
</tr>
<tr>
<td>Stocks</td>
</tr>
</tbody>
</table>

<sup>a</sup> Real estate volatility equal to 100% of stock volatility.
<sup>b</sup> Real estate volatility equal to 75% of stock volatility.
<sup>c</sup> Real estate volatility equal to 50% of stock volatility.

Summary and Conclusions

In the late 1970s and early 1980s, real estate significantly outperformed alternative asset classes. In that period, many institutional investors increased their commitment to real estate to capture the benefits of equity real estate investment, although industry average allocations have remained unchanged. Since 1982, the investment situation has changed significantly. Reported real estate returns have fallen, while returns earned on stocks and bonds have skyrocketed. In this new environment, an efficient investment strategy calls for a new look at allocation to real estate as an asset class.

Ultimately, the efficient allocation to real estate depends on the investor’s expectations of risk and return. Under various assumptions concerning the performance of real estate, the efficient allocation falls in the 3%-11% range. The low end of this range corresponds to current actual portfolio holdings of large pension funds, while the high end is somewhat lower than those recommended in academic studies. In the current market, these new allocations are more sensible and suggest that institutional investors should still consider real estate as a viable asset class for a diversified portfolio. Of course, the results are dependent on the expectations used in the simulation algorithm, but the real estate return and the correlation coefficients employed are deemed conservative. If an investor believes that correlations are lower or that real estate returns will not dip as low as 7.5%, the efficient allocation increases to higher levels for real estate than those reported in Figure 6.

Furthermore, as institutional investors increase their attention to real estate and the market becomes more institutionally dominated — as has the stock market — the trend toward even greater investment in real estate will continue. Over time, as passive index portfolios are constructed, real estate allocations should increase to more than 25% of institutional portfolios. In this way, the short-term strategic weightings represent a drastic underweighting for real estate, given the total value of equity investment in the asset class. This increase will require the creation of properly constructed real estate investment vehicles, which more closely meet the needs of institutional investors. In this way, the 3%-11% recommendations supported above are appropriate in the short term, while over the longer term, the allocations should be higher.

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