Property, Common Stock, and Property Shares

Increased potential for diversification.

Dirk Brounen and Piet Eichholtz

Property shares are here to stay, although the debate regarding their true property nature continues. The fact that property companies are nearly fully invested in real estate should result in a high correlation between their returns and the development of the underlying property markets. Their low-cost and liquid trading mechanism differs substantially from practices in the unsecuritized property market, however, which causes significant variations in the market performance of securitized and unsecuritized property. These variations cloud the relationship and raise a question as to whether property shares can qualify as property investments.

In October 1987, United States real estate investment trust (REIT) prices fell by 14% in one month, causing doubts regarding their property performance characteristics. Then again, October 1987 was not a banner month for the U.S. property markets. Occasions like these have created the general perception that REITs may have attractive performance characteristics, but that the relationship with the underlying property market is weak at best.

Ross and Zisler [1987] consider REIT indexes inappropriate for measuring the returns of property investments, because of their high volatility. Paladino and Mayo [1995, 1998] claim that the similarities between property shares and common stock make REITs not a useful way to diversify a stock portfolio. Gyourko and Keim [1992], Eichholtz and Hartzell [1996], and Quan and Titman [1997], however, find a statistically significant relationship between property and property share returns.

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Appraisal-based return indexes available from the unsecuritized property markets are smoothed, understating both the true volatility of property returns and the covariance with property stocks. Appraisers tend to rely partly on estimated values from previous periods, which creates aggregated series with high levels of first-order autocorrelation. This process smooths the progress of the return series, and results in an inherent time lag (see Firstenberg, Ross, and Zisler [1988], or Geltner [1989b, 1991]) and in potential biases (Giliberto [1988], and Geltner [1989a]). These direct property indexes thus cannot qualify as the true measure of property returns either.

According to Ross and Zisler [1987], the true return index for property lies somewhere between the available securitized and unsecuritized property return indexes. Researchers have tried various approaches to construct this true index, by either adjusting (unsmoothing) the direct property returns series, or by adjusting (unlevering, hedging) the property share returns series. Geltner [1989a, 1989b] has developed methods to desmooth appraisal-based private property series, while Giliberto [1990, 1993] and Liang, Chatrath, and McIntosh [1996] have developed a method to filter stock market effects out of the returns to property shares.

We shed more light on this issue by comparing real estate index returns to directly held property and to common stock and property shares. We use the filtering techniques proposed by Geltner and Giliberto to investigate the role of real estate in the mixed-asset portfolio using standard mean-variance analysis. We use data from the United States and the United Kingdom for a time period never analyzed before.

The results reveal increasing similarities between securitized and unsecuritized property performance in both countries between 1986 and 2002.

INTERNATIONAL RETURNS DATA

The U.K. and the U.S. are the only two countries providing both appraisal-based property indexes and property share indexes with broad coverage and a long history. For the United States, we use the National Council of Real Estate Investment Fiduciaries Index (NCREIF), which includes the performance of 2,600 properties with a sum total market value of some $US 102 billion. For the United Kingdom, we use the index of the Investment Property Databank (IPD). In 1999 this index was based on 236 portfolios including 11,900 properties worth $US 137 billion. Each index is the leading direct property benchmark in the country. They both report returns of properties on a full-equity basis quarterly.[1] The study period is 1986–2002, the longest period for which both series are available simultaneously.

To measure the performance of the property shares in these markets, we use the Global Property Research (GPR) General National indexes. The GPR General tracks the total returns of all listed property companies in each national market. Like the appraisal-based property indexes, GPR General indexes are broadly spread over different domestic regions and include the performance of all types of property.

For common stock returns, we use the most common broad market indexes. For the United States, this is the S&P 500 index, and for the United Kingdom it is the Financial Times Stock Exchange index (FTSE). For bonds, we use the J.P. Morgan Bond indexes for both countries. All indexes report total rates of return in local currencies.

Exhibit 1 displays the key statistics for the return series. The risk-return statistics exhibit some interesting findings, confirming expectations for the United States. In both samples, we document the lowest standard deviations for the appraisal-based property indexes and the highest standard deviations for the property share indexes.

PROPERTY SHARES AND COMMON STOCK

To illustrate the performance of the property share indexes during the sample period, we plot the national series together with the common share indexes in Exhibits

EXHIBIT 1
Common Stock, Property, and Property Share Indexes

Country Index	Market Cap	Mean	Standard Deviation
United States			
S&P 500	12,310,208	2.57%	8.45%
GPR General U.S.	121,092	2.00%	8.40%
NCREIF	101,621	1.63%	1.63%
United Kingdom			
FTSE All Share	2,260,478	2.29%	9.03%
GPR General U.K.	65,640	1.96%	11.48%
Investment Property Databank (IPD)	136,940	2.47%	2.39%

Values are in millions of U.S. dollars as of December 31, 1999.

Means and standard deviations are quarterly based and relate to the full sample period of December 1986 through December 2002.

GPR: Global Property Research, which tracks the performance of all international listed property companies.

EXHIBIT 2
Historical Performance—U.S. Common Stock and Property Shares

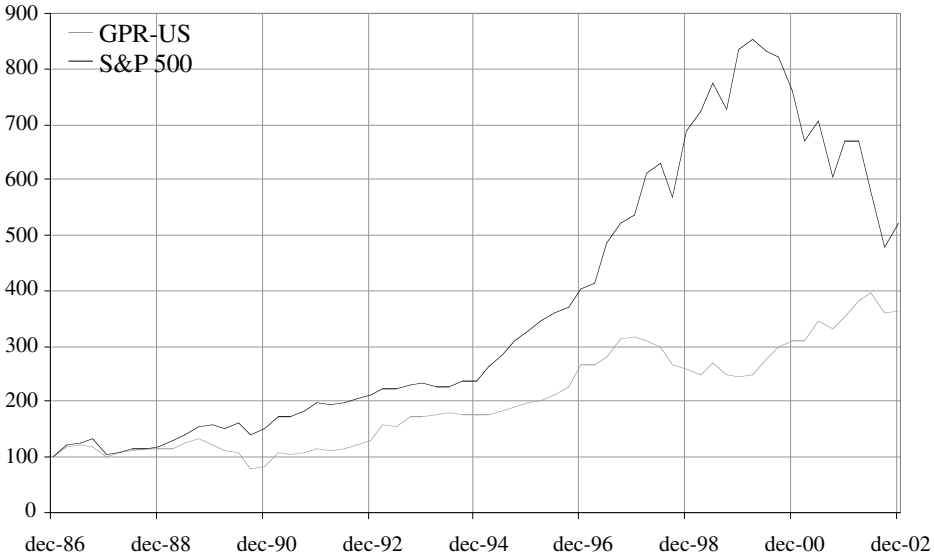
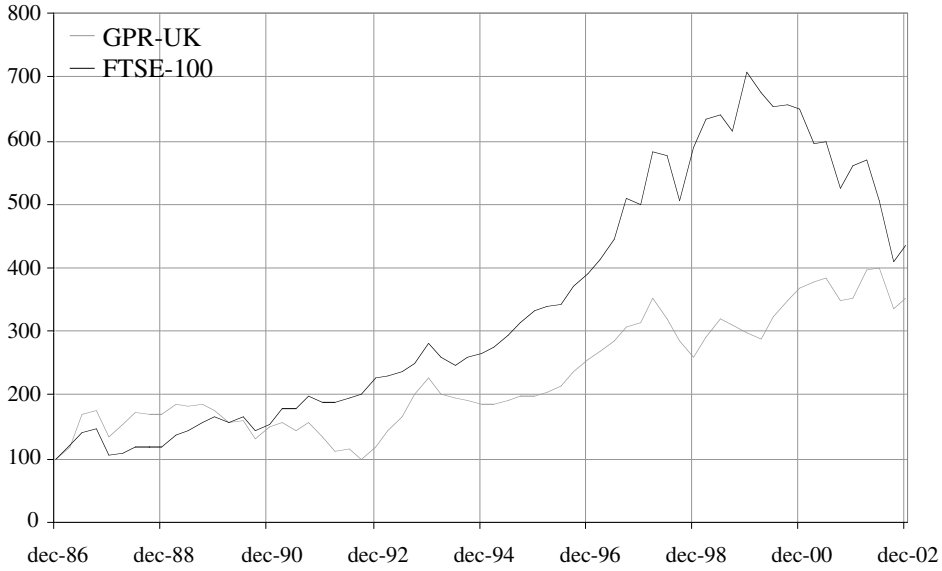


EXHIBIT 3
Historical Performance—U.K. Common Stock and Property Shares



2 and 3. In both countries, we document a simultaneous fall in property share returns during the early 1990s. During this period, both markets suffered an economic slump when property markets were faced with high vacancy rates and declining rents and property values.

The most striking phase in our sample period is seen in the global high-tech bubble and subsequent bust. At that time, property shares and common stock took paths in the opposite directions. When the stock market boomed, property shares were out of fashion, and disappeared off the radar screen of most institutional and private investors, despite very attractive income yields. When the stock markets collapsed, investors seeking shelter-found a safe haven in property shares.

Sector rotation like this can be explained by so-called positive feedback trading strategies and intentional herd-

ing as described by Grinblatt, Titman, and Wermers [1995] and Froot, O'Connell, and Seasholes [2001]. International changes in investor preferences have more recently directed increasing capital flows into property and the property share markets, resulting in strong performance of these markets in the last three years. Strikingly, these developments hold for both the United States and the United Kingdom, and seem to indicate a global phenomenon.

Exhibit 4 provides the correlation statistics for property shares and common stock. The numbers indicate that cross-correlations between shares and property shares decline in the later subperiods. These results support earlier studies that document a similar decline in correlation.

Ziering, Liang, and McIntosh [1999] and Clayton and MacKinnon [2000, 2001] also find a falling trend in the correlation between REITs and the overall common stock market. They stress the structural change in REITs during the 1990s, induced by amendments in the tax code in 1993 that motivated REIT managers to take a more strategic focus and to disseminate information more efficiently. These changes have induced a swift maturation in the market for REITs, with wider analyst coverage and increased sophistication of investors, all relying on the increased amount of information to price property shares more efficiently.

The evidence suggests an increasing diversification potential of property shares for a common stock investor over time. This finding is confirmed by the results presented in Exhibit 5. This is a graph of 16-quarter rolling correlations between stock and property markets for the United States and the United Kingdom. In both countries, the plots tell a very similar story; cross-correlations fall from a level of around 0.8 in the early 1990s to a level of 0.2 at the turn of the millennium.

This drop has not been continuous, but its development nevertheless follows a clear trend. In the last period, correlations seem to be rising a bit, but they are still well below the levels of the early 1990s. Again, the fact that this development can be observed in both the United States and the United Kingdom is very interesting.

The combination of these two results—the strong recent performance of property shares, and the low and declining cross-correlations with common stocks—provides strong support for the role of property shares in a mixed-asset portfolio. These effects may well be related to the strong and stable performance of the asset underlying the performance of property shares: direct property.

THE DIRECT PROPERTY MARKET

The development of the direct property markets of the United States and the United Kingdom as plotted in Exhibits 6 and 7 clearly shows a performance that looks both positive and very stable. Again, a striking result is in the high-tech boom period, when property shares did not perform well while the underlying direct property market continued to deliver double-digit total returns. Only when the bubble burst did the indirect property market pick up the positive pace of the direct market.

Apart from such short-term discrepancies, both markets seem to remain in line, with indirect property showing a more volatile return path. Of course, this phenomenon has been well documented in the literature and can be largely attributed to differences in trading mechanisms and in measurement of performance.

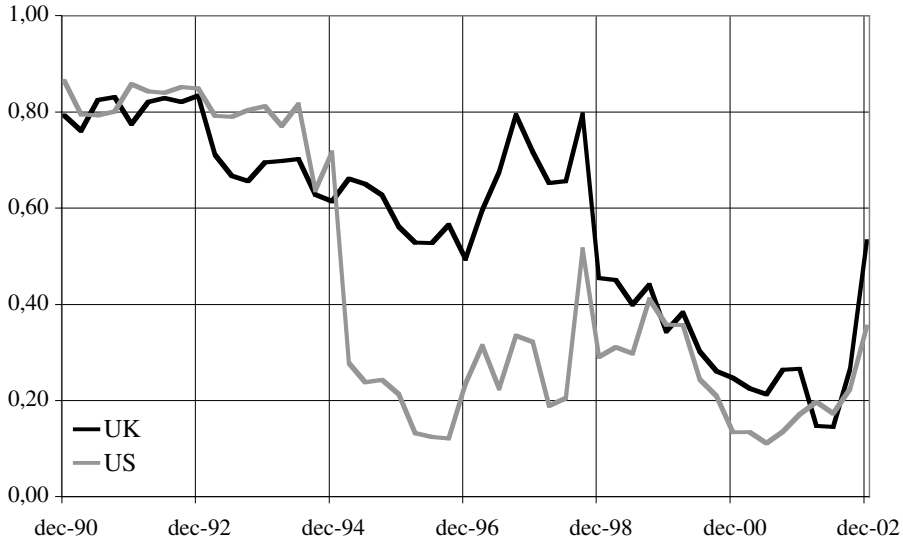
As they are traded continuously on public stock exchanges, property shares display return volatilities in line with those found for common stock. The returns of direct property, on the other hand, are based on appraisals, which are known for their backward-looking characteristics and subsequent smoothing and lagging biases. Which

EXHIBIT 4
Correlation Statistics—U.S. and U.K. Markets

		First-Order	Contemporaneous Correlations					
			Full Sample		1986-1993		1994-2002	
Country	Index	Autocorr.	GPR U.S.	S&P 500	GPR U.S.	S&P 500	GPR U.S.	S&P 500
United States	NCREIF	0.69	-0.12	-0.03	-0.15	-0.15	-0.10	0.18
	GPR U.S.	0.09		0.52		0.75		0.29
	S&P 500	-0.04						
			GPR U.K.	FTSE	GPR U.K.	FTSE	GPR U.K.	FTSE
United Kingdom	IPD	0.86	0.08	-0.06	0.16	0.01	-0.20	-0.20
	GPR U.K.	0.16		0.61		0.71		0.48
	FTSE 100	-0.01						

EXHIBIT 5

16-Quarter Rolling Cross-Correlation of Stocks and Property Stocks



of these investment vehicles reflects the genuine property performance is an unanswered question.

Geltner [1993b] has developed a model adjusting real estate return series for first-order autocorrelation. The model applies a reverse filter on the capital growth components of private real estate returns in order to recover the underlying true returns on property, as shown below:

$$r_t^u = \frac{(r_t^* - (1 - a)r_{t-1}^*)}{a} \tag{1}$$

where r_t^u is the unobserved true capital growth return; r_t^* is the observed appraisal-based capital growth; and a is a time-invariant parameter between 0 and 1. In the absence of smoothing, a will equal 1 so that the unobserved true return is completely independent of the observed return of the previous period; hence serial autocorrelation will be 0. Unfortunately, the value of a cannot be estimated statistically and relies on subjective judgment regarding the degree of smoothing in the property market.

Giliberto [1992] in a survey suggests that property investors in the U.S. view the true volatility of property as half that of equities, which inspired empirical studies like Barkham and Geltner [1995] and Stevenson [2000] to fix a so that the periodic risk measure of property equals half that of the common stock market.

Stevenson [2000] also proposes a simple first-order autoregressive (AR1) model that can correct return series for autocorrelation without the need to set parameters arbitrarily. This AR1 model, the full information model, assumes that the observed direct property returns follow a first-order autoregressive process, so a can be estimated as the β coefficient in the regression:[2]

$$r_t^* = \alpha + \beta r_{t-1}^* \tag{2}$$

The corrected return can then be derived using the procedure:

$$r_t^u = \frac{r_t^*}{1 - \beta} - \frac{\beta}{1 - \beta} r_{t-1}^* \tag{3}$$

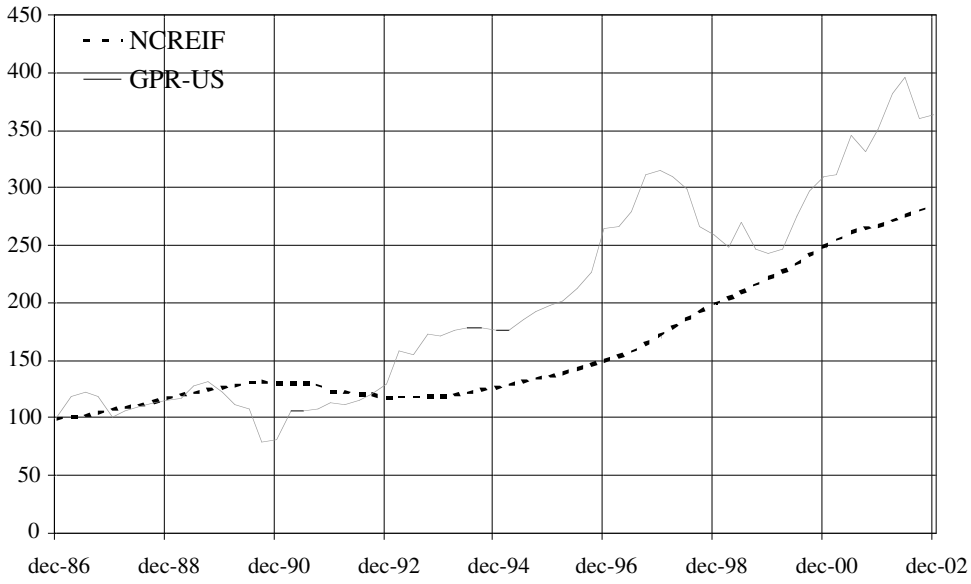
After adding the corresponding income returns, we obtain an unsmoothed private real estate return estimate. We can apply this AR1 model to retrieve the underlying corrected property returns in both markets.

HEDGING PROPERTY SHARE RETURNS

Giliberto [1990] regresses the returns of direct United States property and REITs on the returns to common stocks and bonds for the period 1978 through 1989, to filter out capital market influences on property series. He finds that the residuals from both regressions exhibit strong correlations, indicating that a common factor is present in both sets of returns. This common factor is labeled as "pure" property.

Giliberto [1993] and Liang and Webb [1996] extend

EXHIBIT 6
Historical Performance—U.S. Direct Property and Property Shares



these findings by proposing a dynamic method to strip securitized property returns of their stock market component. By relating historical returns on securitized property (r^p_t) to those of the general stock market (r^e_t), they derive a time-varying monthly hedge ratio (β), computed on a rolling 48-month basis:

$$r^p_t = \alpha + \beta r^e_t + \varepsilon_t \quad (4)$$

In the second stage, this hedge ratio is used to subtract the common stock market premium from the monthly securitized property total returns, leaving a residual that is referred to as the hedged property share return (r^{hp}_t):

$$r^{hp}_t = r^p_t - \beta(r^e_t - r_{ft}) \quad (5)$$

This hedged property share index separates the common stock market sentiment and the securitized property share returns and offers a better view on property performance.

Acton and Poutasse [1997] have applied this hedging procedure in order to reexamine the correlation between publicly and privately traded property in the United States. They report an increasing similarity between both markets after 1993.

We extend this research internationally, use more recent data, and apply both the hedging technique as to public property share returns and the full information model for the private property returns. For both samples, hedging property share returns results in time series very similar to their unhedged originals but different in return levels. These hedged property share returns no longer reflect stock market booms and busts, like Black Monday, but appear to display the macroeconomic fluctuations of each country.

COMPARING FILTERED PROPERTY INDEXES

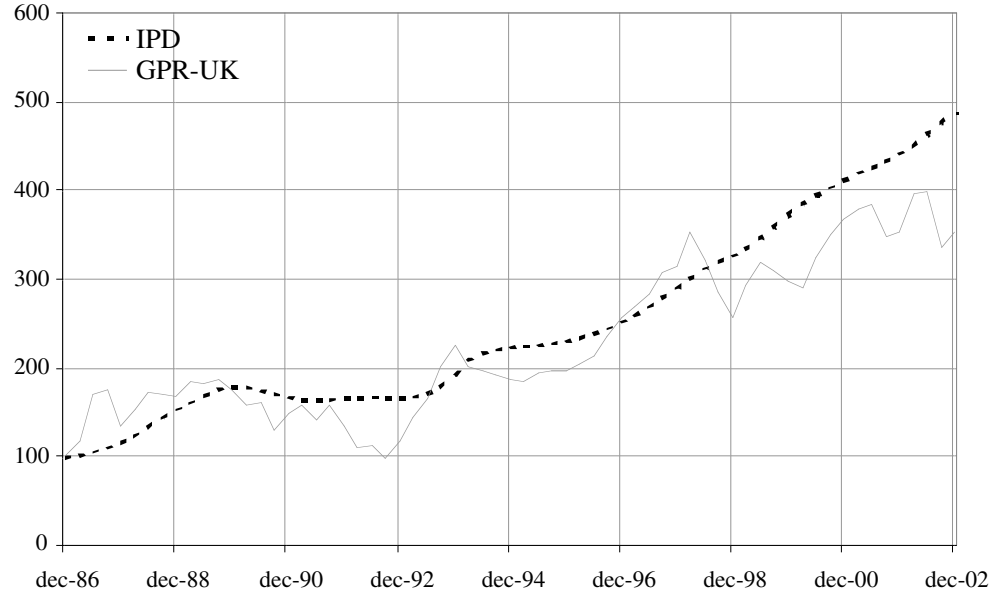
Exhibit 8 provides statistics for the unsmoothed and hedged property series. The numbers show a distinct increase in the volatility of the direct property series. For the United States, the quarterly standard deviation increases from 1.63% to 3.51% in the unsmoothing process, while for the United Kingdom it increases from 2.39% to 5.95%. Besides an increase in volatility, the full information indexes also exhibit a strong decline in first-order autocorrelation for both countries, a direct result of the filtering technique.

For the property share return series, filtering out the stock market component results in reduced volatility. For the United States, the quarterly standard deviation declines from 8.40% to 6.12%, and for the United Kingdom from 11.48% to 8.27%.

The adjusted property series also show much stronger correlations than the original ones, as can be seen in the fourth column of Exhibit 8. For the United

EXHIBIT 7

Historical Performance—U.K. Direct Property and Property Shares



States, the correlation between the NCREIF and the REIT returns is –0.12, which rises to 0.33 after filtering both series for their microstructure effects. For the United Kingdom, the correlation increases from 0.08 to 0.25.

The results we find in both the United States and the United Kingdom suggest that we have come closer to the common property component underlying both series, but the correlations we find are quite far from 1.00, and the standard deviations of the hedged property share returns are still higher than those of the unsmoothed direct real estate series. This indicates that the truth still lies somewhere in between.

So how can our results help an investor trying to decide how much to allocate to real estate?

THE MIXED-ASSET PORTFOLIO

To shed light on the position of real estate in the mixed-asset portfolio, we propose a worst case approach. This means we apply a standard mean-variance optimization to a combination of property performance characteristics gained through the various models. Of the three inputs we need for the portfolio optimization, the expected return is of the least concern. There are no theoretical reasons to assume that the average of observed property returns is biased, provided one uses a long enough time series. Thus we use the observed direct property series as the basis for the expected property returns in the optimization.

We know that the observed direct property series probably understates volatility, while the opposite holds for the property share series. We thus retrieve the standard deviation from the hedged property share returns series. For cross-correlations, we use the results from the observed property share returns.

In this manner, we combine risk-return characteristics that are free from smoothing and lagging and are not penalized by stock market sentiment when it comes to historical return volatilities. These characteristics do not favor real estate as an asset class and may therefore yield reliable insights as to the place of real estate in the mixed-asset portfolio.

The results of this exercise are presented in Exhibit 9. We identify two portfolios on the efficient frontier: the global minimum-variance (GMV) portfolio, and the portfolio that optimizes the Sharpe ratio, the Sharpe optimal portfolio. The results clearly show that even accounting for unfavorable risk and cross-correlation estimates, real estate still earns just under 10% of the optimal portfolio allocation in both countries.

SUMMARY

We have examined the relationships among private property, the securitized property share market, and the

EXHIBIT 8

Correlation Statistics—U.S. and U.K. Markets, Unsmoothed, and Hedged Property Series

Country Index	Mean	Standard Deviation	First-Order Autocorrel.	Cross-Correlations		
				Full Sample	1987-1993	1994-2002
United States						
NCREIF	1.63%	1.63%	0.69	-0.12	-0.15	-0.10
GPR General U.S.	2.00%	8.40%	0.09			
Full Information Index U.S.	2.47%	3.51%	-0.26	0.33	0.43	0.13
Total Hedged GPR U.S.	2.30%	6.12%	0.19			
United Kingdom						
IPD	2.47%	2.39%	0.86	0.08	0.16	-0.20
GPR General U.K.	1.96%	11.48%	0.16			
Full Information Index U.K.	1.63%	5.95%	0.20	0.25	0.25	0.27
Total Hedged GPR U.K.	1.55%	8.27%	0.18			

EXHIBIT 9

Mean-Variance Allocations

United States	Stocks	Bonds	Real Estate	Expected Return	Volatility	Sharpe Ratio
Global Minimum-Variance	29.01%	52.20%	29.01%	9.55%	8.87%	0.51
Sharpe Optimal Portfolio	32.11%	58.29%	9.60%	10.33%	10.09%	0.53
United Kingdom	**Stocks**	**Bonds**	**Real Estate**	**Expected Return**	**Volatility**	**Sharpe Ratio**
Global Minimum-Variance	4.54%	92.23%	3.23%	8.06%	5.00%	0.61
Sharpe Optimal Portfolio	4.28%	85.54%	10.19%	8.22%	5.13%	0.63

Historical risk and return characteristics of the S&P 500 and FTSE 100 for stocks and JPMorgan Bond indexes (U.S. and U.K.) for bonds. For real estate we use historical returns of NCREIF and IPD and cross-correlations of GPR-US and UK (property share indexes) and standard deviations of hedged GPR returns.

common stock market in the United States and the United Kingdom. We find that the correlations between property share returns and common stock returns show a similar declining trend in both countries, indicating increased mixed-asset diversification potential for property shares.

For investors trying to establish the optimal mix of stocks, bonds, and real estate, the question is the kind of series to use for property. Property share series reflect a stock market component, which makes them volatile and liable to stock market sentiment, while the direct property series suffer from the smoothing and time lags endemic to appraisals. The true but unobserved property index probably lies somewhere in between. This is the reason we adjust the property share returns series and the direct property series to remove microstructure effects from both. The resulting indexes show more statistical similarities than the originals, which makes it likely that we have indeed come closer to the true property returns.

In the final step in answering how much to put into real estate, we take a worst case approach. That is, we use a standard mean-variance optimization model with real estate inputs that are as free as possible from known biases like smoothing, lagging, and stock market sentiment. The results of that analysis are surprisingly similar for the United States and the United Kingdom. For both countries, we find optimal portfolio allocations of around 10%, if we use the maximum Sharpe ratio portfolio. Even under pessimistic assumptions, real estate allocations are substantial.

ENDNOTES

The authors thank the National Council of Real Estate Investment Fiduciaries and the Investment Property Databank for their generous supply of the data and David Ling and Jeffrey Fisher for their help in getting these data.

[1]The IPD index also reports on a monthly basis, but for the sake of consistency we have used quarterly figures.

[2]The main difference between the Geltner [1993a] model and the AR1 model is the assumption each makes regarding the efficiency of the property market. The AR1 model assumes the property market is perfectly efficient, assuming that the underlying returns are unpredictable. The Geltner [1993a] model, however, does not make this assumption.

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