The Relative Importance of Sectors V's Regions in Determining Property Returns

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Abstract

A number of studies have investigated the benefits of sector versus regional diversification within a real estate portfolio without explicitly quantify the relative benefits of one against the other. This paper corrects this omission by adopting the approach of Heston and Rouwenhorst (1994) and Beckers, Connor and Curds (1996) on a sample of 187 property data points using annual data over the period 1981-1995.

The general conclusion of which is the sector diversification explains on average 22% of the variability of property returns compared with 8% for administratively defined regions. A result in line with previous work. Implying that sector diversification should be the first level of analysis in constructing and managing the real estate portfolio. However, unlike previous work functionally defined regions provide less of an explanation of regional diversification than administrative regions. Which may be down to the weak definition of economic regions employed in this study.

Introduction

Traditionally most property investment decisions were either implicitly or explicitly based on naive diversification. Where fund managers simply choose properties that appear to be "good deals" on an individual basis rather than considering the cumulative risks that they might be building into their portfolios. The experience of the 1980s revealed the weakness in this "building by building" approach to property portfolio construction. That is a portfolio made up of the 'best deals' can quickly turn into a one dominated by under-performing investments. For example, UK property portfolios that ostensibly appeared well diversified by property type and region were found to have a significant concentration to one sector and/or region, particularly Central London Offices, with a high proportion of large properties that were only tradable in a very thin market. Added to this a number of portfolios had a high level of development properties still to be completed when the market collapsed, without an explicit exit strategy. As Wurtzebach (1994) says "it became obvious, as performance faltered, that portfolio-level decisions affect returns and that the selection of the correct combination of assets at the portfolio level can materially affect portfolio performance."

Responding to these changes in the market, and to others within the profession (McNarmara, 1990(a), 1996), property fund managers are now starting to adopt a more structured top-down approach to focus research effort and to provide stronger controls on the portfolio construction and management process (McNarmara, 1990(b)). Enabling portfolios to be constructed in full cognisance of the risks to which the investor is exposed. As such, this represents a marked change from the deal driven bottom-up approach traditionally employed in property portfolio construction.

A requirement of such a top-down approach is the classification of the individual investment categories into classes for which there is a high degree of similarity in return and risk characteristics but a low degree of similarity between classes (Malizia and Simons, 1991). For real estate portfolios, the conventional approach is to define diversification categories by property type and geographical region, (Webb (1984), Louargand (1992) and De Witt (1996)). This kind of classification recognises that different factors are likely to influencing the performance of property at both the sector and regional level. For the portfolio manager the question becomes one of investigating whether sector or regional diversification offers the greater benefits in terms of risk reduction and therefore which should be the first level of analysis in portfolio construction and evaluation.

Typically two basic methods for investigating this questions are the inspection the correlation's within and between property types and regions and/or to construct efficient frontiers based on the Modern Portfolio Theory (MPT) of Markowitz (1952,1959). For example the work of Miles and McCue (1982, 1984), Hartzell et al. (1986) Webb (1984), Myer and Webb (1991), and Firstenberg et al (1987), typifies the general approaches adopted in this area. The general conclusion of these early studies is to suggest that property type diversification is more beneficial in terms of diversification than regional. However, the Russell/NCREIF regions used in US studies or the Standard regions employed in the UK are politico-geographical

definitions, McNarmara and Morrell (1994). Later research then has tended to search for regions defined by economic base - classifying urban areas in terms of function rather than administratively defined boundaries. Work in this area includes, Hartzell et al. (1987), Shulman and Hopkins (1988), Malizia and Simons (1991), Mueller and Ziering (1992), Mueller (1993). All showing that functionally defined urban areas are preferred to administrative regions as the basis for diversification.

A similar question has previously been investigated in the international equity market when discussing the relative importance of country versus industrial classification on security returns. See for example, Beckers, Grinold, Rudd and Stefek (1992), Grinold, Rudd and Stefek (1989), Heston and Rouwenhorst (1994), and Beckers, Connor and Curds (1996). The first two studies used a fundamental factor model, as well as a CAPM-style local market factor to characterise each stock. The factor exposures, derived from a combination of accounting data and time series returns data, and using monthly cross-sectional regressions to derive the factor returns.

The latter work of Heston and Rouwenhorst (1994) and Beckers, Connor and Curds (1996) uses a much simpler type of factor model. Both use simple dummy variables to identify the industry and country affiliation of each stock. When these dummy variables are regressed on the cross-section of security returns, the estimated coefficients on the dummy variables are the implicit returns of country and industry factors. In this way the it is possible to compare the fit of various models of country and industry classification on security returns.

This paper applies this approach to annual property data in the UK over the period 1981-1995 on a sample of 187 property returns. The general conclusion being that sector dominates region in virtually every period in explaining property returns. Implying that sectoral diversification should be the first level of analysis in constructing and managing the real estate portfolio. However, unlike previous work functionally defined regions provide less of an explanation of regional diversification than administrative regions. Which may be down to the weak definition of economic regions employed in this study.

Previous Studies

In a survey of institutional investment practices in US real estate portfolios Webb (1984) found that 61% of investors diversified by property type and 62% diversified by geography. A result confirmed by Louargand (1992) who found that 89% of US fund managers surveyed diversify by property type and 72% by geography (additionally 41% by economic location) and 54% ranking property type as the most important diversification criterion. More recently De Witt (1996) finds that most property fund managers diversify their real estate portfolios *consciously* and *rigorously*. That is employing a strategic top-down approach rather than letting the portfolio evolve as more buildings are acquired. De Witt also finds that to achieve this conscious structure fund managers rely on either property type or location as the dominant criterion for portfolio construction.

In such a top-down approach to diversification managers need to know whether it is better to diversify by type then region or by region then type. The answer to such a

question is needed so that the fund manager can best allocate his resource in terms of research resources and manpower, (McNamara, 1990).

A number of studies have addressed this question using an array of different methodologies. For example, Miles and McCue (1982, 1984) and Hartzell *et al.* (1986) all used correlation based approaches to see whether diversification by property type offered greater diversification benefits than that between regions. All three studies concluding that property type diversification was superior to region. The simple inspection of correlation coefficients, however, is of limited benefit in deciding whether it is better to diversify by sector or region, as in most studies no tests of significant difference between intra and inter correlation's is undertaken. Also correlation matrices provide only one aspect of diversification. In order to investigate the true benefits the individual risk of the asset must also be considered. This as led later researchers to construct efficient frontiers based on mean-variance analysis.

For example, Firstenberg et al (1987), using quarterly data from 1978-1985, in a general study of the benefits of real estate investment found that the correlation's between the four regions: East, South, West, and Midwest, were all positive but in some cases almost zero. The authors concluding that investing the entire portfolio in any single region is unnecessarily risky. Efficient frontiers were also calculated with some holdings in all regions appearing in efficient portfolio combinations, except at the extremes. Diversification by five property-types: Apartments, Hotels, Office buildings, Retail properties including Shopping Centres, and Industrial properties such as Warehouses were also investigated. The results for property-type diversification were somewhat different than those obtained with regional diversification. Efficient diversification could be achieved in as few as two asset types. Which may be an indication that the benefits of diversification by property-type are greater than for regional. However, portfolio compositions changed wildly from one extreme to another across the frontier. Furthermore, no attempt was made to compare regional and property-type diversification as such.

Later Myer and Webb (1991) analysed the ten year period from 1978 to 1988 using NCREIF quarterly returns for Office, Retail, R&D/Office, and Industrial. They found relatively low (less than .50) correlation's between all property-type categories of real estate, except Office and Industrial at .67. For the entire 1978 to 1988 time period, they estimated the single optimal portfolio allocation to be Industrial (50.7%), Retail (42.3%), R&D/Office (6.9%), and Office (0%).

Finally, Eichholtz et al (1995) compared diversification results from the US with the UK to find similarities, and if the UK market was able to be analysed with similar techniques previously used in the US. Eichholtz, et al using the NCREIF sector and regional classifications for the US data, basing their analysis on quarterly returns from 1983-92. For the UK the Investors Chronicle Hillier Parker index was used, with semi-annual observations from 1977-93. The UK data disaggregated by the three property types offices, industrial and retail, and by 11 regions: London, South East, East Anglia, East Midlands, West Midlands, Wales, Yorkshire and Humberside, North, North West and Scotland. These regions were also aggregated to produce '3 Super regions'. That is London, the Rest of the South and North England. Then using a battery of methods including; correlation's analysis, principal components, and mean-

variance analysis, Eichholtz et al found that there were contrasting results between the US and UK markets. This was especially so in the diversification strategy of office, and research and development (R&D) properties. In the US market Office and R&D real estate offered optimum performance when diversified across all regions, yet in the UK office diversification was optimised over the North and South regions or just the London market. The other UK sectors providing results consistent with the US data, with total diversification across sectors and regions as the optimum strategy.

Based on previous research it appears that property-type diversification is more beneficial in reducing portfolio risk than regional diversification. To some, especially property professionals these results are at best counterintuitive. Real estate professionals have consistently claiming that the most important element in property performance is "location, location, location." Similarly, urban and regional economics would suggest that local economic activity should directly impact local property performance; that is, when the local market prospers so should the individual properties within the local market. This has led researchers to question whether conventionally-defined regions (the NCREIF divisions in the US or the Standard Regions in the UK) are appropriate for property portfolio purposes. For example as early as 1984 Miles and McCue suggest that to quantify diversification benefits in real estate and structure optimal portfolios there is a "need for more rigorous definitions of property type, location and lease structures". Because for the Markowitz diversification strategy to be most effective, in terms of regional diversification, two requirements must be met simultaneously (Malizia and Simons, 1991). First, the performance of properties within each area must be homogeneous. Second, the correlation of the property performance between the regional markets must be low or negative. "In other words, we are seeking those dimensions which will best divide property assets into relatively homogenous sets that perform similarly but where the sets perform differently", McNamara and Morrell (1994). Whether administratively defined regions meet these criteria has been the main thrust of the current research into geographical diversification. In particular it has been proposed that regions - or urban areas - classified according to economic function would form the basis of a more effective risk management strategy.

The first study to test this proposition was the research of Hartzell, Shulman and Wurtzebach (1987) when they compared the naive four region NCREIF classification system against the Salomon Brothers economic geography system, which segmented the United States into eight regions having similar economic characteristics. Their results indicated significant diversification potential due to the lower correlation among the eight regions. The results consistent with the intuitive hypothesis that if demand for real estate is related to basic economic factors, then the creation of geographic regions by economic base concepts will produce a more efficient diversification strategy. Malizia and Simons (1991) confirmed the these results by comparing demand factors in the economic based geographic regions used on three different classification schemes showing that the Salomon Brothers' classification consistently exhibited higher regional homogeneity than did the NCREIF and Bureau of Economic Analysis classifications. However, both of theses studies continued to defining regions on a contiguous basis, even if such economic regions were no longer state based.

Wurtzebach (1988) broke the contiguous geographic constraint and grouped metropolitan areas based on employment in their dominant industries and employment growth patterns. Similarly within Europe, Hartzell et al. (1993) found that economic regions are not contiguous within the European Union based on employment data. The noncontiguous grouping scheme of Wurtzebach was subsequently compared with the contiguous geographic grouping schemes in Mueller and Ziering (1992), and was found to be a superior diversification strategy. Later Mueller (1993) developed an economic base diversification scheme using a one-digit Standard Industrial Classification (SIC) codes to group 316 US Metropolitan Statistical Areas (MSAs) into nine categories. The author then compared the standard NCREIF four region split, the Hartzell et al (1987) eight region structure and nine region classification based on SIC's, with the economic grouping seeming to provide the best diversification benefits.

The new orthodoxy then is to define 'regions' based on economic function, rather than administrative convenience, since it will be the economic structure that will lead to differences in demand and hence property performance. To implement such an approach requires some sort of classification of urban areas, usually towns. This has led to the use clustering techniques to try and group towns together which exhibit similar characteristics and then to try and give the clusters a clear and recognisable label. For example, Hoesli and MacGregor (1995) and Hoesli, Lizieri and MacGregor (1996) have applied clustering methodology in the UK on a sample of 165 properties with the intention of examining the dimensions of diversification in the UK commercial real estate market. The data covering a wide sphere of urban and non urban property, so that the West End and London city markets were not allowed to dominate the returns. The findings of all tests were consistent with property sector type diversification, as offering more comprehensive information about the property market behaviour.

However, clustering techniques, as Hoesli, Lizieri and MacGregor (1996) recognise, are essentially descriptive and exploratory and they stress the need to employ further multivariate tests to assess of the benefits of sectoral versus regional diversification. That is a method of an analysis is needed to explicitly separate the two diversification categories and to quantify the relative importance of one with the other in determining property returns. The following section outlines how this can be achieved using the approach of Heston and Rouwenhorst (1994), as extended by Beckers, Connor and Curds (1996).

Method

In order to separate the sectoral performance from regional performance, we apply the approach of Heston and Rouwenhorst (1994) and Beckers, Connor and Curds (1996) and postulate the following model for the return on the *ith* property that belongs to region *j* and sector *k* :

$$R_i = \alpha + \sum_{j=1}^{M} \beta_{i,j} F_j + \sum_{k=1}^{L} \lambda_{i,k} F_k + \varepsilon_i \qquad (1)$$

where:

R_i = the return of property i in time period t i = 1,....N
α = the return on the market in general
β_j = the return to the regional factor j j = 1,.....M
λ_k = the return to the sector factor k k = 1,....L
F_j = 1 if the property is in region j, 0 otherwise.
F_k = 1 if the property is in sector k, 0 otherwise

Equation (1) is a very simple factor models of returns with zero/one exposures to the explanatory variables (sectors and regions) which elegantly allows for the separation of the regional and sector effects, but rules out any interaction between these effects. That is a properties return is broken down into two components: a sector factor return and a regional factor return. It is also assumed that the property-specific disturbances have a zero mean and finite variance for returns in all sectors and regions, and are uncorrelated across properties..

However, it is not possible to estimate (1) directly by cross-sectional regression techniques, because of perfect multicollinearity between the regressors. Since the regional dummies as well as the sector dummies add up to a unit vector across properties, since every property is in one sector and one region. As a result there is no unique way of identifying sector and regional effects, we can only measure cross-sectional differences between regions and cross-sectional differences between sectors. One possibility would be to arbitrarily choose one region in one sector as a base, and estimate equation (1) under the restriction that this sector regions zero.

Rather than apply such an arbitrary sector/regional choice, Heston and Rouwenhorst (1994) and Beckers, Connor and Curds (1996) show that equation 1 can be estimated directly by imposing the following two linear constraints. That is, we find α, β, λ by minimising $\sum_{i=1}^{N} \hat{\varepsilon}_i^2$ Equation 1 subject to:

$$\sum_{i=1}^{N}\sum_{j=1}^{M} \beta_j F_j = 0 \qquad (2)$$

and

$$\sum_{i=1}^{N}\sum_{k=1}^{L} \lambda_k F_k = 0 \qquad (3)$$

This approach simplifies the interpretation of the coefficients but does not affect the statistical properties of the model (see Suits (1984) and Kennedy (1986)). Since the two linear constraints, Equations 2 and 3, imply that in each year, the average market-wide effect of the sector factors is zero and the average market-wide effect of the regional factors is zero. Adding the two equality restrictions implies that the sector factor returns are measured net of the market return. So for example, if property returns market-wide are mostly positive in general in a given year and Office properties are also rising but less so than the market, then the Office factor return will be

negative. The same holds for the regional factors: If property returns are generally positive and Scottish properties are also rising but by less than in most other regions, then the Scottish regional factor return will be negative. Translated into standard factor modelling terminology, the factor betas in the Heston and Rouwenhorst model are all equal to zero or unity and the regression coefficients correspond to sector and regional factor returns. The amount of an asset's return arising from each component dependent on its exposure to that source.

Data

The efficient estimation of Equation 1 depends on the availability of a large database of property returns which can easily be classified into sectors and 'regions'. The Investment Property Databank (IPD) provides such a source. The data covering 12302 properties at the end of 1995 with a aggregate value of £47,867m based on the data from 207 funds (IPD, 1996). From such a vast database IPD are able to provide a number of breakdowns of the data into a large number of sectors and regions at least for the annual data from 1981. One breakdown that is especially useful for this study is the Key Centres data. This data provides annual returns, rental growth and yields for Retail, Office and Industrial properties in a total of 208 locations (essentially towns) in the UK over the period 1981-95. Such a large data base ideally suited to the approach of Heston and Rouwenhorst (1994), as it enables the analysis to cover a large variety of regions and property types.

However, although the Key Centres data is classified by property type, IPD do not provide a classification of the data into regions. Also drawing on the previous work it is clear that administrative regions may not prove useful, especially at the highly aggregated level of the Standard Regions in the UK. Economically defined regions probably preferred. In the UK the work of Green and Owen (1990) provides one potential economic classification.

Arguing that changes in employment are so diverse that any analysis can only be done at the level of the local labour market area (LLMA). Green and Owen based their analysis of the UK on the Department of Employment 322 Travel-to-Work Areas (TTWAs) which is the most widely known and commonly used employment and unemployment data at the LLMA level. Using these data Green and Owen were able to classify the 322 towns into a number of clusters based on two different methodological approaches. First, the 322 TTWAs were grouped on the basis on a number of selected dimensions of interest representing urban and regional characteristics. A similar approach to that adopted by Champion et al (1987). The second classification used a taxonomy based on grouping towns with similar employment, demographic and labour market characteristics and then reporting the one that produced the most easily defined clusters of similar towns. Table 2 lists the 10 clusters that appeared to work best for Green and Owen and had easily identifiable features; such as Unemployment Blackspots; Resorts, and Service Growth Areas.

Table 1: Classification of TTWA's

Cluster	Classification	Example
1	Manufacturing Towns	Leicester
2	Declining Centres	Leeds
3	High-Tech Growth Centres	Reading
4	Male Employment Centres	Huddersfield
5	Unemployment Blackspots	Wakefield
6	Resorts	Clacton
7	In Migration Nodes	Milton Keynes
8	Relatively Prosperous Areas	Hereford
9	Service Growth Areas	Bournemouth
10	Established Service Centres	London

Source: Green and Owen (1990)

UK institutional investors, however, holds only 57 properties on average (IPD, 1995), thus limiting the number of property categories that can be employed. Hoesli, Lizieri and MacGregor (1996), therefore, argue that for all but the largest investors, a diversification approach based on say a three sector by three regional classification scheme in the UK maybe a reasonable strategy. This '3 Super regions' regional scheme covering Office, Shop and Industrial properties in London , the rest of the South East and the rest of the UK. Eichholtz et al (1995) have also used such a scheme in their analysis is sector versus regional diversification. Therefore, for purposes of comparison the following analysis also employs the '3 Super regions' classification scheme. Finally to provide a comparison with the previous work by Hoseli and MacGreggor (1995) the data was also categorised into the 11 Standard Regions but with the South East subdivided into London and the Rest of the South East as previously done by Eichholtz et al (1995) as London represents a dominant area of institutional property investment (IPD, 1996).

The 208 Key Centres were, therefore, allocated an administrative 'regional code' based on the Standard Regions in the UK, used in government statistics. The data was then aggregated to form the '3 Super regions' of Eichholtz et al (1995). Finally the data was classified by economic function based on the work of Green and Owen (1990). Of the 208 Key Centres 21 locations could not be easy classified from both sources which left 187 locations. Table 1 summarising the property sector and regional breakdown of the data.

Figure 1: The UK Standard Regions

Table 2: Number of Towns in Sector/Regions

Regions	Retail	Office	Industrials
Standard Regions			
London	15	19	12
South East	17	14	16
South West	9	8	7
East Anglia	3	4	4
East Midlands	5	2	3
West Midlands	5	1	2
North West	7	2	1
Yorks and Humberside	6	5	3
North	3	1	
Scotland	3	3	3
Wales	2	1	1
Super Regions			
London	15	19	12
The Rest of the South East	17	14	16
The Rest of the UK	43	27	24
Clusters			
Manufacturing Towns	2	1	1
Declining Centres	19	11	9
High-Tech Growth Centres	10	11	12
Male Employment Centres	2		
Unemployment Blackspots	1		
Resorts			
In Migration Nodes			1
Relatively Prosperous Areas	1		
Service Growth Areas	3	1	
Established Service Centres	37	36	29
Total	75	60	52

As can be readily appreciated from Table 2 the data is fairly evenly spread across the sectors but not the regions. Approximately half of the sampled properties are in two regions, London and the South East. Reflecting the institutional bias to the South of England. The data also reflects a bias towards service dominated areas, either established or growth centres, representing 57% of the property data, again concentrated in the South of England. The data may, therefore, not reflect the performance of property in regions as such but of the South of England. While the relative performance of regional dummies in explaining property returns may not be significant.

Results

Table 3 shows the amount of variability explained (adjusted R^2) from applying Equation 1 to the property data for each of the 15 years from 1981 to 1995 and the overall averages. The sector and regional adjusted R^2 results, for the Standard regions, are also presented graphically in Figure 1.

Since adjusted R^2 figures are shown we can see the incremental impact of adding each factor. As will be readily appreciated the property sectors dominate the regions in determining property returns, irrespective of whether we use the Standard Regions, the '3 Super regions', as suggested by Eichholtz et al (1995) and Hoesli, Lizieri and MacGregor (1996), or the economically based areas derived from Green and Owen (1990). Such a result is therefore in line with the previous research. But the results should be viewed with some caution as they may reflect the more even spread of the data across the sectors compared with the skewed data for the regions, irrespective of whether we use administratively or economically defined classifications. That is the regional classifications may not be sufficiently well defined as to fully reflect changes in property returns as the data is concentrated in just a few areas.

Table 3: Adjusted R^2 Figures for Sector and Regional Diversification 1981-95

Year	Sector	Region			Total		
		Standard	Super	Economic	Standard	Super	Economic
1981	0.224	0.054	-0.005	0.044	0.279	0.219	0.264
1982	0.187	0.005	0.029	0.010	0.192	0.216	0.211
1983	0.390	-0.014	-0.011	0.046	0.376	0.380	0.431
1984	0.357	-0.003	-0.010	0.026	0.354	0.347	0.357
1985	0.470	-0.027	-0.013	-0.019	0.443	0.456	0.466
1986	0.176	0.033	0.040	0.024	0.209	0.216	0.227
1987	0.041	0.155	0.094	0.030	0.197	0.136	0.074
1988	0.234	0.109	0.029	0.046	0.343	0.263	0.273
1989	0.503	-0.001	-0.002	-0.019	0.501	0.500	0.504
1990	0.161	0.160	0.123	0.037	0.321	0.284	0.244
1991	0.331	0.161	0.169	0.018	0.492	0.500	0.390
1992	0.165	0.319	0.281	0.138	0.483	0.446	0.304
1993	-0.011	0.020	0.038	0.055	0.010	0.027	0.042
1994	0.091	0.127	0.019	0.036	0.218	0.109	0.138
1995	0.047	0.111	0.007	0.005	0.158	0.054	0.054
Average	**0.224**	**0.081**	**0.052**	**0.032**	**0.305**	**0.277**	**0.265**

It will also be appreciated from Table 3 and Figure 1 that the relative amount of variance explained by the sector and regional dummies changes over time. In particular the lowest value occurs in 1993, a year in which the property market in generally underwent a significant re-rating as an investment class. At such times then it appears that sector and regional influences are dominated by other considerations of the property market as a whole.

Also sector influences are not dominant in every year. Only the period before the property market crash of the 90's does sectors consistently dominate region in determining property returns. However, from 92 the regions have tended to dominate the sector classifications, at least for those categorises defined by the Standard regions. Which may indicate a change in the relative performance for regional diversification compared with sector diversification in the future.

Figure 1: Adjusted R^2 Figures for Sector and Regional Diversification 1981-95

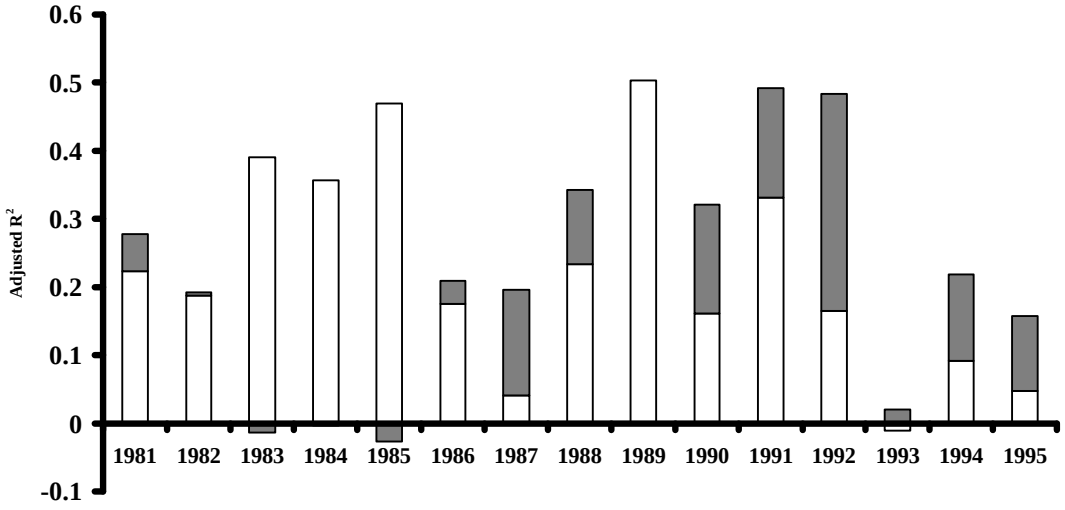

Table 3 also shows that administratively defined areas, either the Standard regions or the '3 Super regions', provide a greater explanation of property returns than the economically defined areas. The functionally based areas used here, however, may be poor proxies of the regional economic base. In particular, the classification may not be stable over time. That is the clusters produced may only be the best solution at a given point in time. The Green and Owen (1990) clusters are based on the 1984 revision of the 1981 Census of Population data, for journeys to work (Department of Employment, 1984 and Coombes et al, 1985) and as such may not be relevant today. For example, it is noticeable that the towns included in the Unemployment Blackspots cluster are all in the north above a line running across England from the river Severn to the Humber estuary. The so called North-South divide. However, if the exercise was repeated now, it is likely that we would find a number of southern towns included in this group. It is also worth noting that the clusters are based on employment data only. That is the failure of the functionally based regions, to outperform the administratively

circumscribed towns, may simply be the result of using an out of data classification scheme and/or one that is not sufficiently well defined. For example, the average adjusted R^2 value for the functionally defined areas from 1981-1986 is over 2% compared with less than 1% for both administratively defined regions. Also in ever year from 1981-86 the amount of variability explained is greater for the Green and Owen classifications than the other two schemes. However, from 1990 the reverse has been the case, with both administratively defined regions outperforming the Green and Owen classifications. On average the standard regions explaining 15% of property returns compared with 11% for the '3 Super regions' and only 5% for functionally defined areas. The administratively defined regions both outperforming the Green and Owen classifications in ever year from 1990-1995, except for 1993. All of which suggests that when determining town classifications the approach adopted may need to take account of changes over time and also not be focused on one criteria.

Conclusions

In the search for the most meaningful classifications of property in the real estate portfolio most fund managers, according to McNamara and Morrell (1994), will adopt "one that ... categorises properties performing similar economic functions in similar locations". That is by sector and region. A method of an analysis is therefore needed to explicitly separate the two diversification categories and to quantify the relative importance of one with the other in determining property returns.

Previous studies have tended to analyses this issue in two main ways. First by applying the MPT approach of Markowitz and secondly, by the use of clustering techniques. However, none of these approaches as explicitly quantified the relative benefits of sector and regional diversification. This paper corrects this omission by adopting the approach of Heston and Rouwenhorst (1994) which provides an elegant and simple approach to the decomposition of sector and regional influences on property returns. That is by separately measuring sector and regional effects we can gauge the relative importance of each in explaining property returns.

The general conclusion of which is that sector influences have a greater influence on property returns than regional effects, however defined. Sector diversification explaining on average 22% of the variability of property returns compared with 8% for administratively defined regions and only 3% for functionally defined areas. Which may be down to the definition of economic regions employed in this study. That is the Green and Owen functionally based classifications may be too weak for the current study and a more up to date and wide ranging scheme needs to be found. Nevertheless because regional influences are so small, sector diversification would appear to be the more effective tool for achieving risk reduction than regional diversification. Implying that sectoral diversification should be the first level of analysis in constructing and managing a real estate portfolio. The results for the period since 1992, however, may suggest that this may not be the case in the future.

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