Real Estate Asset Allocations and International Real Estate Markets

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In this paper we examine the institutional real estate ownership patterns of
life insurance companies for 10 countries over the period 1986-96. The
countries included are Australia, Austria, Belgium, France, Italy, the
Netherlands, Spain, Sweden, the United Kingdom, and the United States.
We find that most institutional investors worldwide have shifted out of real
estate assets and into stocks and bonds over the last decade. We then
investigate whether this behavior is the result of changing investor
perceptions or a shift in stock market capitalization. To test this hypothesis,
the paper derives measures of ex ante real estate returns following
previous empirical work in finance. The results indicate that only a small
proportion of what is driving institutional investors' real estate portfolio
decisions is actually explained by changing investor perceptions and
lagged unexpected excess returns.

Keywords

Institutions, International Investment, Portfolio Diversification.

1.   Introduction

For institutional investors, the rationale for real estate investing is not hard to
discern. By and large, real estate returns are not highly correlated with other
assets typically found in portfolios, such as stocks, bonds and money market

instruments. This tells us that real estate tends to expand the opportunity set of total investing. Consequently, when real estate is left out of the portfolio, more risk than necessary is assumed, perhaps with a penalty to returns as well. In fact, if institutional investors care only about the mean and variance of the return on their invested wealth, one would expect these investors, as a first approximation, to hold the market portfolio of stocks, bonds, and real estate. Also, if there are no serial correlations in market returns, and if asset risks and correlations seldom change, then one would expect most institutional investors to hold a particular optimum mix of assets in their portfolios and to attempt to maintain these proportions in the face of changes in market values. Yet the available data would seem to indicate that since the mid-1980s there has been a substantial change in the portfolio composition of most institutional investors worldwide. The direction of this change has fairly consistently been from holding a mixed portfolio of stocks, bonds, and real estate to holding a mixed portfolio of stocks and bonds with very limited investments in real estate assets. The exceptions to this rule, however, are important, and we shall refer to their significance a little later.

Inevitably, the question that arises is "why?" Why has this change occurred? What are the economic forces that have determined its extent and direction? One general concern is that the great bear market in real estate, which began both in the U.S. and abroad in the late 1980s and continued into the early 1990s, has dramatically changed the way in which most institutional investors view real estate. An alternative concern is that institutional investors have made a switch from real estate to stocks and bonds because current economic conditions are more favorable to stocks and bonds than to real estate. Moreover, there is some concern that most institutional investors are dominated by a short-run trading mentality, and that they are quick to dump any investment that they believe might have a short-term downward price movement, regardless of its long-term prospects. This situation can arise not only for reasons having to do with noisy rational expectations, but also as a result of such factors as the existence of deadweight costs.[1]

This paper investigates the relationship between real estate portfolio weights and net asset yields by focusing on the expected annual returns on real estate

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[1]Although not studying the lack of real estate diversification, Gehrig (1993), Low (1993), Brennan and Cao (1994), and Zhou (1994) provide a dynamic noisy rational expectations model where some investors know more about one asset and others know more about another asset. These types of models help explain why some investors look like they are insufficiently diversified. Stulz (1981) argues that some securities may not be held by investors because of deadweight costs (e.g., a cost associated with holding).

needed to rationalize observed portfolio holdings. We also employ the approximate accounting identity of Campbell (1987, 1991) to estimate the relationship between ex post real estate returns and ex ante future real estate excess (over risk-free rates) returns. A lesson to be learned from this study is that, when times are good for stocks (relative to real estate), as they have been in most countries in recent years, most institutional investors appear to be very reluctant to rebalance their portfolios. By design, then, real estate asset allocations will fall. Real estate markets can also go through a prolonged crash, as in the United States during the late eighties and early nineties. This, too, can lead to reduced real estate asset allocations.[2]

We also observe in this paper a negative correlation between real estate asset allocations and lagged real estate unexpected excess returns. These results confirm findings in the literature that risk-neutral investors should be less inclined to invest in an asset after an unexpected increase in the asset's excess return because this price increase could be due to a possible downward adjustment of future expected returns. Further research should investigate conditions under which models of institutional investor behavior could explain both the level and the cross-sectional variation in real estate ownership documented here. We also recognize that substantial research remains to be done to further our understanding of cross-country differences in institutional real estate ownership patterns, particularly among Asian countries. Our sample, dictated by data availability, excludes Asian institutional investors.

2.   Institutional Real Estate Ownership Patterns

This section examines institutional real estate ownership patterns of life insurance companies for 10 countries over the period 1986-96. The countries included are Australia, Austria, Belgium, France, Italy, the Netherlands, Spain, Sweden, the United Kingdom, and the United States; together they account for about two-thirds of invested assets of insurance companies worldwide. All our data on real estate ownership patterns for non-U.S. countries are from Datastream. The real estate ownership data for the United States come from Life Insurance Fact Book. We consider the data chosen to be the best available, but such data must be used with care.

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[2] These conclusions suggest that institutional investors, on the one hand, invest on the basis of rational forecasts of future returns, holding a higher fraction of stocks when expected returns on stocks are high, and, on the other hand, they invest on the basis of perceived fundamentals, holding a small fraction of real estate assets when perceived returns on real estate are low.

Table 1 and Figure 1a-1h present summary data on country-by-country institutional real estate portfolio holdings (value-weighted) over the period 1986-96. As our measure of asset allocation to real estate, we use the reported proportion of total life insurance company assets invested in real estate, either directly or indirectly through commingled funds. A priori, we might expect institutional investors to invest between 15 to 20% of their assets (or higher) in real estate (see Firstenberg, Ross, and Zisler (1988), Fogler (1984), Hartzell, Heckman, and Miles (1986), Ibbotson and Siegel (1984), Miles and McCue (1984), and most recently LaSalle Advisors (1997)). The data show, however, that there are few institutional investors which are even roughly in accord with what the portfolio theory would predict.

**Table 1 Institutional Real Estate Portfolio Holdings**

	Selected Years		Sub-intervals		
	1988	1996	1986-96	1986-91	1992-96
United States	0.0815	0.0259	0.0590	0.0752	0.0346
United Kingdom	0.1722	0.0723	0.1283	0.1650	0.0842
Sweden	-	0.0481	0.0766	0.0886	0.0742
Austria	0.1437	0.0986	0.1096	0.1130	0.1069
Netherlands	0.0720	0.0500	0.0665	0.0707	0.0623
Italy	-	0.1457	0.1684	0.1770	0.1632
France	0.0602	0.1232	0.0895	0.0696	0.1054
Spain	0.2881	0.1658	0.2407	0.2594	0.2257
Belgium	0.0639	0.0457	0.0674	0.0745	0.0617
Australia	0.0000	0.0695	0.0356	0.0000	0.0640
Mean	0.0871	0.0469	0.0728	0.0836	0.0546

Note : All our data on real estate ownership by non-U.S. life insurance companies are from *Datastream*. The real estate ownership data for the United States come from *1996 Life Insurance Fact Book*.

The data also show that, even though real estate fundamentals have been improving worldwide, the holdings of real estate by most institutional investors have dropped sharply as a percentage of portfolio assets over time. U.S. institutional investors, for example, have gone from holding approximately 8% of their portfolio in real estate in 1986 to less than 2.5% today.

A roughly similar pattern is found in the U.K. U.K. institutional investors, which held more than 16% of their assets in real estate during the period 1986-91, today hold approximately 7¼% of their assets in real estate. Dutch investors have reduced their holdings of real estate assets from approximately 7% of total portfolio assets in the period 1986-91 to about 5% today.
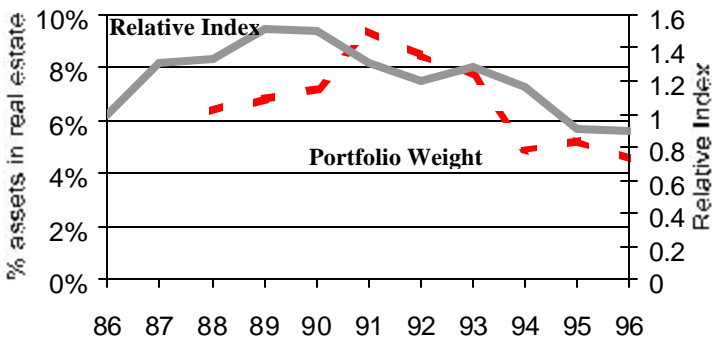
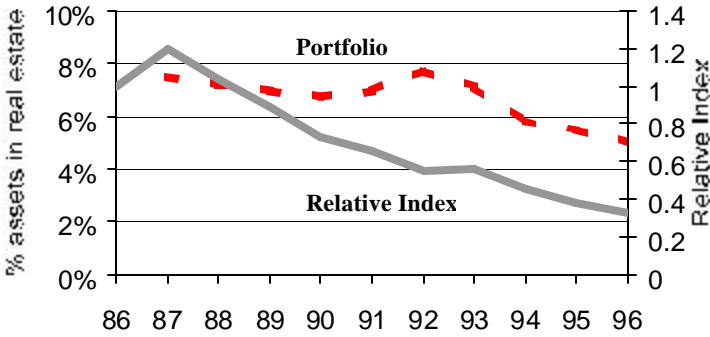**Figure 1a: Australian Institutional Real Estate Ownership**
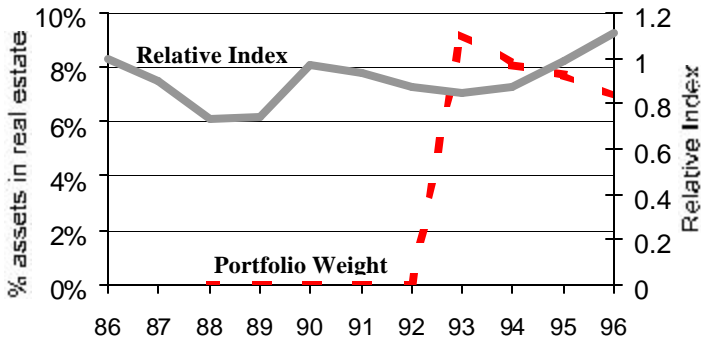
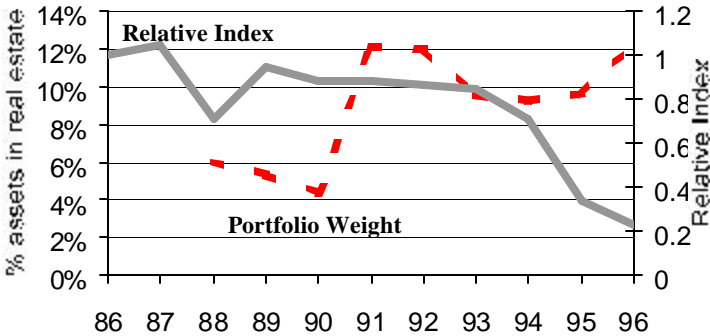**Figure 1b : Austrian Institutional Real Estate Ownership**
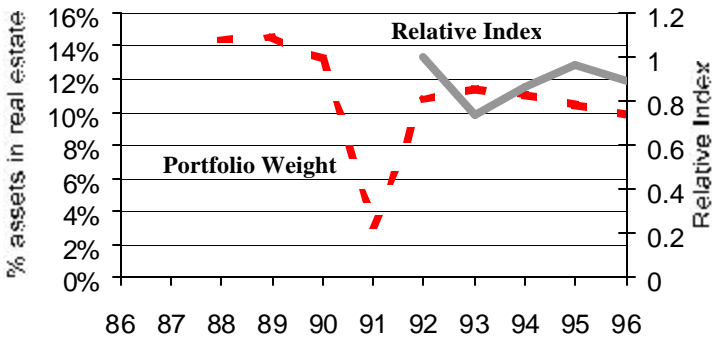
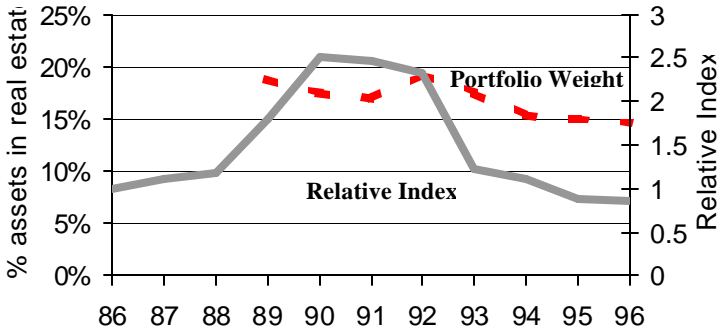**Figure 1c: Belgian Institutional Real Estate Ownership**

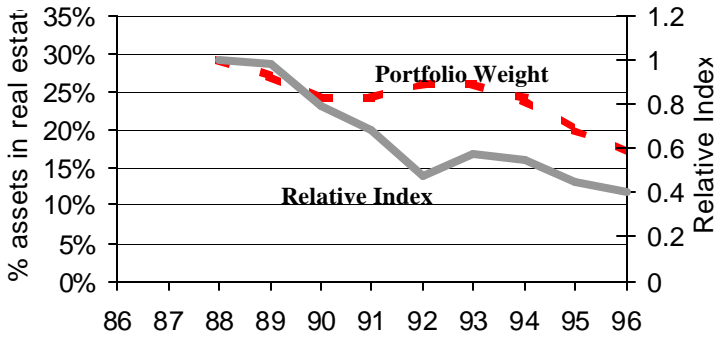**Figure 1d : Dutch Institutional Real Estate Ownership**

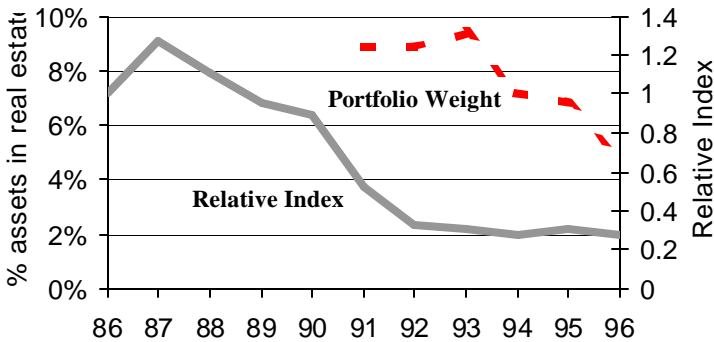**Figure 1e : French Institutional Real Estate Ownership**

Figure 1f : Italian Institutional Real Estate Ownership

Figure 1g: Spanish Institutional Real Estate Ownership

Figure 1h : Swedish Institutional Real Estate Ownership

There is also evidence that institutional investors in Austria, Belgium, Italy, Spain, and Sweden have significantly reduced their relative portfolio shares in real estate. To a great extent this decline follows the real estate cycle in each country, but this is not a complete explanation, for there has been a rise in real estate activity in many of these countries, especially during the latter 1990s.

In France the numbers exhibit a slightly different pattern. French institutional investors have gone from holding approximately 7% of their invested assets in real estate during the period 1986-91 to having over 12% of their assets invested in real estate in 1996. As for Australia, the data at hand show that investment in real estate is a recent phenomenon (at least for the Australian institutional investors included in our sample).[3] For instance, over the period 1986-91, when institutional investors worldwide held about 8% of their assets

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[3] We do not wish to push these data too far. As noted below, the data are open to question on a number of specific points.

in real estate, Australian institutional investors were typically not invested in real estate. In 1993, by comparison, Australian institutional investors held about 9% of their assets in real estate. This ratio has since declined to less than 7% today.

Finally, we should point out that the countries can be ranked in the following order, starting with those with the heaviest portfolio shares invested in real estate in 1996: Spain, Italy, France, Austria, U.K., Australia, Netherlands, Sweden, Belgium, and the U.S. This ranking is partly explained by the fact that European institutional investors on average are noticeably larger (in terms of asset size) than their U.S. counterparts.

Theoretically, one could argue that small institutional investors are likely to have relatively high costs per dollar of direct investment outlay. As a result, they are unlikely to find real estate an attractive investment. On the other hand, and again from a theoretical standpoint, large-scale institutional investors should be able to amortize these costs over a relatively large direct investment outlay. Thus, one would expect most large-scale institutional investors to own more real estate assets (as a percent of total wealth), especially since real estate in a typical common stocks and bonds portfolio may reduce the portfolio's risk without penalizing returns. Ciochetti, Sa-Aadu, and Shilling (1997) confirm the existence of a significant size effect for institutional investors.

3.   Constructing Real Estate Expected Returns

There are several different approaches which may be used to measure ex ante real estate returns. Here we choose to follow two distinct approaches: the French-Poterba (1991) CAPM approach, and the Campbell (1987, 1991) approximation to the present-value model.

3.1   French-Poterba CAPM Approach

The French-Poterba methodology makes use of the Sharpe-Litner capital asset pricing model (CAPM). As Merton (1973) and others have shown, the Sharpe-Litner capital asset pricing model implies the following asset pricing:

$$E_t(R_{t+1}) - R_t^f = \mathbf{1}\, w'\Sigma \tag{1}$$

where R_{t+1} is   a   vector   of   mean   returns,   R

t

[f] is the risk-free rate, λ is the aggregate index of relative risk aversion in each country, w' is the transpose of a set of portfolio weights w, Σ is a covariance matrix, and E_t is the conditional expectations operator, conditional on information available at time t.

Here (1) can be used either to determine the optimal portfolio weights, w^*, given the vector of mean excess returns, $E(R_{t+1}) - R_t^f$, or to infer the expected excess returns, $E_t(R_{t+1}^*) - R_t^f$, implied by w. We choose to follow the latter approach.

In implementing this approach, we examine annual returns on common stocks, bonds, and real estate in each of our 10 countries from 1986 to 1996. All returns are expressed in local currency (i.e., without the effects of foreign exchange translation). Data sources used in the various rates of return calculations include: Ibbotson's SBBI Yearbook and NAREIT Handbook for U.S. returns, and Datastream for non-U.S. returns. The real estate returns are for the property-stock sector. Firms in this sector are engaged primarily in the development and management of commercial real estate. Average market capitalization for these companies exceeds US$100 million, which implies a reasonable degree of liquidity (which is important for the analysis that follows). Among the property companies included are Lend Lease Corporation (Australia); Unibail (France); Aedes and Immobiliare Metanopoli (Italy); Rodamco (Netherlands); Metovacesa and Vallehermoso (Spain); Hammerson and MEPC (United Kingdom); and Equity Residential, New Plan Realty Trust, and Weingarten Realty (United States). The bond market returns are for long-term (10-years or longer) government bonds.

We use these returns data to construct a number of variables, which we now describe. An important variable in our model is the covariance matrix, Σ, which is our measure of the diversification benefits of real estate. The modeling approach taken here is to make a reasonable estimate of Σ for each country. A number of difficulties are inherent in this approach, of which researchers familiar with these issues are well aware. Firstly, there is the disadvantage of working with subindexes. Secondly, property-stock sector returns and volatilities vary widely across countries. Thirdly, some of these differences result from differences in the amount of leverage used and whether stocks of active developers-owners or passive holding companies predominate the country-specific property-stock sector index. Nevertheless, by making a separate estimate of Σ for each country, the results should reflect the fundamentals of the countries' underlying property markets, although direct property investments' returns and volatilities may be different, a point that we will refer to later.

Although we do not reproduce the results here, in calculating Σ along the lines suggested above, we find, first of all, that most property-stock sector returns are significantly positively correlated with stock market returns at the 0.01 level.   We also see that most property-stock sector returns are significantly positively correlated with real estate returns at the 0.01 level. Of course, neither of these results is surprising, since many broad factors affect all three: stock market returns, property-stock returns, and real estate returns.[4]

In Panel A of Table 2, we show the expected real estate returns needed to justify the observed portfolio weights in each of our 10 countries.   The procedure outlined above allows us to obtain yearly expected returns for the period 1986-1996. Rather than reproduce these returns for each year, we aggregate them by country for the whole sample period and then for two subsamples. To obtain $E_t(R^*_{t+1})$ for each country we add the implied values of $E_t(R^*_{t+1}) R_t^f$ to last period's risk-free rate.[5]

Panel B of Table 2 shows that substantial differences in expected real estate returns for institutional investors in a given nation are needed over time and across countries to rationalize observed portfolio holdings.   These differences suggest that institutional investors in Australia, the United Kingdom, and the United States currently are quite pessimistic about their real estate markets. For example, in the U.S. case, institutional investors currently would appear to have very low yield expectations on real estate.

Table 2 : Expected Real Estate Returns and Return Deviations
Panel A.   Expected Real Estate Returns Needed to Justify the Observed
                 Portfolio Weights (in local currency)

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[4] Gyourko and Keim (1992) stress this. See also Zeckhauser and Silverman (1983): stressing the role that corporate real estate plays in the value of the firm. This suggests that at least part of the variance in stock returns should be related to changes in the value of corporate-owned land and structures.

[5] We use the following proxies as the risk-free rates: 3-month treasury bill rates for Australia, Belgium, and Sweden; 3-month interbank loan rates for Spain and France; a bank discount rate for Italy; a 1-month interbank rate for the Netherlands; a 3-month VIBOR rate for Austria; and 1-month treasury rates for the United Kingdom and the United States. During the 1986-95 period, these returns ranged from 6.36% (Austria) to 25.73% (Spain).

	87-96	87-91	92-96
United States	0.0918	0.1044	0.0791
United Kingdom	0.1846	0.2185	0.1506
Sweden	0.2410	-	0.2304
Austria	0.0636	0.0659	0.0604
Netherlands	0.1239	0.1271	0.1203
Italy	0.1630	0.1775	0.1452
France	0.1797	0.1596	0.1881
Spain	0.2573	0.2734	0.2373
Belgium	0.1269	0.1339	0.1207
Australia	0.1652	0.1938	0.1344
Mean (Value-Weighted)	0.1184	0.1234	0.1063

Panel B.   Deviation Between Expected Real Estate Returns and Actual
             Real Estate Returns (in local currency)

	87-96	87-91	92-96
United States	-0.0101	0.0711	-0.0913
United Kingdom	0.0334	0.1226	-0.0558
Sweden	0.0984	-	-0.0984
Austria	0.0307	-	0.0307
Netherlands	0.0868	0.1221	0.0586
Italy	0.2147	0.1333	0.2473
France	0.1607	-0.0598	0.2929
Spain	0.1995	0.3441	0.1126
Belgium	0.0628	0.1025	0.0469
Australia	-0.0302	-0.0271	-0.0320
Mean (Value-Weighted)	0.0229	0.0636	-0.0306

Note : The expected returns are calculated by adding the expected excess returns derived from the CAPM to the risk-free rates. The following risk-free rates are used: 3-months treasury bill rates for Australia, Belgium, and Sweden; 3-months interbank loans rates for Spain and France; a discount rate for Italy; a 1-month interbank rate for the Netherlands; a 3-month VIBOR rate for Austria; and 1-month treasury bill rates for the United Kingdom and the United States.

From Panel A, we see that U.S. investors are expecting to earn at best a rate of return that is in the 8% range. Yet, current returns are in the 17% range, suggesting an implied difference of -900 basis points (expected minus actual) as shown in panel B. For U.K. institutional investors, the current annual expected return on real estate is in the 15% range, while current returns are in the 20½% range, an implied difference of -550 basis points. A similar interpretation holds for institutional investors in Australia; although, the numbers are not quite as dramatic.

Those institutional investors currently most optimistic (taking into account

current actual returns) are the French and the Italians. The data in panel A of Table 2 show that these investors currently expect real estate returns to be in the 14 to 19% range, while actual returns on real estate are quite negative. The Swedes and the Spaniards are also quite optimistic about their real estate markets.   Both expect real estate returns to be in the 23% range.   In comparison, actual real estate returns in Sweden and Spain currently are in the 13% range.

We next compare our cross-sectional estimates for the period 1987-91 with those for the period 1992-96 to see if there were substantial changes in investor perceptions about real estate markets over this longer interval. The data clearly indicate that most institutional investors are less sanguine about real estate markets now than they were in the 1980s. Not surprisingly, U.S. institutional investors show by far the greatest relative downward change in perceptions over time. One explanation for this has to do with the real estate losses U.S. institutional investors incurred over this time period. Most U.S. institutional investors had terribly negative experiences from buying commercial real estate directly in the 1980s. This situation arose because the U.S. had such weak levels of real activity during this time period and such a huge surplus of space built in the 1980s. This affected the net incomes of even the best debt-free properties. Another factor contributing to the under-performance of real estate in the U.S. was the plunge in interest rates and inflation rates since the 1981-82 period. This trend generally leads to lower overall realty returns and higher stock market returns, which is a common theme in the real estate literature.[6]

The evidence in Table 2 indicates that institutional investors in U.K. went from being overly optimistic about their local real estate markets in 1987-91 to being pessimistic about real estate investments in the period 1992-96. It is plausible that the vast amount of overbuilding that occurred in the late 1980s following Prime Minister Thatcher's relaxation of capital controls is partly to blame for this. Alternatively, it may simply reflect low inflation and low interest rates, and the fact that, with a decrease in the rate of inflation, real estate investments are a much less attractive investment vehicle relative to stocks and bonds. This is another point to which we shall return.

With respect to the institutional investors in the 7 countries of Continental Europe, all but France and Italy are less sanguine about their local real estate

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[6] For studies along these lines, see Fama and Schwert (1977), Chan, Hendershott, and Sanders (1990), Gyourko and Linneman (1988), Goetzman and Ibbotson (1990), Newell (1996), Hoesli, MacGregor, Matysiak, and Nanthakumaran (1996), and Barkham, Ward, and Henry (1996).

markets now than they were in 1986-91. In France, expected returns on real estate increased from 15.96% in 1987-91 to 18.81% in 1992-96, while expected excess returns (over the ris k-free rate) unambiguously increased. In Italy, expected returns on real estate fell from 17.75% in 1987-91 to 14.52% in 1992-96. At the same time, however, expected excess returns on real estate in Italy (over the risk-free rate) rose from 13.33% in 1987-91 to 24.73% in 1992-96.

In the 1980s, Australia experienced a rate of inflation of 7.9%, but in the 1990s, inflation declined to 2.2%. At the same time realty returns underperformed stocks in the period 1986-89, and again in the period 1990-94. Since 1994, however, realty returns have outperformed stocks. This helps to explain why investment in real estate is a recent phenomenon in Australia, but does not explain why Australian institutional investors are less sanguine about their local real estate markets now than they were in 1986-91.

Before moving on, several caveats would appear to be in order. First of all, the procedure we followed in calculating $E(R^*_{t+1}) - R^f_t$ is, inevitably, open to question at a number of specific points. The sample of 10 countries over the period 1986-96 is admittedly very small and, in some respects, unrepresentative. Furthermore, while we have attempted to make very skillful and exhaustive use of the data, one wonders whether the sample is strong enough to support the weight it has to carry. For example, several of the actual portfolio weights for countries of Continental Europe may or may not be representative, so that a good deal of play remains in our estimates of the expected returns that would induce institutional investors in each of these countries to hold more real estate in their portfolios. These are points, needless to say, that we are fully aware. Having said that, these sample limitations do not take away from the main endeavor of the study, as we see it, to explain the behavior of some of the larger institutional investors in countries like France, the United Kingdom, and the United States. Fortunately, in the present case the paucity of data stops at institutional investors in these countries. On this basis, perhaps we should place greater emphasis on the results in these countries, and delete all of the remaining countries. But still we might miss some general and perhaps quite plausible hypothesis affecting institutional investors in other countries.

Another potentially important bias in these results stems from the use of property-stock sector returns to calculate S. Virtually all existing studies of appraisal-based real estate returns show that property-stock sector returns are far more correlated with the stock market than with appraisal-based property return series (see, e.g., Hartzell and Mengden (1986), and Ro ss and Zisler (1987)).[7] To determine how sensitive the results are to these different

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[7] In addition to huge differences in price volatility between stocks and bonds, with their daily market quotations, and the infrequently appraised values of real estate that

covariances, subsequent analyses were replicated for the U.S. and the U.K. using appraisal-based real estate returns. The U.S. data were obtained from NCREIF (National Council of Real Estate Investment Fiduciaries), while the U.K. data were obtained from Weatherall Green & Smith. Both indices consist of direct real estate equity investments actually made by major institutional investors. The conclusions were virtually unchanged.

To test further the robustness of our results, we performed the same analysis on historical portfolio weights but with a common covariance matrix for all countries of Continental Europe except Belgium and Italy. Evidence provided by Eichholtz, Huisman, Koedijk, and Schuin (1996) suggests that returns in most European countries, except for Belgium and Italy, are significantly correlated with the returns of the European continent as a whole.

This would suggest that $E_t(R^*_{t+1}) - R^f_t$ for these countries would be better measured using a common covariance matrix.[8] We found that our results are quite robust to different specifications of a common covariance matrix.
A final caveat pertains to our choice of ?. In the above calculations, we had set the value of ? = 3. To test the importance of this parameter, (1) was reestimated using ? = 2 (see Giovannini and Jorion (1989) for more details). The qualitative results were unchanged.

To summarize, the patterns in Table 2 seem to be, in fact, remarkably regular. Institutional investors in Australia, the United Kingdom, and the United States currently are all quite pessimistic about their local real estate markets, while institutional investors in France and Italy, for example, appear to be quite optimistic. Also, at the same time most institutional investors are less sanguine about real estate markets than they were in the 1980s. Along with current stock market fundamentals, this has caused most institutional investors to back away from holding real estate investments, thereby decreasing relative portfolio shares in commercial real estate to levels corresponding to the low end of allocation ranges.

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make up an appraisal-based property return index, there is the problem of adjusting appraisal-based property returns for illiquidity and transaction costs, which suggests resorting to property-stock sector returns.

[8] Compare with Goetzmann and Wachter (1996). Goetzmann and Wachter offer a substantially different treatment, in which they use cluster analysis to construct groups of countries based on the comovements in their real estate returns. Their findings suggest that Australia, Sweden, Hong Kong and Taiwan are all relatively unambiguous in their relationships with other countries. They also could not reject the hypothesis that Sweden, Belgium, France, and several other countries cluster the United Kingdom.

3.2 *Campbell Approximate Present-Value Model*

The Campbell (1987, 1991) approximate loglinear present-value model holds that current unexpected excess returns on an asset can be decomposed into the following accounting relationship:

$$e_{t+1} - E_t\,(e_{t+1}) = (E_{t+1} - E_t)\sum_{j=0}^{\infty} r^j \Delta d_{t+1+j}$$
$$- (E_{t+1} - E_t)\sum_{j=0}^{\infty} r^j r_{i+a+j}$$
$$- (E_{t+1} - E_t)\sum_{j=0}^{\infty} r^j e_{i+a+j} \tag{2}$$

where d_{t+1} is the log of the real dividend (cash flow) paid to investors during period t+1, r_{t+1} is the real interest rate for the time period t+1, e_{t+1} is the continuously compounded excess (over the risk-free rate) return on the asset, ? denotes a one-period backward difference operator, and $(E_{t+1} - E_t)$ represents a revision of expectations given any new information arriving at time t+1. The discount rate parameter ? is a number slightly less than 1 (i.e., ? is constrained to be 0.9962). Equation (2) says that when the unexpected excess return on an asset is positive, then either the expected future growth in the asset's cash flows must be increasing, expected future real estate interest rates must be decreasing, or expected future excess returns on the asset must be decreasing or some combination of these three effects must occur simultaneously.

Equation (2) implies

$$v_{e,t+1} = e_{d,t+1} - e_{r,t+1} - e_{e,t+1} \tag{3}$$

where $v_{e,t+1}$ is the unexpected component of the asset return e_{t+1}, $e_{d,t+1}$ represents innovations in (or news about) cash flows, $e_{r,t+1}$ represents innovations in future real interest rates, and $e_{e,t+1}$ represents innovations in future excess returns.

To estimate $e_{d,t+1}$, $e_{r,t+1}$, and $e_{e,t+1}$, we model excess returns to real estate, the real interest rate, the one-month risk-free rate relative to its past 12-month moving average (the relative bill rate), the dividend yield, and excess returns to the value-weighted market portfolio, according to a first-order VAR model. We can write the VAR model in matrix notation as

$$z_{t+1} = Az_t + w_{t+1} \tag{4}$$

where z_{t+1} is a 5x1 vector, the first element of which is excess returns e_{t+1} on real estate, and the second element of which is the real interest rate, w_{t+1} is an error term, and A is a 5x5 matrix of coefficients to be estimated.
From (4), we obtain

$$e_{e,t+1} = a_1' \, \mathbf{r} \, A(I - \mathbf{r}A)^{-1} w_{t+1} \quad e_{r,t+1} = a_2'(I - \mathbf{r}A)^{-1} w_{t+1} \tag{5}$$

where a_1' is a 5x1 vector whose elements are all equal to 0 except the first element, which is equal to 1, and a_2' is similarly defined except that its second element is equal to 1.

From (3) and (5), given that the first element of w_{t+1} is $v_{e,t+1} = a_1' \, w_{t+1}$, we then obtain

$$e_{d,t+1} = [a_1' + a_1' \, \mathbf{r}A(I - \mathbf{r}A)^{-1} + a_2'(I - \mathbf{r}A)^{-1}] w_{t+1}. \tag{6}$$

Having done that, it is possible to use $v_{e,t+1}$ and $e_{e,t+1}$ to study the relationship between unexpected excess returns on real estate today and expected excess returns in the future. We can also use $v_{e,t+1}$ to determine what has driven the switch from real estate to stocks and bonds in each of the countries examined above.

In all countries except for Australia, the model in (4) is estimated using monthly returns. For Australia, the model is estimated using quarterly data. The data sources are the same as described above. All values are expressed in local currency.

Table 3 provides the results of estimating (4). We highlight two features of the results. First, for the majority of the countries there is a relatively high degree of predictability in the monthly excess real estate returns. For example, in the United States approximately 14% of the variation in monthly excess returns on real estate is accounted for by the five forecasting variables. Similar or higher degrees of predictability are exhibited in Austria, the Netherlands and Spain.

F-test	R^2
3.67	0.144
1.41	0.060
2.12	0.088
2.08	0.234
2.96	0.119
1.01	0.044
0.39	0.017
2.69	0.113
1.25	0.054
1.08	0.144
3.31	0.017

al interest rate, the relative
folio at time t. The sample
, Belgium, and Sweden; 3-
h treasury bill rates for the
S&P 500 index, and the rest
e sample does not include
5%. F-test gives the joint
erest rate, and the dividend
the value-weighted market

In Sweden and the United Kingdom, approximately 6 to 9% of the variation in monthly excess returns on real estate is accounted for by the five forecasting variables. The lowest degrees of predictability are exhibited in Italy and France. Second, the predictability in Table 3 is consistent with studies by Campbell (1987), Fama and French (1988), and others. For example, Campbell

(1987) finds that approximately 11% of the variation in monthly excess returns on stocks is predicted by a set of similar variables. Fama and French (1988), using a slightly different set of variables, report an unadjusted R^2 of 4%. Ferson (1989) reports an average unadjusted R^2 of approximately 5% for real estate.

The expected excess returns on real estate themselves vary significantly over time. This is illustrated in Figures 2a-2d. These figures plot the expected excess return (risk premiums) in Australia, Continental Europe, the United Kingdom, and the United States. These values are calculated using the estimated regression coefficients in Table 3. The values in Figures 2a, 2b, and 2d are measured in percentage points per month whereas the values in Figure 2c are in percentage points per quarter.

As can be seen, expected risk premiums are the most volatile in Australia followed by expected risk premiums in the United Kingdom, the United States, and Continental Europe respectively. The peak forecastable risk premium in the United States is approximately 3.81%. In contrast, the lowest forecastable risk premium in the United States is -3.12%. The series seems to peak just before or after a business trough, and tends to bottom out as the economy recovers. This result is consistent with Mei and Saunders (1997).

If we compare the forecastable risk premiums in the United States with the forecastable risk premiums in the United Kingdom, we find a correlation coefficient of 0.1856. Similarly, the correlations with the forecastable excess returns in the United States and Continental Europe, and in the United States and Australia are 0.2639 and 0.3098 respectively. The correlations with the expected excess returns in the United Kingdom and Continental Europe, and in the United Kingdom and Australia are 0.3897 and -0.2933 respectively. Lastly, the correlation with the expected excess returns in Continental Europe and Australia is -0.3023. These results are easy to explain within the context of Eichholtz, Huisman, Koedijk, and Schuin's (1996) finding that there are significant benefits to real estate diversification across continents.

Figure 2a: US Expected Excess Returns on Real Estate

Time Period: 1987.1-1996.7
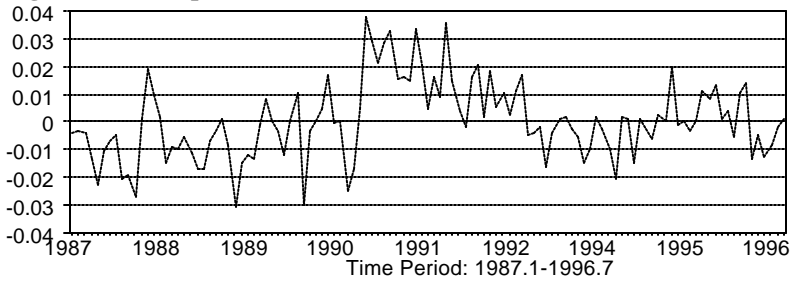
Figure 2b: UK Expected Excess Returns on Real Estate

Time Period: 1987.1-1996.7
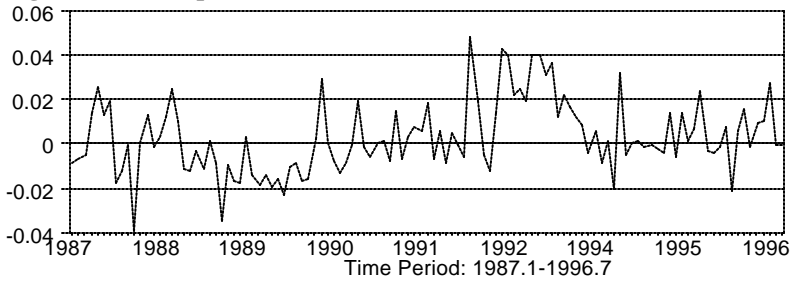
Figure 2c: Australia Expected Excess Returns on Real Estate

Time Period: 1987.1-1996.2
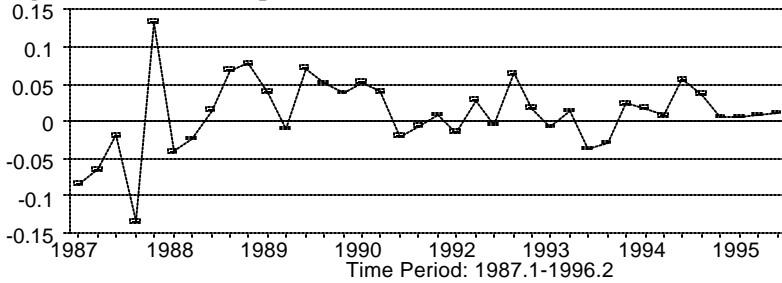
Figure 2d: Europe Expected Excess Returns on Real Estate

Time Period: 1987.1-1996.7
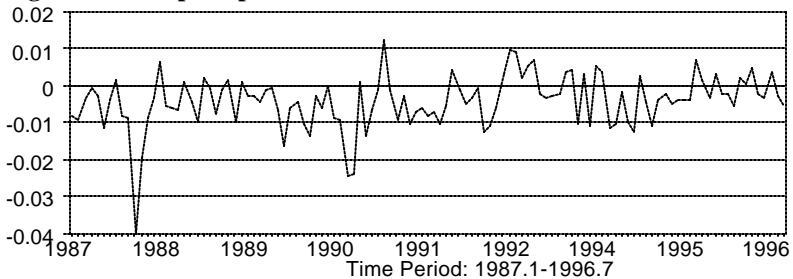
We next present a variance decomposition for real estate returns in our 10 countries (see rows 1-10 of Table 4). These values are normalized by the variance of the return innovation itself so the numbers reported are shares that add up to one.

The decompositions suggest that the cash flow innovations $e_{d,t+1}$ account for a large portion of the return variation in real estate portfolios in most countries followed by innovations in future expected returns $e_{e,t+1}$. To illustrate this, consider the case of the United States. Here the variance decomposition attributes 213% of the variance of real estate returns to news about future cash flows, and 202% to the news about future excess returns.

We can also see that there is a large negative correlation between innovations in future cash flows and news about future excess returns. The remainder of the variation in real estate excess returns is explained by the variation in the real interest rate and the three covariance terms - $COV(e_{d,t+1},e_{r,t+1})$, $COV(e_{d,t+1,}\ e_{e,t+1})$, and $COV(e_{r,t+1\ ,}\ e_{e,t+1})$. The decompositions for Australia, Italy, Spain, and Sweden are fairly similar to that of the United States; both the variance of news about future cash flows and future expected returns are quite large, while news about real interest rates $e_{r,t+1}$ is relatively small.

In contrast, the decompositions for Belgium, France, and the United Kingdom suggest that a large portion of the return variation in real estate portfolios is attributable to news about real interest rates. Then there is Austria. Here the variance decomposition literally and figuratively "blows up" owing to the low apparent variance of the return innovation in Austria. Even so, if forced to categorize Austria we would categorize it more like Belgium, France, and the Netherlands than like Australia, Italy, Spain, Sweden, or the United States, since both the variance of news about future cash flows and real interest rates are more important than the variance of news about future expected excess returns.

The last column of Table 4 reports the correlation between unexpected excess returns $v_{e,t+1}$ and innovations in future expected excess returns $e_{e,t+1}$. The correlations are negative for all countries but Austria and France. This negative correlation implies that unexpectedly large excess returns today are associated with smaller future excess returns, holding all else constant. This in turn implies that the optimal investment strategy for a risk-neutral investor is to invest immediately after an unexpected drop in $e_{t+1} - E_t e_{t+1}$, since this price drop is consistent with an upward adjustment in future expected rates of return.

Table 4 : Variance Decomposition for Excess Real Estate Returns

	Var (ε_d)	Var (ε_r)	Var (ε_e)	2Cov ($\varepsilon_d,\varepsilon_r$)	2Cov ($\varepsilon_d,\varepsilon_e$)	2Cov ($\varepsilon_r,\varepsilon_e$)	Corr (V_e,ε_e)
U.S.	2.136	0.830	2.023	-1.306	-2.589	-0.060	-0.482
U. K.	2.122	1.904	0.606	-3.751	-0.938	1.09	-0.875
Sweden	1.333	0.651	1.209	-1.560	-1.748	1.13	-0.817
Austria	16596	19768	142.33	-35313	2912.4	-3190	0.085
Netherlands	6.452	6.256	0.868	-11.271	1.812	-3.01	-0.284
Italy	1.491	0.806	0.899	-1.542	0.305	-0.940	-0.610
France	2.322	0.326	0.165	-1.346	-0.813	0.361	0.154
Spain	1.773	0.854	1.435	-0.961	-1.110	-0.964	-0.324
Belgium	2.475	0.835	0.308	-2.186	-1.040	0.630	-0.183
Australia	0.665	0.160	0.249	-0.343	0.234	0.034	-0.776
Average	2.307	1.402	0.862	-2.696	-0.654	-0.192	-0.466

Note : Austria is excluded in calculating the average.

The evidence in Table 4 is consistent with the idea of mean reversion. Most assets display a negative correlation between unexpected excess returns $v_{e,t+1}$ and innovations in future expected excess returns $e_{e,t+1}$ because when $v_{e,t+1}$ falls the market may get inappropriately pessimistic about current or future earnings. Or it may reflect the dynamics of some common macroeconomic driving variables (see Fama and French (1986)). Fama and French (1988) suggest that there is considerable mean reversion in the return on a stock market index for horizons from 18 months to 5 years. Poterba and Summers (1986) also find considerable evidence of negative serial correlation at long horizons for most countries, the only exceptions being Finland, South Africa, and Spain. From the international evidence, Poterba and Summers conclude that mean reversion is more pronounced in less broad-based and less sophisticated foreign equity markets. There is also evidence in Mei and Saunders (1997) of mean reversion in real estate excess returns in the United States for holding periods greater than 1 year.

4.   Hypothesis Tests

Let us now set down a simple portfolio model to test if institutional investors

shift out of real estate assets into stocks in response to a bull market in stocks. The alternative hypothesis is that institutional investors switch some portion of their funds from real estate into financial assets as they become pessimistic about their local real estate markets.

We proceed as follows. We let w $^\wedge_t$ be the proportion of total assets held in real estate in a given base period (we use 1986), adjusted for the cumulative change in the value of the institutional investor's stock portfolio over time. We then let $q_t = w_t/w$ $^\wedge_t$, which is the actual portfolio weight in real estate divided by the adjusted portfolio weight. The resulting portfolio quotient should depend largely on the expected excess return on real estate. We then estimate the following regression equation:

$$q_t = \boldsymbol{b}_0 + \boldsymbol{b}_1[E_{t-1}(R^*_t) - R_{t-1}] + \boldsymbol{m}_t \tag{7}$$

If institutional investors decrease their investments in real estate when they are pessimistic and increase their investments in real estate when they are optimistic, one would expect to find a positive and significant relation between q_t and $E_{t-1}(R^*_t) - R_{t-1}$.

Alternatively, the q_t of a typical institutional investor may vary not because of decreased returns on real estate, but because of the lure of higher returns on other assets. Obviously, if the pulling power of, say, a bull stock market is more important than the push of low returns on real estate assets, then we would expect the relation between q_t and actual values of real estate returns to be weak.

It is reasonable to expect a substantial lag in the adjustment of q_t to changes in $E_t(R_{t+1}) - R_t$. This is because a decrease in the economic attractiveness of real estate must be perceived by the institution, a decision must be made regarding which assets to sell or which property markets to get out of, and the properties must actually be sold. The first two lags might be short for some institutions, but the full response to a significant decline in the expected returns on real estate is undoubtedly not completed for a number of years.

The reader will note that the inclusion of $E_{t-1}(R^*_t) - R_{t-1}$ on the right-hand side of (7) results in an expression that is somewhat circular, since we first used actual values of w_t to solve for $E_{t-1}(R^*_t) - R^f_{t-1}$. To see what is precisely involved, one can first solve (1) for $E_{t-1}(R^*_t) - R^f_{t-1}$. The result can then be substituted into (7). This yields

$$q_t = \boldsymbol{b}_0 + \boldsymbol{b}_1[Z_{1,t-1}\boldsymbol{a}_1^2 + Z_{2,t-1}\boldsymbol{a}_{12} + Z_{3,t-1}\boldsymbol{a}_{13} - (R_{t-1} - R^f_{t-1})] + \boldsymbol{m}_t \tag{8}$$

where $Z_{i,t-1} = ?_{t-1}w_{i,t-1}$, s_{ij} is the covariance of asset i with asset j and $?_{t-1}$ is a constant. Written in this way, it becomes clear that $E_{t-1}(R^*_t) - R_{t-1}$ represents the effect that real estate is expected to have on an institutional investor's portfolio (which appropriately involves $w_{i,t-1}$ and s_{ij}). Note that the effect measured in (8) is over and above the actual risk premium $R_{t-1} - R^f_{t-1}$

In a more straightforward test of the factors driving institutional investors' real estate investment decisions, we also regress q_t on lagged real estate unexpected excess returns. That is to say, we estimate the equation:

$$q_t = \beta_0 + \beta_1 v_{e,t-1} + \mu_t. \tag{9}$$

The model in (9) avoids some of the problems inherent in (7), and follows directly from the work of Mei and Saunders (1997) and others.

Table 5 provides the coefficient estimates for both regression equations. The top panel of Table 5 reports the regression results for equation (7). There are some notable patterns. Specifically, the evidence with respect to (7) shows that the relation between real estate portfolio weights and lagged values of our expected return differentials on real estate is positive and statistically significant. These results confirm that optimistic expectations have a positive effect on institutional investors' demands for real estate assets. Yet the proportion of the total variance explained in the dependent variable is only 9.8% (see whole sample). Note that when the model is estimated over the 1986-91 subperiod, the proportion of total variance explained increases to 39.8%. In the 1992-96 subperiod, the statistical significance of the model drops to 9.6%.

A brief interpretation of the results so far, then goes as follows. As institutional investors become more pessimistic about their local real estate markets, they would appear to make active portfolio shifts out of real estate into financial assets. But these shifts are relatively small. A larger proportion of the total portfolio shift from real estate into financial assets over the whole sample period 1986-96 can be explained by the relative increase in stock market capitalization.

In considering these results, it should be remarked that real estate diversification of a portfolio typically entails agency risks and costs, and that real estate is a different type of asset than stocks and bonds. Consequently, simplistic arguments about geographical and/or property-type diversification, as those given above, may not be totally applicable.

There also is a liquidity argument that may help explain a portion of the shift

between real estate and financial assets. This argument suggests that illiquidity can cause investors to act in a more risk averse manner with regard to their holdings of risky assets.[9] This argument works in several ways. Applied to the case of Australia, for example, where the realty market is fairly illiquid in terms of global standards, this argument helps explain why institutional investors in that country hold a much smaller fraction of their assets in real estate than, say, institutional investors in Britain. Applied to the case of the U.S., on the other hand, where a big change between traditional ownership and REIT (Real Estate Investment Trust) ownership has been taking place, this argument could help explain the declining portfolio share allocated to privately-held real estate.

To determine exactly how much of the declining portfolio share is attributable to a shift from privately-held real estate into publicly-held REIT shares, one would need data regarding institutional holdings of publicly-traded REIT shares. Unfortunately, we cannot adequately test this with available data, but we believe such an investigation would help to explain why institutional investors, at least in the U.S., hold less traditional real estate investments today (as a percent of total assets) than in 1986.

Let us now turn to the estimation results of equation (9). These results are presented in the bottom panel of Table 5. Two aspects of the results stand out. First, the results generally suggest that q_t varies inversely with $v_{e,t-1}$. This result is not inconsistent with the previous literature. The main result in the literature is that institutional investors' real estate investment decisions, at least in the United States, appear to be negatively related to lagged real estate unexpected excess returns (see Mei and Saunders (1997)).

Second, and perhaps more important, the goodness of fit (R^2) for the portfolio share equation is approximately 9.0% (see whole sample period). We interpret this to mean that while institutional investors are apt to raise (lower) q_t after a decrease (increase) in $v_{e,t-1}$, only a small proportion of the variation in q_t is actually explained by the relative increase or decrease in $v_{e,t-1}$. We judge this percent to be extremely low, and therefore conclude that most of the change in q_t can be explained by the marked change in the value of the institutional investor's stock portfolio over time and not by a change in $v_{e,t-1}$,.

The major caveat about these results is that they are dependent on a particular specification of the z_{t+1}s in (4). Fortunately, the results do not appear to be very sensitive to specification of the z_{t+1}s. Nor do the results appear to be very sensitive to the number of lags we include in our VAR

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[9]See, for example, Grossman and Laroque (1990).

system. We should also note that there is some evidence that dividend yields and short and long-term interest rates have a modest degree of forecasting power for excess stock returns. The forecastability of stock returns also seems to increase with the time interval over which returns are measured.

5.   Conclusions

The evidence on the investment behavior of institutional investors presented here raises an interesting question. Why has the institutional ownership of real estate in most countries been declining as a percent of total assets? To address this issue, a model of *ex ante* real estate expected returns was first formulated. The model allows us to compute the expected real estate returns needed to justify why institutional investors have historically tended to underweight real estate in their portfolios, and why most institutional investors as of late have shifted out of whatever real estate assets they do own and into financial assets. The model produces estimates that are plausible, and quite robust with respect to alternative specifications.

We then use these estimated *ex ante* real estate expected returns to analyze the relation between relative net yields and portfolio shares. Here we find that investor pessimism plays a relatively modest role in explaining why most institutional investors have been shifting their funds from real estate assets to financial assets. The results instead suggest that portfolio allocations to real estate have fallen to the bottom of benchmark ranges for most institutional investors worldwide because of the relative shift in stock market capitalization that has taken place over the last decade.

In this paper we also used Campbell's (1987, 1991) approximate log-linear present-value model to characterize the dynamic relationship between real estate excess returns in the current period and expected real estate excess returns in the future. Here we find a modest degree of forecasting power for real estate returns, and evidence of a strong negative correlation between unexpected excess returns today and innovations in future expected excess returns. We also find a negative relation between institutional investors' portfolio allocations to real estate and lagged real estate unexpected excess returns. This negative relationship suggests that most institutional investors behave rationally.

With regard to our ability to explain what drives institutional investors' real estate portfolio decisions, we note that only a small proportion of what is driving institutional investors' real estate portfolio decisions is actually explained by lagged unexpected excess returns. Too small in fact to conclude

that institutional investors have been switching their funds from real estate into financial assets primarily because they are much more pessimistic about future expected real estate returns today than they were a decade ago.

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