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Continental Factors in International Real Estate Returns

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This paper examines the extent to which real estate returns are driven by continental factors. This subject is relevant for determining the country allocation of international real estate portfolios. If returns are driven by a continental factor, investors should look for diversification opportunities outside their own continent. This paper finds strong continental factors in North America and especially in the United States. For the Asia–Pacific region, real estate returns are not driven by a continental factor. The results suggest that, for European, North American *and* Asia–Pacific real estate portfolio managers, the Asia–Pacific region provides attractive international diversification opportunities.

For portfolio managers executing a top-down approach to international investing, determining the optimal country allocation is the main concern. Recent empirical research by Heston and Rouwenhorst (1994, 1995) and Beckers, Connor and Curds (1996) has shown that international diversification is more effective in reducing portfolio risk than diversification across industries. However, these studies are only concerned with diversification of stock portfolios. For real estate, this topic has received far less attention. This is probably as much due to the lack of good international real estate returns data as it is to the fact that international real estate investment is still in its infancy compared to international stock investment.

Nevertheless, some empirical research has been conducted to examine international real estate diversification opportunities. Sweeney (1989), Giliberto (1990), Giliberto and Testa (1990) and Liu and Mei (1996) have used Markowitz portfolio models to construct efficient international real

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estate portfolios. Sweeney (1989) uses office rent indices in major cities across the world, and Giliberto (1990) and Giliberto and Testa (1990) use the returns on property shares. These studies find efficient portfolios with counterintuitive compositions. Major cities and important countries are excluded from the efficient portfolios, or receive very low allocations.

An alternative way of approaching the country allocation problem is to examine whether real estate returns show international co-movements. Eichholtz, Mahieu and Schotman (1993) investigate whether national real estate returns move with real estate returns in other countries by looking at continental patterns in these returns, adopting a principal-components approach. The continental effects they find are strongest for Europe and North America. Goetzmann and Wachter (1995) use a cluster analysis to construct country groups. They find some evidence of groupings along continental boundaries as well.

This paper also concentrates on continental co-movements in international real estate returns, but uses a different approach. It investigates whether real estate returns are generated by continental factors. In this regard, a continental factor has a twofold definition. First, country returns should depend significantly on the aggregate market returns in the home continent, and second, this relationship should be stronger than the dependence on other continents' markets.

The purpose of this paper is to give real estate portfolio managers input for their international diversification decisions. There are two important reasons why continental factors are relevant for portfolio managers. First, if continental factors are important, real estate investors can only achieve optimal international diversification by investing inter-continentally. Furthermore, the existence of continental factors implies that international investors can acquire a near-optimal country allocation by just selecting a country from each continent. This can save transaction and monitoring costs, which can be substantial for real estate investments.

The plan of this paper is as follows. The second section describes the method of analysis, and the third section presents the data on which this analysis is based. The fourth section presents and discusses the results, which indicate that continental factors exist in Europe and North America. For the Asia–Pacific region, real estate returns were more independent of continental influences in the past. The paper ends with a discussion regarding the consequences for international portfolio construction and some concluding remarks.

Methodology

As described in the introduction, the goal of this paper is to concentrate on international diversification opportunities for real estate investors. As discussed, a majority of the studies concerning this issue, among which are Sweeney (1989), Giliberto (1990) and Giliberto and Testa (1990), have adopted Markowitz portfolio models to construct efficient international real estate portfolios. Theoretically, the market portfolio should be efficient, and one would therefore expect an efficient portfolio to be near the market portfolio's composition. The fact that none of the portfolios in these cited studies does, suggests that a straight Markowitz approach does not generate a satisfactory country allocation.

Another problem arising from the Markowitz approach in an international setting is that the resulting efficient country weights and, in a mixed-asset framework, the fraction invested in stocks versus the fraction invested in real estate securities are very period-specific. This is due to the fact that historical returns and covariances are normally used as inputs of the Markowitz model, and these are often very unstable; Kaplanis (1988), Eichholtz (1996b) and Liu and Mei (1996) elaborate on this issue.

Given these characteristics of real estate returns in a Markowitz context, this paper adopts a different approach. It investigates the issue of international real estate diversification in answering the question whether real estate returns are generated by continental factors. Assume an investor who is based in country x. The question is, then, whether he or she should invest in real estate in the continent to which country x belongs, or in other continents. As shown in Eichholtz, Koedijk and Schweitzer (1997), investing abroad involves information costs which are substantially higher than investing in domestic markets. Therefore, our real estate investor would like to invest as close as possible to country x, where closeness can be interpreted in terms of physical distance, but also in terms of market structure and legal environment. On the other hand, if the returns on real estate in country x are highly correlated with those in other countries within the same continent, the real estate investor will be better off by investing in other continents to profit from low correlations. The diversification decision is therefore a trade-off between information costs and continental influences in the returns of country x. This study concentrates on the latter part of this trade-off, and examines the continental factors in international real estate returns. Since the study is mainly concerned with international portfolio consequences, it not only looks at the continental factor but also at inter-continental dependencies. This reflects the international investment decision of the above investor.

From this point, this study deviates from the studies by Heston and Rouwenhorst (1994, 1995) and Beckers, Connor and Curds (1996). In these studies, stock returns are regressed on dummy variables indicating the country in which the stock is listed and the industry sector to which it belongs. Their dummy approach identifies the dependence upon country membership, but is not suited to shed light on inter-continental dependencies without problems of singularity. Liu and Mei (1996) examine international mixed asset investment from a U.S. standpoint. They regard investments as either U.S. or non-U.S. Our approach is more general in scope and does not relate to any specific home country.

In this study, the existence of continental factors is examined using the following multi-factor model. Define $r_x(t)$ as the log return of a real estate index for country x, $R_{k/x}(t)$ as the log return of a real estate index for continent k to which country x belongs and from which the returns of country x are excluded, and $R_c(t)$ as the log return of a real estate index of continent c to which country x does not belong ($c = 1, \ldots, n_c$) all at times t. Then the following factor model is used to examine the cross-correlations:

$$r_x(t) = \beta_0 + \beta_{xk} R_{k/x}(t) + \sum_{c=1}^{n_c} \beta_{xc} R_c(t) + \epsilon_x(t) \qquad (1)$$

in which $\epsilon_x(t)$ is the standard i.i.d. error term. If a continental factor exists in the real estate returns of country x, then the estimated coefficient β_{xk} is positive and significant. Furthermore, it should be larger than the estimated coefficients β_{xc} for all other continents $c = 1, \ldots, n_c$. Note that the factor model (1) gives information whether the real estate investor in country x should diversify in his own or in other continents. The most attractive continents are those for which β_{xc} are small.

Data

Past research in international real estate portfolio issues has used two types of property returns data: time series of rents and time series of returns on property shares. For example, Sweeney (1989) and Goetzmann and Wachter (1995) use rental data. The disadvantage of this approach is that rents in different countries are hard to compare, given the international variation in the rental contracts. About the use of rental data, Corgel, Jaffe and Lie (1992) conclude that "differences in legal environments for leasing, especially when dominated by the statutory traditions of European countries, make international comparisons of rent levels very difficult." Studies based on

returns such as those on property shares do not suffer from these international comparison problems. Studies such as Giliberto (1990), Liu and Mei (1996) and Eichholtz (1996a) therefore use this type of data. Chan, Hendershot and Sanders (1990) note that real estate data based on traded assets are more representative of transaction prices than those based on appraised values. In addition, Eichholtz and Hartzell (1996) argue that property shares may be more volatile than the underlying real estate, because they are publicly traded and thus exposed to the arbitrage forces of the public stock markets. However, they do not suffer from the problems of infrequent trading and lack of a central marketplace. Property shares are traded in many countries, which makes them suitable for studying international diversification issues. This paper uses data from property shares.

The international real estate securities data this study is based upon are obtained from the Global Real Estate Securities Database of Global Property Research. This database contains prices, market capitalizations, dividends and company characteristics of real estate companies listed on stock exchanges over more than 30 countries on a monthly basis since 1984. The database provides the history of some 600 property companies—both companies that are currently listed and companies that were listed in the past but not at present. Eichholtz and Koedijk (1996) present characteristics of these data. Most time series start in January 1984, and they are all used through December 1995. The database has been constructed on the same basis for all countries in which listed property companies exist. This international consistency is especially important for distinguishing between property investment companies and property developers. The database regards a company as an *investor* if more than 75% of its revenues derive from an equity real estate portfolio. *Investor–developers* are companies with more than 75% of revenues coming from a combination of investment and development activities. All other real estate companies included in the database are regarded as *developers*. This study uses the data from the investors and investor–developers. Limiting the study to investors only would seriously reduce the number of countries involved.[1]

The data used to examine the factor model (1) consist of the real estate securities indices for 12 European countries, 8 countries in the Asia–Pacific

[1] We have conducted the same analysis with data for the investment companies only. The results correspond qualitatively to the results presented here, albeit for a much smaller sample of countries.

Table 1 ■ Summary statistics—Europe.

Country	F^a (%)	σ^b (%)	ρ(Eur)^c	ρ(Nam)	ρ(Asia)	n	T
Austria	6.48	6.11	0.11	−0.13	−0.05	6	82
Belgium	9.98	18.40	0.30*	0.28*	0.06	1	102
France	6.79	13.68	0.37*	0.45*	0.32*	50	144
Germany	6.42	1.42	0.31*	0.10	0.17*	16	144
Ireland	8.27	39.44	0.41*	0.31*	0.21*	1	125
Italy	4.15	22.62	0.21*	0.20*	0.11	5	144
Netherlands	4.00	10.12	0.38*	0.17	0.22*	5	97
Portugal	−25.32	37.37	0.21*	0.15	0.27*	2	70
Spain	5.79	37.07	0.49*	0.39*	0.34*	3	105
Switzerland	7.27	7.40	0.27*	0.15	0.18*	22	144
Sweden	−70.11	79.53	0.12	0.11	0.13	4	81
United Kingdom	9.30	21.49	0.44*	0.49*	0.34*	38	144

F is the annualized average monthly return of the country index, σ the standard deviation of the monthly returns, $\rho(j)$ the correlation between the monthly returns of each country and the index of continent j, n the number of domestic property companies in the index of the specific country on December 31, 1995, and T the number of months with available data for each country.

[a] Annualized average monthly return.

[b] Annualized standard deviation of monthly return.

[c] Correlation with the European index from which the specific country is excluded.

*Significantly different from 0 at the 95% confidence level.

region and 2 countries in North America.[2] The countries included are listed in Tables 1, 2 and 3. All indices are market-weighted and consist of real estate companies that invest in *domestic* assets.[3] Since the data for North

[2] Note that the paper only uses data for three continents. For example, Africa is not included as a factor in (1), since no sufficient data were available. This might lead to an omitted-variable problem, since real estate investment in, among others, South Africa is emerging. However, all of the important real estate markets are included, and this problem is therefore probably of limited importance for our results.

[3] A company is categorized as domestic if it invests at least 75% of the portfolio in the country in which it has its main stock-market listing. By the same definition, internationals invest at least 25% of their portfolio in one or more foreign countries. Using property companies that invest internationally could possibly create a bias, since these companies depend highly on non-domestic developments. However, the calculations were also done for data in which the international property companies were included, and the qualitative results did not differ from the ones presented here.

Table 2 ■ Summary statistics—North America.

Country	F^a (%)	σ^b (%)	ρ(Eur)	ρ(Nam)^c	ρ(Asia)	n	T
Canada	3.69	20.54	0.50*	0.44*	0.33*	3	144
U.S.:							
Diversified	10.72	17.74	0.54*	0.74*	0.36*	68	144
South	13.01	18.21	0.44*	0.43*	0.19*	22	144
East	15.81	15.30	0.41*	0.53*	0.18*	13	144
Midwest	9.64	27.68	0.16	0.29*	0.17*	10	144
West	9.02	14.20	0.38*	0.58*	0.29*	17	144

F is the annualized average monthly return of the country index, σ the standard deviation of the monthly returns, $\rho(j)$ the correlation between the monthly returns of each country and the index of continent j, n the number of domestic property companies in the index of the specific country on December 31, 1995, and T the number of months with available data for each country.

[a] Annualized average monthly return.

[b] Annualized standard deviation of monthly return.

[c] Correlation with the North American index from which the specific country is excluded.

*Significantly different from 0 at the 95% confidence level.

America only consist of real estate securities in Canada and the U.S., the property companies in the U.S. are distributed over five separate groups. The first four groups consist of companies that invest more than 60% of their assets either in the south, the east, the midwest or the west.[4] The last group, which is named USA Diversified, invests less than 60% of its assets in any one of these regions.

In addition to these country indices, indices of continental real estate security returns as described in the previous section are also constructed. All these indices are market-weighted total-return indices expressed in local currency.[5] This is done to eliminate currency influences from the results. The index weights are calculated in U.S. dollars. From these indices the log returns for each month are calculated. In order to mitigate the effects of outliers in the

[4] The boundaries are the same as used by Russell/NCREIF.

[5] The analyses were also done for returns expressed in a common currency, the U.S. dollar. All qualitative results remained the same.

Table 3 ■ Summary statistics—Asia.

Country	F^a (%)	σ^b (%)	ρ(Eur)	ρ(Nam)	ρ(Asia)^c	n	T
Australia	15.44	13.70	0.53*	0.40*	0.29*	32	144
Hong Kong	25.30	36.64	0.51*	0.35*	0.07	18	144
Indonesia	−17.59	55.38	0.21	0.10	0.18	4	68
Japan	8.49	35.27	0.26*	0.25*	0.03	22	144
Malaysia	10.26	48.87	0.48*	0.41*	0.23*	8	119
New Zealand	2.31	29.18	0.12	−0.03	0.13	6	95
Philippines	12.61	34.97	−0.06	−0.34*	−0.06	3	50
Singapore	10.49	39.48	0.50*	0.51*	0.18*	4	144

F is the annualized average monthly returns of the country index, σ the standard deviation of the monthly returns, $\rho(j)$ the correlation between the monthly returns of each country and the index of continent j, n the number of domestic property companies in the index of the specific country on December 31, 1995, and T the number of months with available data for each country.

[a] Annualized average monthly return.

[b] Annualized standard deviation of monthly return.

[c] Correlation with the Asian index from which the specific country is excluded.

*Significantly different from 0 at the 95% confidence level.

data, a Winsorization procedure was applied (see Krasker, Kuh and Welsch 1983). This procedure identified and altered two outliers per series at most.[6]

Table 1, 2 and 3 present summary statistics for the returns of the real estate indices for countries in Europe, the Asia–Pacific region and North America respectively. The tables present the average monthly returns, the standard deviations over these monthly returns, the correlations with the returns of the continental indices,[7] the number of domestic real estate investment companies in each country and the number of time periods for which data are available.

For European countries in Table 1, average annualized returns on property shares range from 4% in the Netherlands to nearly 10% in Belgium over the period 1984–1995. A few outliers exist for Portugal and Sweden. These

[6] An observation is defined as an outlier if its absolute value is more than four times the standard deviation from the sample mean. Once an outlier is identified, its value is set equal to the boundary, which equals the sample mean plus or minus four times the standard deviation.

[7] For each country, the country returns were excluded from the index of its own continent as in (1).

countries both suffer from having only two or three property shares listed over a short period of time. In terms of standard deviations, one clearly observes the high variation in returns for countries where a relatively small number of funds are listed. Furthermore, one can observe low variation in the German, Swiss and Austrian returns. The variation in the returns of the United Kingdom is quite high despite the large number of property shares available (38).

Table 2 sketches the case for North America. For the United States, the average annualized return on property shares is 11% with a annualized standard deviation of 20%. For shares listed in the midwest, the average return is lower with a higher variation, reflecting the relatively small number of companies listed there. On Canadian property shares, the average return for the sample period equals 4% with a variation of 20%.

For the Asia–Pacific region, Table 3 shows a high level of variation and higher average returns than for Europe and North America. Only in Indonesia are the average returns negative, with a variation of nearly 55%.

The tables also shed light on the correlations among real estate returns within and between different continents. Real estate returns in European markets are highly correlated with other European markets and less with the markets in North America and in the Asia–Pacific region. The average correlations are 0.30, 0.22 and 0.19 respectively. In North America, correlations with continental returns are rather high: an average of 0.38 over the regionally specialized property companies. Not surprisingly, the diversified U.S. property companies show an even higher correlation with their continental index. For countries in the Asia–Pacific region the average correlation with returns of their own continent equals 0.13, which is small relative to the continental correlation in Europe and North America. This effect shows up in Hong Kong and Japan especially, where the correlations with the returns on their own continent are not significantly different from 0. The correlations with Europe and North America are 0.32 and 0.21 on average.

Given the definitions in preceding sections, these correlations suggest that continental factors are likely to exist in Europe and North America, but not in the Asia–Pacific region. In the following section, this will be examined more formally using the factor model (1).

Results

In the previous section, correlations between returns of country indices of property companies and returns of continental indices were presented. These

correlations showed that both European and North American real estate returns depend on the returns in the home continent. In Asia–Pacific countries, however, the continental correlations are less important.

The reported correlations do not control for cross-correlations between the real estate returns over different continents. This univariate approach is therefore not suited to model the choice of the real estate investor. The multi-factor model (1) looks at the diversification opportunities over the three continents simultaneously. Therefore, the influence of continental factors is examined in the context of the model (1) with the data described above.

Tables 4, 5 and 6 present OLS estimates for the parameters in the regression equation (1) for each country in Europe, North America and the Asia–Pacific region respectively. Table 7 presents the averages of the slope coefficients by continent. This summarizes the results for each individual continent and provides a clear picture of the existence of continental factors.

Table 4 shows that real estate returns in almost all European countries depend positively and significantly on real estate returns of other European countries. Only for Italy, Portugal and Sweden is this effect positive but not significant. Comparing the levels of the slope coefficients, one can observe that the influence of the real estate returns of countries in Europe depend more on the European index than on Asia–Pacific or North American returns (except for France, which is more influenced by North American returns). This result is more clearly presented in Table 7, which presents the averages of the slope coefficients over all countries within a continent. The average slope coefficient for Europe (0.55) is significantly larger than those for the Asia–Pacific region (0.08) and for North America (0.15).[8] A continental factor clearly exists in Europe; in order to find optimal diversification opportunities European real estate investors should look outside their own continent. On average, both North America and the Asia–Pacific region are attractive.

For North American regions, Table 5 reports a dependence on the real estate returns of both their own continent and the Asia–Pacific region. On average the real estate returns in North America are not significantly correlated with European returns. Judged by the size and sign of the estimated β coefficients, a continental factor exists for North American real estate returns. North American portfolio managers should find their diversification opportunities mainly in Europe.

[8] At a 5% confidence level.

Table 4 ■ OLS estimates—Europe.

Country	β_0	β_{Eur}	β_{Nam}	β_{Asia}	R^2
Austria	0.01	0.21	−0.09	−0.02	0.07
	(0.00)	(0.10)	(0.05)	(0.03)	
Belgium	0.01	0.48	0.23	−0.11	0.11
	(0.01)	(0.25)	(0.14)	(0.09)	
France	0.00	0.24	0.29	0.08	0.24
	(0.00)	(0.13)	(0.08)	(0.04)	
Germany	0.01	0.04	−0.01	0.00	0.09
	(0.00)	(0.01)	(0.01)	(0.01)	
Ireland	−0.00	1.42	0.27	0.08	0.17
	(0.01)	(0.45)	(0.25)	(0.13)	
Italy	0.00	0.39	0.17	0.01	0.05
	(0.01)	(0.26)	(0.14)	(0.08)	
Netherlands	0.00	0.44	−0.02	0.03	0.15
	(0.00)	(0.14)	(0.08)	(0.05)	
Portugal	−0.02	0.37	0.03	0.34	0.08
	(0.01)	(0.68)	(0.34)	(0.24)	
Spain	−0.00	1.45	0.33	0.18	0.27
	(0.01)	(0.43)	(0.25)	(0.15)	
Switzerland	0.00	0.17	−0.00	0.03	0.08
	(0.00)	(0.08)	(0.05)	(0.03)	
Sweden	−0.06	0.60	0.23	0.27	0.02
	(0.03)	(1.35)	(0.70)	(0.46)	
United Kingdom	−0.00	0.81	0.40	0.11	0.28
	(0.00)	(0.29)	(0.11)	(0.06)	

This table presents the OLS estimates of the parameters in (1), *i.e.* a regression of the real estate returns of countries in Europe on a constant term (β_0), on returns of the European index from which the specific country in each row is excluded (β_{Eur}), on the returns of the North American index (β_{Nam}) and on the returns of the Asia–Pacific index (β_{Asia}). Standard errors are presented in parentheses. The number of observations used in each regression can be found in column 8 of Table 1.

Table 6 presents the case for investors in the Asia–Pacific region. In contrast with the results for Europe, real estate returns in the Asia–Pacific countries appear not to depend positively and significantly on the continental returns. The returns depend more on European real estate returns and to a lesser extent on North American returns. Table 7 leads one to conclude that Asia–Pacific real estate returns are not influenced by a continental factor as they are in Europe and in North America. The slope coefficient for the European index is almost one on average. Thus Asian–Pacific real estate returns

Table 5 ■ OLS estimates—North America.

Country	β_0	β_{Eur}	β_{Nam}	β_{Asia}	R^2
Canada	−0.00	0.10	0.27	0.64	0.25
	(0.00)	(0.06)	(0.11)	(0.20)	
U.S.:					
South	0.01	−0.03	0.31	0.54	0.22
	(0.00)	(0.06)	(0.09)	(0.18)	
East	0.01	−0.04	0.40	0.32	0.31
	(0.00)	(0.05)	(0.07)	(0.15)	
Midwest	0.01	0.14	0.43	−0.14	0.12
	(0.01)	(0.08)	(0.14)	(0.27)	
West	0.01	0.04	0.44	0.08	0.33
	(0.00)	(0.04)	(0.07)	(0.14)	

This table presents the OLS estimates of the parameters in (1), *i.e.* a regression of the real estate returns of countries in Europe on a constant term (β_0), on returns of the European index (β_{Eur}), on the returns of the North American index from which the specific country in each row is excluded (β_{Nam}) and on the returns of the Asia–Pacific index (β_{Asia}). Standard errors are presented in parentheses. The number of observations used in each regression can be found in column 8 of Table 2.

depend highly on the returns in Europe, an effect that does not hold vice versa, as can be seen in Table 7.

In all, the preceding results indicate a strong continental factor in European property company returns, a somewhat weaker but still significant continental factor in North America and, surprisingly, no such continental influence in Asia–Pacific real estate returns. These results are based on the complete sample from 1984 until 1995.

For a better look at the importance of the continental factors, one can investigate their behavior over time. Capital market integration is a continuous evolutionary process, and it could therefore be insightful to determine the dependence of country real estate returns on continental factors on a continuous-time basis. Estimating the model (1) over a rolling window of 60 months and calculating the average β_{xk} over each country x in continent k gives a picture of the changing pattern of real estate market integration over time, even though this is not a formal test of such integration. Figures 1, 2 and 3 present the average β_{xk} for Europe, North America and the Asia–Pacific region for a rolling window of 60 months, ending at the indicated month on the X-axis.

Table 6 ■ OLS estimates—Asia–Pacific.

Country	β_0	β_{Eur}	β_{Nam}	β_{Asia}	R^2
Australia	0.01	0.46	0.08	0.04	0.20
	(0.00)	(0.13)	(0.07)	(0.04)	
Hong Kong	0.01	1.59	0.20	−0.10	0.19
	(0.01)	(0.35)	(0.20)	(0.09)	
Indonesia	−0.02	1.11	−0.13	0.25	0.05
	(0.02)	(1.07)	(0.53)	(0.39)	
Japan	0.00	1.02	0.38	−0.21	0.11
	(0.01)	(0.41)	(0.21)	(0.12)	
Malaysia	−0.01	1.82	0.61	0.05	0.24
	(0.01)	(0.54)	(0.31)	(0.16)	
New Zealand	0.00	0.45	−0.27	0.16	0.03
	(0.01)	(0.46)	(0.24)	(0.16)	
Philippines	0.02	0.36	−1.14	0.08	0.12
	(0.01)	(0.74)	(0.46)	(0.28)	
Singapore	−0.00	1.08	0.82	−0.09	0.25
	(0.01)	(0.37)	(0.20)	(0.11)	

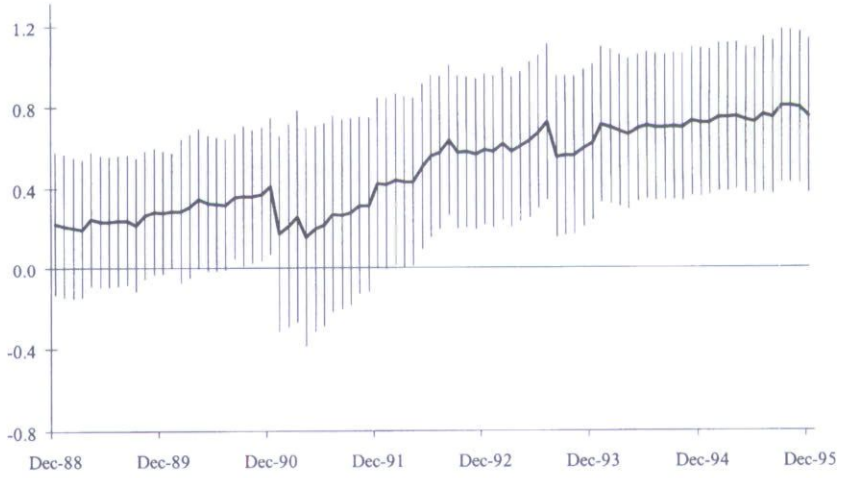
This table presents the OLS estimates of the parameters in (1), *i.e.* a regression of the real estate returns of countries in Europe on a constant term (β_0), on returns of the European index (β_{Eur}), on the returns of the North American index (β_{Nam}) and on returns of the Asia–Pacific index from which the specific country in each row is excluded (β_{Asia}). Standard errors are presented in parentheses. The number of observations used in each regression can be found in column 8 of Table 3.

Table 7 ■ OLS estimates—Averages.

Continent	β_{Eur}	β_{Nam}	β_{Asia}
Europe	0.55	0.15	0.08
	(0.14)	(0.07)	(0.05)
Asia–Pacific	0.99	0.07	0.02
	(0.20)	(0.11)	(0.07)
North America	0.04	0.37	0.29
	(0.03)	(0.04)	(0.09)

This table presents the averages of the OLS estimates of the parameters in (1) over all countries within a continent. The country-specific estimates can be found in Tables 4, 5 and 6. Standard errors are presented in parentheses.

Figure 1 ■ Average continental factor in returns of *European* real estate in a rolling window over 60 months within a two-standard-error confidence interval.



For example, Figure 1 shows a level of almost 0.2 for the average slope coefficient of the continental factor over all European countries for the 60 months preceding January 1989 within a two-standard-error confidence band. It clearly shows an increase in the importance of the European continental factor over time, which is not surprising given the increasing economic and institutional integration in Europe. Therefore, for European

Figure 2 ■ Average continental factor in returns of *North American* real estate in a rolling window over 60 months within a two-standard-error confidence interval.

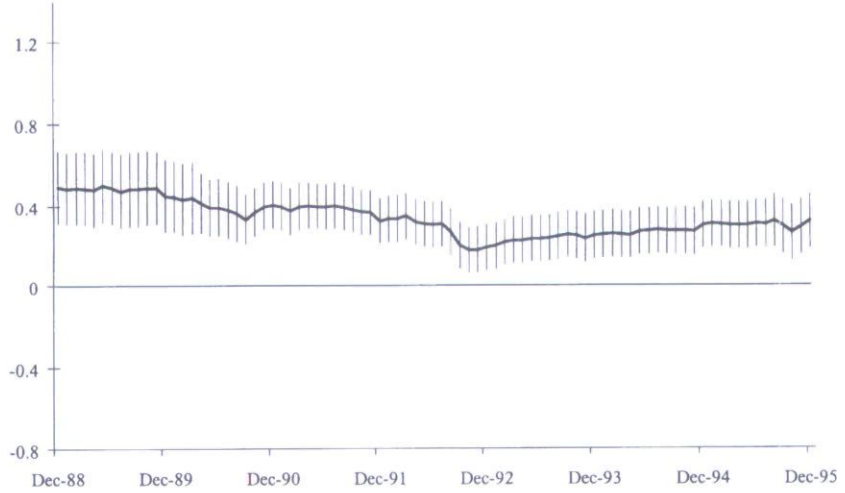
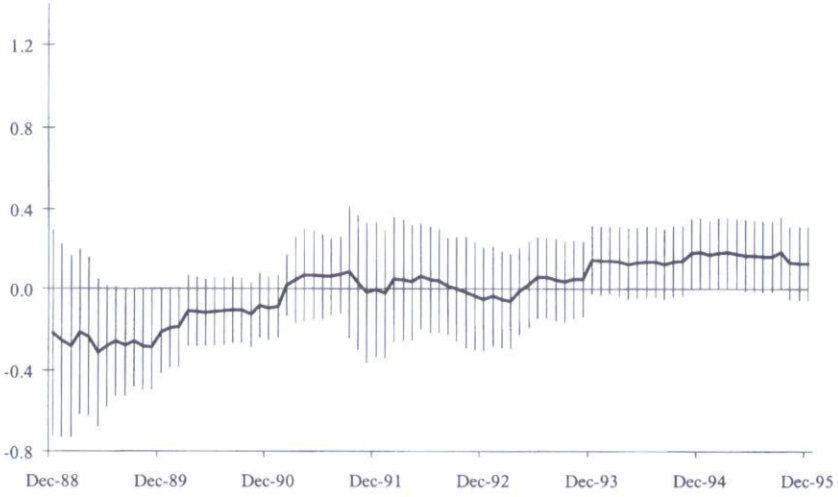


Figure 3 ■ Average continental factor in returns of *Asia–Pacific* real estate in a rolling window over 60 months within a two-standard-error confidence interval.



real estate portfolio managers, it has become more important to look outside their own continent to find diversification opportunities. For the last time periods, one can observe an average slope coefficient of about 0.7. This suggests that the national real estate markets in Europe are now to a large extent dependent on the European real estate market as a whole.

Figure 2 presents the time-varying dependence of North American real estate returns. The North American continental factor is significant and more stable than the European one; it varies between 0.3 and 0.5. North American real estate portfolio managers can find better opportunities in Europe than in the domestic markets, given Figure 2 and the evidence in Table 7.

Figure 3 presents the dependence from the viewpoint of an Asia–Pacific real estate portfolio manager. A clear distinction between the Asia–Pacific situation on the one hand and the European and North American cases on the other is that the continental factor has not been significant for almost all periods. In the periods it was significant, the value was negative instead of positive. Although the continental factor is increasing over time, it is not yet significant and is much lower in value than the continental factor of Europe. Therefore, Asia–Pacific real estate portfolio managers can still find good diversification opportunities in their own continent, and the need for a truly inter-continental investment strategy is not as strong as it is for European and North American real estate investors.

Conclusions and Portfolio Implications

This study examines the extent to which real estate returns are driven by continental factors. It shows clear evidence for the existence of continental factors in Europe and in North America. For real estate investors in these continents, diversification opportunities should be found in other continents. European investors can find these opportunities especially in Asia–Pacific countries and to a somewhat lesser extent in North America, whereas North American property investors should diversify into Europe. For real estate investors in the Asia–Pacific region, diversification opportunities can be found in their own continent. In contrast with Europe and North America, real estate returns are not driven by a continental factor in the Asia–Pacific region. Diversification opportunities for Asia–Pacific real estate investors can also be found in North America, but the information advantages a real estate investor has of the developments in his own region give him an incentive to use the diversification opportunities he has there rather than to diversify globally.

The low R^2's in the regressions indicate that in general, the international dependence of national real estate markets is weak, which implies that international diversification is effective in decreasing the risk of real estate portfolios. This result confirms the results in Eichholtz (1996a), in which evidence is presented that international diversification is more effective for real estate than it is for stock and bond portfolios.

Analyzing the integration of real estate markets over time shows a stable pattern for North American and Asia–Pacific markets and growing integration within Europe. Our results show that the continental factor has stabilized in recent years, indicating that it is unlikely that the European real estate markets will integrate much further.

Finally, the results also lead one to expect that the Asia–Pacific continental factor is likely to remain much smaller than the North American and the European continental factors in the short to medium run. Therefore, real estate diversification opportunities in the Asia–Pacific region can be expected to remain attractive for European, North American *and* Asia–Pacific investors in the near future.

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