

# **The University of Reading Business School**

## **Department of Real Estate & Planning**

### **Working Papers in Real Estate & Planning 07/06**

The copyright of each working paper remains with the author.  
If you wish to quote from or cite any paper please contact the appropriate author.  
In some cases a more recent version of the paper may have been published elsewhere.



---

The University of Reading

# **Geographical Concentration in the Institutional Market for Office Property in England and Wales**

**Peter Byrne and Stephen Lee**

**Centre for Real Estate Research, Department of Real Estate & Planning  
The University of Reading Business School**

## **Abstract**

This paper examines the regional investment practices of institutional investors in the commercial real estate office market in 1998 and 2003 in England and Wales. Consistent with previous studies in the US the findings show that investors concentrate their holdings in a few (urban) areas and that this concentration has become more pronounced as investors have rationalised their portfolio holdings. The findings also indicate that office investment does not fully correlate with the UK urban hierarchy, as measured by population, but is focused on urban areas with high service sector employment. Finally, the pre-eminence of the City of London and West End office markets as the key focus of institutional investment is confirmed.

**Keywords:** *Offices, Institutional Investment, Spatial Concentration.*

# Geographical Concentration in the Institutional Market for Office Property in England and Wales

## 1. Introduction

Real estate professionals consistently claim that the most important element in property performance is “location, location, location”. The desire for some kind of spatial (geographical) diversity would seem to be a fairly fundamental principle in real estate portfolio management. Diversity however, is difficult to achieve because of two problems: measuring risk consistently across and between geographic areas, and establishing boundaries. Such an analysis in, for example, the UK, based on counties or local authorities will be limited in some sense by the fact that the geographic units are not necessarily economically cohesive and may be too large to be appropriate bases for a strategy of investment diversification and balance. This has led real estate researchers to question whether conventionally defined geographical ‘regions’ are appropriate for real estate portfolio analysis purposes, a view that is not new but has gained more mainstream acceptance, especially in the US. In the UK, even though McNamara and Morrell (1994) highlighted the need to link the economic performance of ‘locations’ with real estate performance over a decade ago, little work has been done to investigate the structure of this relationship in any systematic way. Such evidence as there is in the UK suggests that investors concentrate their real estate holdings in preferred ‘locations’ and that this concentration is not driven by economic considerations.

In the US, Shilton and Stanley (1995) found that institutional investors are highly concentrated in a very few (major) metropolitan areas. Shilton *et al.* (1996) reported that in the case of the NCREIF<sup>1</sup> investment universe in the United States, only 30 counties (less than 1% of the total) have been the premier locations for investment by members of NCREIF. Malpezzi and Shilling (2000) found that institutional investors tilt (i.e. ‘overweight’) their portfolio allocations towards locations where the share of local employment in business services, finance, insurance, and real estate, and transportation is relatively high (compared to national averages). This is a view shared by Smith *et al.* (2004).

Although research in the UK is much less developed, it draws similar conclusions to the US, with the results implying at least four conclusions. First, like their US counterparts, UK office investors have specific areas of the country as ‘favourite’ locations for their portfolio selections, especially in the South East. Second, location appears to have been a stronger influence on investment flows into real estate investment than economic performance (Key *et al.*, 1998). Third, there appears to be a geographical dimension for the office and industrial property types but not for retail property (see for example, Cullen, 1993; Hoesli *et al.*, 1997 and Hamelink *et al.*, 2000). Finally, a number of studies clearly identify the central London office markets: the City, Mid-town and West End as significant “property regions” in their own right (see Cullen, 1993; Hoesli *et al.*, 1997; Hamelink *et al.*, 2000 and Andrew *et al.*, 2005).

In the UK, at an anecdotal level, this overall situation is in many ways common knowledge; ‘everyone knows’ about the concentration of investment in Offices in London and the South East, and that the Central London Office markets are

---

<sup>1</sup> National Council of Real Estate Investment Fiduciaries

significantly different. In fact the form and extent of these investment decisions is not well documented or understood. The recent availability of two different, but related, databases make it possible to study the situation in more objective detail, at least for England and Wales. This paper therefore examines the extent of 'spatial' concentration in Office portfolios by real estate investing institutions in England and Wales at two points in time; 1998 and 2003.

The remainder of the paper is organised as follows. The next section reviews previous studies of spatial investment and diversification. In Section 3 the principal datasets used are discussed. Section 4 presents the results. Section 5 concludes the paper and suggests future areas of research.

## **2. 'Spatial' Diversification**

The issue of spatial or geographical diversification has been the subject of considerable research, principally because geographic diversification has been shown to offer risk reduction benefits within the real estate portfolio, probably because of local market effects (see Viezer, 2000) for a comprehensive review). It is not always the case that the best diversification results come from investing in geographically remote markets. Equally, markets with similar economic land use are not always spatially clustered. Pursuing a 'pure' administrative geographic diversification, big investments could be made in the City of London and the City of Edinburgh office markets with a claim to be 'geographically diversified' but in fact not be diversified because those markets share similar economic drivers that make them behave the same way (i.e. both, as capital cities, accommodate a large number of government offices and both contain large amounts of office space for the banking and insurance industries).

Real estate is a derived demand, (Redfearn, 2000), and as such, changing local fundamentals, such as employment, income, population, etc., generate changes in real estate market conditions. The degree of correlation between outcomes in any two real estate markets is therefore a function of the extent to which their economic fundamentals are similar. In this way the local economic composition of an area influences systematically the correlation of movements in real estate markets between regions, independent of physical proximity. This relationship is consistent with the theory that aggregate industry shocks are transmitted to local economies as a function of the types of economic activity undertaken by an urban area. Diversification strategies need to be more sophisticated than simply spreading investment across great distances. The assessment of portfolio risk in any real estate market therefore requires an understanding of the economic risks to which the local markets are exposed. This means that investment strategies based on naïve administrative geographic groupings built solely on contiguity add little, if anything, to a successful real estate diversification strategy (Hartzell *et al.*, 1986 and Goetzmann and Wachter, 1995).

In contrast, economically based real estate diversification strategies seem to be more successful, and research has tended to investigate regions defined by economic base; classifying (urban) areas in terms of function rather than administratively defined boundaries. These studies show that economically defined areas are to be preferred technically to administrative regions as the basis for diversification (see Hartzell *et al.*, 1986; Hartzell *et al.*, 1987; Wurtz bach, 1988; Malizia and Simmons, 1991; Mueller and Ziering, 1992; Mueller, 1993; Ziering and Hess, 1995 and Lee and Byrne, 1998 amongst others). The argument is that investors should think of economic diversification as providing additional portfolio risk reduction over and above the benefits provided by traditional geographic diversification.

The economic regional analysis approach appears to have several distinct advantages over a simple geographical analysis in evaluating regional real estate investment opportunities and risks. The method allows a more consistent risk measurement between geographic units and enables the portfolio manager to develop a geographically diversified portfolio through the use of economically cohesive regions. The approach enables managers to evaluate individual local markets while retaining a broader, regional view of economic risk. Implementing such an approach requires some sort of 'classification' of urban areas. The intention is usually to try to develop structures which will optimise the geographical diversification in real estate portfolios. This has led to the use of clustering techniques to try and group together urban areas that exhibit similar characteristics and then to try and give the clusters clear and recognisable labels (see for example, Ziering and Hess, 1995; Goetzmann and Wachter, 1995; Hoesli *et al.*, 1997; Nelson and Nelson, 2003 and Smith *et al.*, 2004).

Even then, knowing how a local economy is performing does not necessarily give a good indication as to how the commercial real estate market is performing, because differences in demand and supply conditions can weaken the link between the local economy and the local property market. For example, job growth converts into demand growth differently in different areas, depending on the local economy and skill base, while real estate demand growth translates into rent increases differently depending on the availability of developable land. Economic growth and rental growth may be only loosely related. Liang and McIntosh (1998) found that employment growth contributes to real estate return only in the short term (e.g. one year), but there was no relationship between expected return and employment growth over the long term (e.g. 10 years). However, they found that employment risks, as measured by employment growth beta or volatility, are linked positively to real estate risks, beta and volatility. They therefore concluded that the analysis of local market employment growth is important for real estate decision making because employment growth risk is related positively to real estate risk. Investors should not however price employment growth too aggressively into their long-term real estate investments because employment growth is only positively related significantly to real estate return in the short term.

Key *et al.* (1998) drew similar conclusions for the UK. Using economic data from the Local Economic Profiling System developed by Public and Corporate Economic Consultants (PACEC) they investigated the correlation between economic and property market performance in the UK. Their analysis showed that the volume of office investment in individual local authorities in the UK is weakly associated with total employment, but quite strongly linked to total Financial and Business Services (FBS) employment, especially in London and its surrounding satellites, which account for 60% of total capital value in all Districts listed. Additionally, they found there was only a weak association between long-run office property returns and employment growth, while industrials showed no associations between employment change and long-run performance.

The contemporary position is thus to try to define 'regional areas' 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. In spite of this view of the importance of economic-based diversification on portfolio performance, little is known of the diversification practices of investors, especially in the UK. In contrast to the recent discussions about the advantages of economic-based real estate activity the little evidence that is available suggests that investors concentrate their real estate holdings in preferred regions when diversifying their portfolios and that this concentration is not driven by economic considerations.

In the US, Shilton and Stanley (1995) found that institutional investors are highly concentrated in a very few (major) metropolitan areas. They reported that in 1993, in the case of the NCREIF investment universe, although properties were located overall in a total of 273 US counties, 38% of properties were in only 10 counties and 55% in 30 counties, a situation that has hardly changed since 1993. For example, Liang and McIntosh (2000) find that while the share of NCREIF investment in the top 30 MSAs has fluctuated over time it still stood at 75% in 1998. Frost *et al.* (2005) found for 2004 that 70-80% of the major institutional-quality real estate was still concentrated in only 38 urban areas.

Shilton *et al.* (1996) later examined private investment by county, and confirmed that 30 (of a total of 3140) counties accounted for over sixty percent of NCREIF real estate investment. They found that this high degree of geographic concentration cannot be explained by population size or total employment within the counties or metropolitan areas, but other factors, such as past growth, and/or amenity levels may need to be examined to explain such concentration.

In a subsequent paper Shilton and Stanley (1996) estimated a stepwise logit model to predict which counties would have positive NCREIF investment and found that larger and richer counties were more likely to attract investment, but that (perhaps surprisingly) counties with higher population densities were less likely to attract investment, *ceteris paribus*. They also estimated a stepwise least squares model for square footage of NCREIF investment (conditional on positive investment), for warehouses, office, and research and development parks. Results varied somewhat by property type but were broadly consistent with the logit results.

Similar conclusions are drawn by Smith *et al.* (2004) who group the numerous US metropolitan areas into eight clusters based on economic characteristics, geographic proximity and absolute size. They find the top seven clusters are composed of just 35 MSAs and account for the vast majority of public and private real estate investment. For instance, they find that at the end of 2003 the top 35 accounted for about 94% of private investments and about 80% of estimated public investment. The eighth group of MSAs beyond the top 35 are called opportunistic markets, as they collectively represent only 5% of institutional real estate investments.

Smith *et al.* (2004) also find that more than 60% of private real estate and over half of public property investments lie in the 10 largest US metro areas by population, although less than one-third of the population lives in these areas. The top 30 metro areas represent about half of the US population, but account for more than 90% of private investments and almost 75% of public holdings. In fact, of the 361 MSAs private investors hold properties in only about 80 or of them. They concluded that... "institutional investors prefer to concentrate their investments in the largest metro areas."

This pattern is also seen by Byrne *et al.* (2002) for business centre executive suites, also in the US. Using a database of 1,692 business centres offering executive suites, for which there was adequate information on ownership and location, they find that executive suites highly concentrated in just a few MSAs. A quarter of the centres in the database are found in just five cities, while the top 12 MSAs account for nearly half the centres, while over half of the 309 MSAs observed have no recorded executive suites<sup>2</sup>.

---

<sup>2</sup> A very high concentration also exists for Business Parks in the UK with 12 local authorities accounting for 92% of the £3.7bn total investment in 2005 (Strutt & Parker, 2005). Furthermore, of the 63 Business Parks in the UK, over 60% by capital value are in London and the South East.

To measure the extent of the over- or under-representation of the executive suites in a particular urban area, they calculate a widely used measure of locational concentration; location quotients (LQs), (Isard, *et al.*, 1960). For example, the population LQ for executive suites in MSA<sub>*i*</sub> would be calculated as:

$$LQ_i = \frac{\frac{\text{Executive suites in MSA}_i}{\text{Executive suites in US}}}{\frac{\text{Population in MSA}_i}{\text{Population in US}}} \quad (1)$$

Thus, an LQ of 1.0 would imply that the number of executive suites in the metropolitan area was proportional to the population share; an LQ greater than 1.0 suggests over-representation and an LQ less than 1.0 suggests under-representation relative to the population in a given MSA.

Using this approach, they found that 12 MSAs had population and employment LQs greater than 2.5. That is, 12 MSAs show levels of concentration two and half times that predicted by population and employment spread across the US. Then, using regression analysis, they tested a number of models to explain the presence of executive suites in a particular urban area. They found that the number of executive suites is significantly related to business services employment and economic and demographic growth and negatively related to a squared employment term and a number of Million City dummies. That is, there is a non-linear relationship between the number of executive suites and size, as measured by employment or city size, with the number of executive suites concentrated in the more economic and demographic growth cities, consistent with much of the prior research on the clustering of economic activity and office dynamics.

A few studies in the US have examined the differences between the geographical holdings of public and private real estate investors and indicate that private NCREIF investment is more heavily concentrated than public REIT<sup>3</sup> investment and is focused in different MSAs. Holden and Redding (1994) for example, examined the portfolios of the 25 largest publicly traded equity REITs, representing 88% by value of the REIT universe at the end of 1992, to determine their level of diversification by property type and geographic area. They conclude that although the investments of these REITs are distributed over many cities and property types, the distribution varies significantly from the composition of both the national stock and the NCREIF data base, for two reasons. First, the surveyed REITs held more retail and apartments but significantly less industrial and office property compared with the national distribution because seven of the 25 REITs surveyed were invested in a single property type. Secondly they find that these REITs not only held properties in 83 of the 100 largest metropolitan areas but they also owned properties in an additional 159 smaller markets. The value of investments in these additional cities accounted for 22% of the total value of REIT properties. In other words, one-fifth of REIT properties by value were in smaller markets. In contrast, institutional-grade real estate held by NCREIF members is almost exclusively focussed in the largest 100 metropolitan areas.

Smith *et al.* (2004) find that public real estate holdings are more widely distributed than those of private investors, with about 15% of public holdings by value within metropolitan areas not included in the top 35 MSAs at the end of 1993. In contrast, the 5.5% share of private real estate holdings not in the top 35 MSAs is concentrated in only 25 additional markets. Nonetheless, about 84% of the estimated value of public

---

<sup>3</sup> Real Estate Investment Trust

real estate holdings is in the same preferred metro areas as those of private investors. In an update, to account for federal government changes in the definition of urban metropolitan areas, Hess and Liang (2005b) continued to find results similar to those reported earlier in 2004.

Malpezzi and Shilling (2000) argued that the prudent man rule in the US, which holds fund managers personally liable for losses on individual investments, forces pension fund real estate investors to concentrate their holdings in 'high-quality' (low risk) real estate markets that are easy to defend in court. In contrast, publicly traded REIT managers are much less constrained in their investment holdings. They contended that private real estate investment will be more concentrated than public real estate investment. To examine this issue, they compare the institutional holdings of public (REIT) and private (NCREIF) real estate holdings using cross-sectional data for 1996 by calculating real estate LQs. They find that there are a large number of MSAs which have no REIT (public) investment, and a greater number which have no NCREIF (private) investment, that is, both public and private real estate investors concentrate their holdings in relatively few markets. The average LQs for private investors across all MSAs is about 0.35, when a value of one would be expected if investors diversified completely. Thus, NCREIF investors do not fully exploit the low covariance between different regions and cities that is known to exist in the US real estate market. In contrast, the average weight for REITs was fairly close to one, which indicates that REITs are much more diversified in their real estate portfolios than NCREIF investors.<sup>4</sup> None of the top five private investment markets (San Francisco, Washington, D.C., Norfolk, VA, Charlotte, NC and Memphis, TN) were the same as the top five public investment markets (Atlanta, GA, Richmond, VA, Saginaw, MI, Raleigh, NC and Allentown, PA). Only Atlanta, Washington, Nashville and Indianapolis made the top 15 of both lists. Public real estate investors concentrate on different markets from private investors. Finally, as hypothesised, they find that although both public and private investors tilt towards 'quality', the tilt is much more pronounced in the case of private investors. Indeed, private investors weight 'high quality' locations five times more than public real estate investors!

They next develop a tobit model for each investor group to examine which variables explain their holdings in the MSAs. Using the 'quality' variable and a number of employment characteristics for each MSA, they find not only that 'quality' is a significant determinant of investment in the MSA but, for both public and private real estate investors, economic structure matters.

The differences in geographical holdings between the public and private investors can be explained by the smaller capital base of public real estate funds and the existing presence of the major institutional investors in the largest metropolitan areas. REITs are forced to concentrate their holdings in (relatively) smaller metropolitan areas, where competition from institutional investors is reduced significantly and market dominance can be achieved more easily. In addition, although the smaller metropolitan areas tend to relatively less diversified economically, and so are more vulnerable to economic downturns, but they are less integrated than the large metropolitan areas preferred by the private investors. Although public funds focus on smaller more volatile regions they are actually more diversified in their real estate portfolios than direct investors, who concentrate their portfolios in relatively few large interrelated metropolitan areas.

The difference in the geographical real estate holdings of public and private investors in the US has however narrowed. Wilkerson (1998) found that from 1993 to 1997 there was a significant shift in the ownership of real estate in the 60 major metropolitan areas

---

<sup>4</sup> See also Mahoney *et al.* (1996) and Liang and McIntosh (2000).



of the US from private to public. The apartment sector saw the greatest change, from a 3.3 percent share at the end of 1993, to 11.1 percent by the end of 1997. On the other hand the retail sector, which in 1993 had the greatest percentage of property in REIT hands, had grown comparatively slowly, rising from 4.6 percent to 8.7 percent, because of reduced acquisitions and generally declining values. The warehouse sector also increased dramatically, from a mere 2.0 percent share in 1993 to 9.3 percent by 1997. Finally, acquisitions in the office sector increased the amount of office space held publicly from 1.1 percent to 7.9 percent. Hess and Liang (2005a) confirm this, finding that REITs increased their market penetration into all property types from 1995 to 2003 at the expense of private investors.

The increased growth in public ownership in the sectors, however, is not matched across all the regions because of factors such as cost considerations; existing dominance by other real estate investors, or poor market characteristics. For instance, Wilkerson (1998) argues that REITs are effectively barred from the very largest markets, such as the Los Angeles apartment and Denver retail markets, as it would take an enormous amount of absolute dollar investment to generate a marginal increase in the percentage of ownership. In other markets, which were already dominated by institutional investors, such as the Boston apartment and the Kansas City office markets, Wilkerson (1998) found that public ownership was low. Since REITs need to grow their funds from operations (FFO) as fast as possible in the face of daily pricing, they need to avoid markets that will reduce current income and dilute any future growth. Hence, Wilkerson (1998) found that REITs avoided metropolitan areas where occupancy rates and rent levels are low. Nonetheless, whereas at year-end 1993, the REITs had no exposure in 25 of the 60 largest metropolitan areas, by 1997 this had fallen to eight. Additionally, Wilkerson (1998) found that by 1997 retail REITs were in all of these 60 major metro areas.

In comparison to the quite extensive work carried out in the US, research in the UK has been much less developed. While it is necessary to be aware of the major differences in the size and structure of the two real estate markets, such studies as there have been show rather similar kinds of results. In the UK there appears to be a geographical dimension to the office and industrial property types but not for retail property. For example, Cullen (1993) used cluster analysis techniques on 5500 properties from the Investment Property Databank (IPD) database, and found that industrial property is relatively homogenous across the UK, and retail properties partitioned more on ownership and lease terms rather than on any regional basis. In contrast the office market displayed a distinct geographical structure. In a similar vein, Hoesli *et al.* (1997) and Hamelink *et al.* (2000), using quarterly data from 1977-1995, find that there appears to be a geographical dimension to office and industrial property types but none for retail property. Jackson and White (2005) find that the classification of markets based on the government's Standard Regions of the UK, or those used by IPD, do not conform to the retail clusters developed from local market rent data. In contrast, the office market clusters closely follow the three super-region classification of the UK office market (London, Rest of the South East and the Rest of the UK). Whereas retail markets in the UK show no geographical component, office markets do.

Geographical location appears to have been a stronger influence on investment flows into real estate investment than economic performance. Key *et al.* (1998) report similar findings. Using data from the IPD database, their analysis showed that the volume of office investment in individual local authorities in the UK is weakly associated with total employment, but quite strongly linked to total Financial and Business Services (FBS) employment, especially in London and its surrounding satellites, which account for 60% of total capital value in all Districts listed. Additionally, they found that although investment has tended to flow to 'growth' locations geographical location appears to

have been a stronger influence on investment flows than economic performance. For instance, 24 out of the 26 Districts with the strongest investment inflows were virtually all in the South East. Office investors have clearly favoured specific areas of the country as primary locations for their portfolios.

A number of other studies clearly identify the central London office markets; the City, Mid-town and West End as being 'different'. Cullen (1993) argued that returns in the City office market show the greatest difference compared with the rest of the UK. Hoesli *et al.* (1997) and Hamelink *et al.* (2000) find that the central London office market, and especially the City, behaves differently from the South East and the rest of the UK, the distinctiveness of London becoming stronger in the second half of their analysis period. A similar pattern was found for the industrial property sector, which displayed a split into a London cluster, the fringe immediately around London and all other 'peripheral' markets. In contrast the retail property markets clustered into a single group and failed to show a distinct London dimension, a result that still persisted with a more refined regional classification scheme. Finally, Andrew *et al.*, (2005) using individual property data over the period 1981-2003, found that "the three inner London areas of The City, Mid-Town and the West End are significant 'property regions' in their own right."

### **3. Data and Preliminary Analysis**

The preference of institutional investors for a limited set of urban areas is tested at two dates; 1998 and 2003, using two real estate data sources. The analysis is confined to England and Wales because of data considerations relating to the availability of comparable data for the rest of the UK.

The first dataset relates to floorspace and rateable value statistics for the so called 'bulk classes' of commercial property at Unitary Authority and District (local authority area, LA) level. (ODPM, 2005).<sup>5</sup> Rateable values are the basis for the 'Business Rate', the commercial real estate tax in England and Wales. The tax is factored on an assessment of 'rateable value' (RV), which in turn is derived from a hypothetical rental valuation of a unit of real estate known as an 'hereditament'. At the time of valuation this rateable value is often close to the open market rental value. The valuation assessment is carried out at regular intervals of five years. The latest relates to values in 2003, and came into legal force in 2005, but were unavailable in a form suitable for this study. The data used in this paper are from the previous re-assessment carried out in 1998, which actually came into force for the determination of the Business Rate in 2000. Although the rental valuation is carried out as at the base year, the aggregate statistics are updated annually and thus change as new hereditaments enter the database, and some drop out. The data are broken down by sector; the data used here are for the office sector only. There are several significant features of these data. First, they are, with some qualifications, a strong proxy for rental value, at least at points in time, and from the rental value the overall capital value may be estimated. Secondly, the rateable value of any hereditament in England and Wales is a public statistic, and can be obtained online or from the relevant local authority. Finally, and perhaps in the context of this paper more important, the data are defined spatially, providing complete coverage for LAs in England and Wales.

---

<sup>5</sup> The bulk class data are compiled by the Government through the Office of the Deputy Prime Minister; (ODPM), on its own behalf and also on behalf of the Valuation Office Agency (VOA) in England and Wales (ODPM, 2005), but the data are now available through the UK Office of National Statistics (ONS) Neighbourhood Statistics (NeSS) website [<http://www.neighbourhood.statistics.gov.uk/dissemination/>]. These data are found from the NeSS homepage under 'Topics', in 'Physical Environment' - 'Key Regeneration Related Statistics', at various levels of aggregation.

The data used in this study are those relating to 'Commercial' Office hereditaments drawn from within the bulk Office class. The hereditament as a spatial unit is difficult to define, but as a legal entity it consists essentially of one taxable occupancy. This means that in some cases a building with several tenants may have multiple hereditaments. Given this complication, these Commercial Office data are used here mainly to set a context for comparing the scale of institutional activity in particular LAs, since they do present good measures of the totality of relevant office space in a LA, even if an element of multiple counting may be present. All the property which is of interest to an institutional investor will come from this category, which contains purpose built and converted offices and includes central government offices.

In 2003 there were 264,503 Commercial Office hereditaments in England and Wales with a total floor space of 79.27m square metres; a total RV of £9.365bn and an estimated capital value of between £120 - 130bn.

The institutional real estate investment data for this study come from the IPD analysis "UK Local Markets 2004" (IPD, 2004 with modifications). This provides a detailed view of the performance of institutional real estate investment in a number of localities across the UK. The results are presented annually for all LAs with four or more properties in institutional ownership. Thus in 2003, for offices in England and Wales, there were data for 101 LAs, from a total of 376 (26.9%). For the purposes of this study, IPD made data available showing (but with much less detail) other LAs where the number of properties held was greater than zero, but less than the four normally required for disclosure. In 2003 there were 66 of these, making a total of 167 (44.4%) with *some* institutional ownership. In the IPD universe in 2003 there were 2904 office properties in England and Wales with a total floor space of about 14.2m square metres and an estimated capital value of approximately £30bn.

The comparator year is 1998, chosen because this is the year to which the rateable value data relates directly. There are considerable differences between the Local Markets in the two years. In 1998 there were 3764 offices with a total floor space of about 13.2m square metres and an estimated capital value of approximately £26.7bn. Thus while the number of offices in the IPD database fell by 23% between 1998 and 2003, the overall amount of space increased by 7.5%, and the capital value rose by 12.4%.

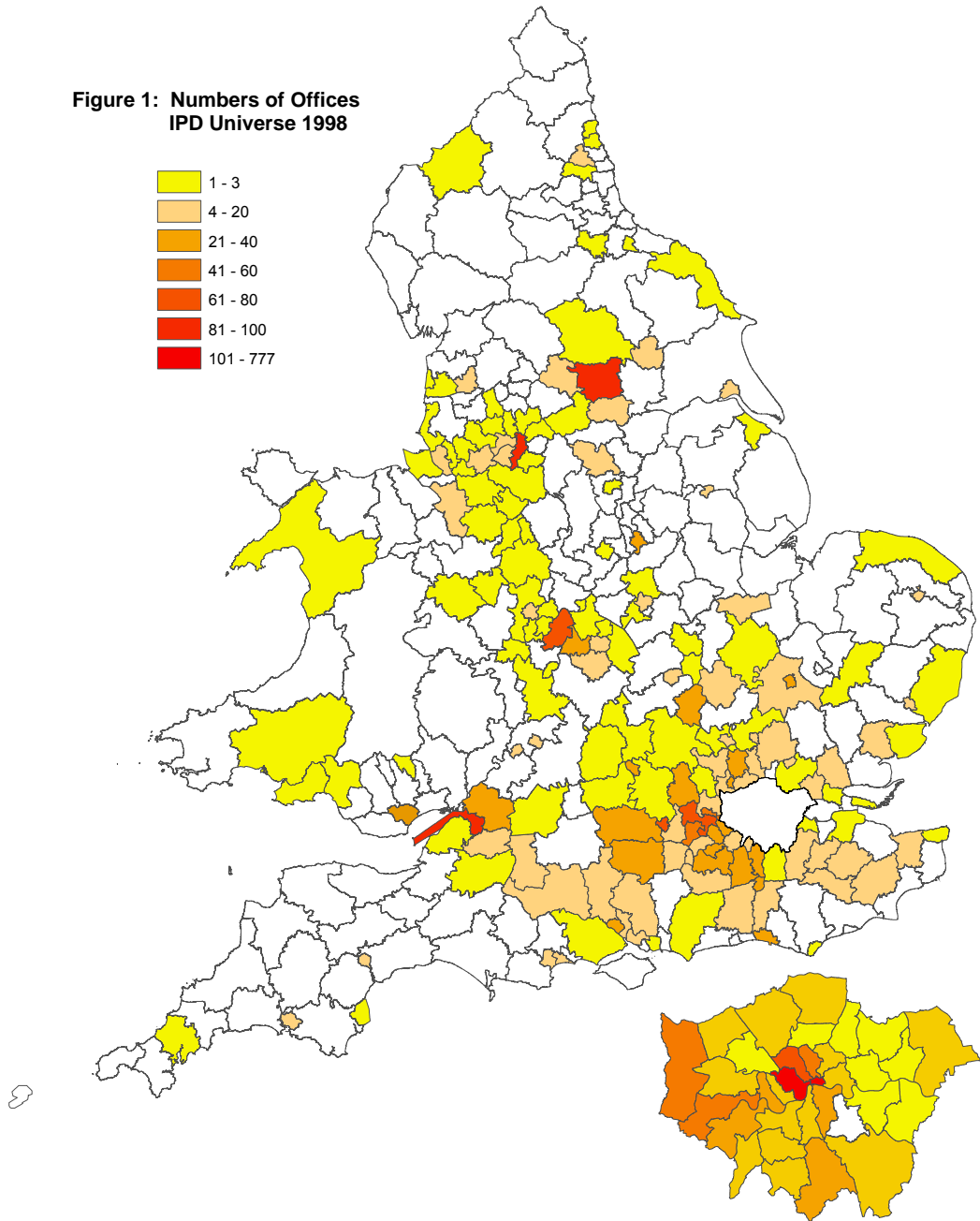
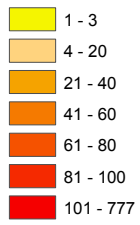
#### **4. The Pattern of Institutional Office Investment in England and Wales**

In order to discover whether institutional investors concentrate their real estate portfolios in a rather small number of (urban) areas (as is clearly the case in the United States) the number of office properties in the IPD database in each of 376 LAs in England and Wales in 1998 and 2003 was established. The results are presented in Figures 1, 2 and 3 and Tables 1 and 2.

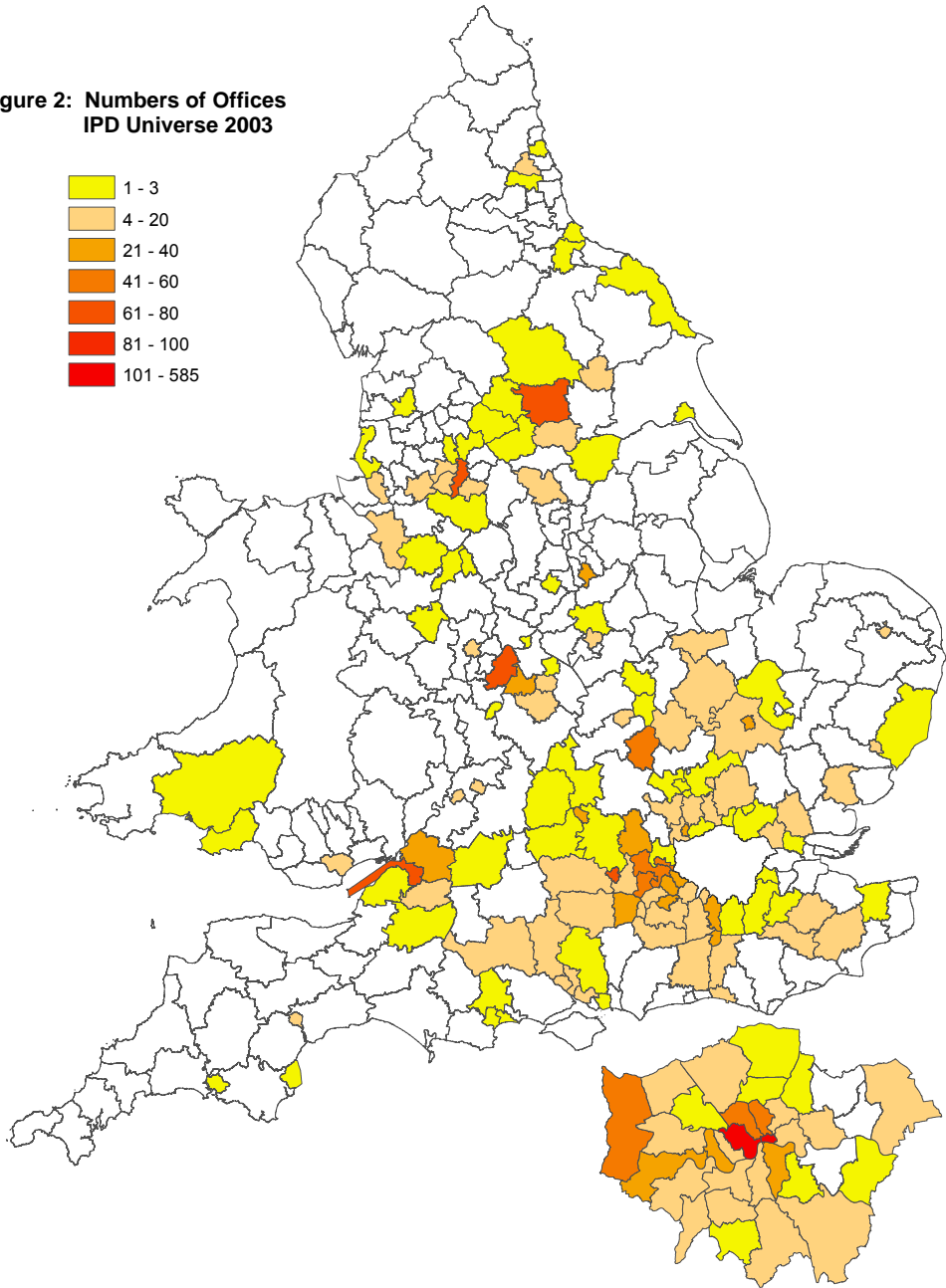
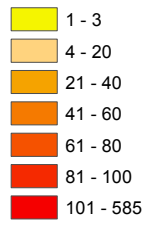
Figures 1 and 2 show the spatial distribution of office numbers across England and Wales in 1998 and 2003 respectively. A considerable amount of concentration will be obvious immediately! The nature of that concentration is discussed below. Figure 3 shows the spatial *difference* between Figures 1 and 2, indicating those areas where institutions changed the numbers of investments held between the two years. This map should be viewed along side Table 2.

Table 1 shows a number of features of interest. Of the 376 LAs in England and Wales, the IPD data show 168 (45%) had no institutional office investment in 1998, while 260

**Figure 1: Numbers of Offices  
IPD Universe 1998**

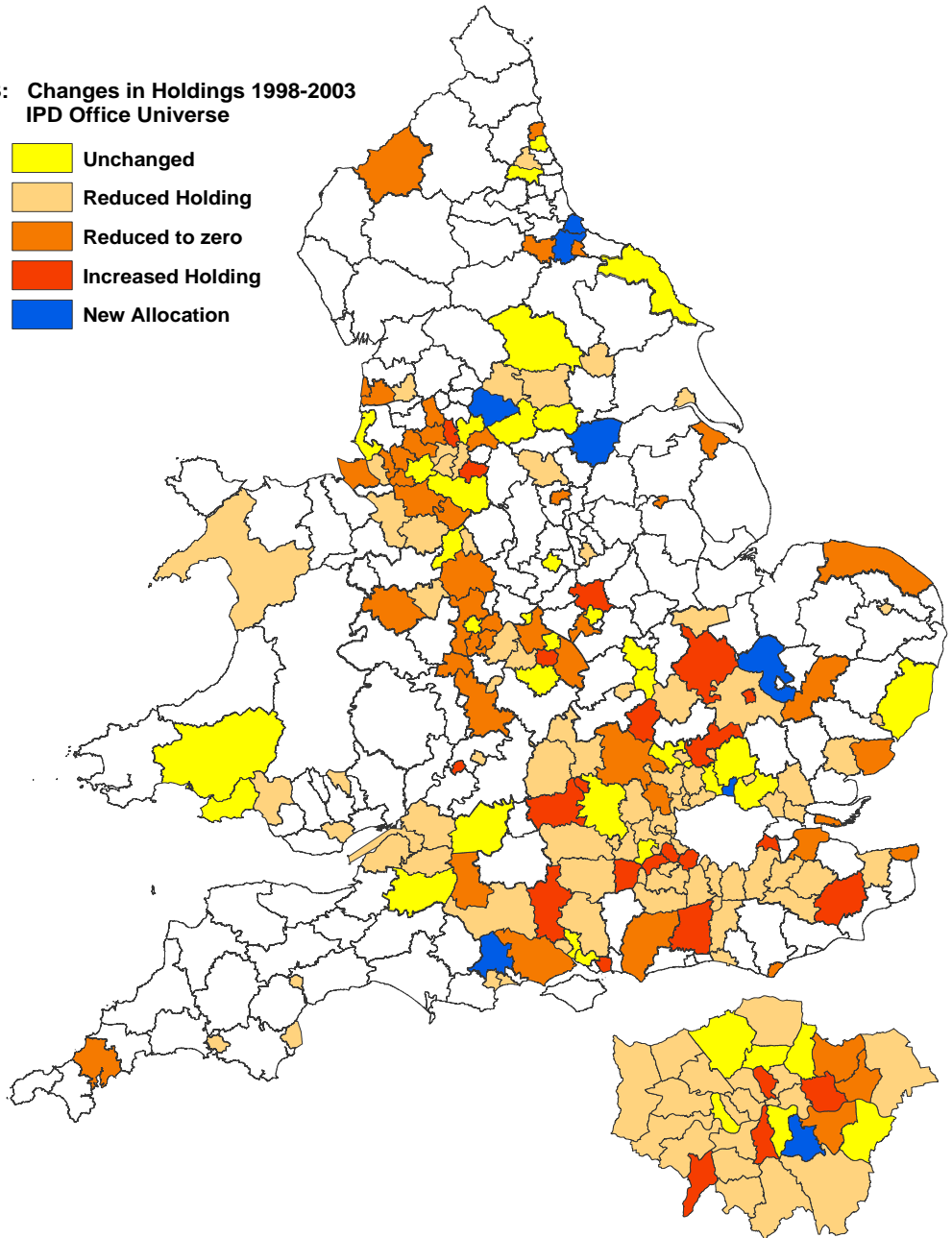


**Figure 2: Numbers of Offices  
IPD Universe 2003**



**Figure 3: Changes in Holdings 1998-2003  
IPD Office Universe**

- Unchanged
- Reduced Holding
- Reduced to zero
- Increased Holding
- New Allocation



(68%) had three or less office holdings and 334 (89%) had less than 20 offices. In Wales, 16 (72%) of the 22 authorities had no institutional office investment and 21 (96%) had three or less, while only one local authority (Cardiff) had more than 20 properties. England had two LAs (Westminster and the City of London) with more than 400 office holdings in 1998, but still had 152 (43%) of 354 authorities with no institutional office investment and 275 (78%) with less than 10 properties.

**Table 1: Office Concentration in England and Wales: 1998 and 2003**

Num. of Offices	England		Wales		E&W	
	1998	2003	1998	2003	1998	2003
0	152	190	16	19	168	209
1-3	87	64	5	2	92	66
4-9	36	43	-	-	36	43
10-19	38	27	-	1	38	28
20-39	26	16	1	-	27	16
40-59	6	6	-	-	6	6
60-79	4	6	-	-	4	6
80-99	3	-	-	-	3	-
100-199	-	-	-	-	-	-
200-399	-	1	-	-	-	1
>400	2	1	-	-	2	1
<b>Total</b>	<b>354</b>	<b>354</b>	<b>22</b>	<b>22</b>	<b>376</b>	<b>376</b>

Table 1 also shows that institutional office investment has become even more concentrated in a few 'preferred' areas. By 2003, 209 (56%) of the LAs in England and Wales had no institutional office investment, a result reflected across both countries. England had 190 (54%) authorities with no institutional office investment. The comparable figures for Wales show 19 authorities (86%) with no institutional investment by 2003. The number of LAs with three or fewer office holdings fell by 2003, while the number with 4-9 properties has increased. Institutional investors have rationalised their office investments, eliminating many of those areas in which they had little investment previously, focussing on certain other areas by increasing their investment.

The changes between 1998 and 2003 are shown more clearly in Table 2 and Figure 3.

**Table 2: Changes in Office Allocation: 1998 to 2003**

Changes: 1998 to 2003	England	Wales	E&W
<b>Unchanged:</b>	<b>180</b>	<b>18</b>	<b>198</b>
<b>of which no holding on either date</b>	<b>144</b>	<b>16</b>	<b>160</b>
<b>Reduced holding:</b>	<b>142</b>	<b>4</b>	<b>146</b>
<b>of which holding reduced to zero</b>	<b>46</b>	<b>3</b>	<b>49</b>
<b>Increased holding:</b>	<b>32</b>	<b>-</b>	<b>32</b>
<b>of which new allocation</b>	<b>8</b>	<b>-</b>	<b>8</b>

Table 2 shows that the majority of LAs saw no change; 198 (52%), or a decline; 146 (39%) in allocation, with some areas; 49 (13%), seeing their holding fall to zero. Wales was the bigger loser relatively, with Cardiff losing half its office investment over the five years between 1998 and 2003. Nonetheless, some LAs; 32 (9%), did see a rise in investment. These increases focused mainly in England with eight (2%) of the LAs showing an investment for the first time. These changes result from positive reallocations by investors, but in some cases may also be a consequence of the

addition or removal of funds with holdings in these LAs from the IPD database or individual properties being sold to investors outside the database.

Table 3 shows the concentration of institutional office investment in the top 30 LAs in 1998 and 2003; as measured by the number of properties (No.), capital value (CV) and floor space (FS).

**Table 3: Concentration in Top 30 Local Authorities: 1998 and 2003**

	1998			2003		
	No.	CV	FS	No.	CV	FS
<b>Top 5</b>	<b>41%</b>	<b>58%</b>	<b>44%</b>	<b>40%</b>	<b>50%</b>	<b>40%</b>
<b>Top 10</b>	<b>50%</b>	<b>67%</b>	<b>53%</b>	<b>50%</b>	<b>61%</b>	<b>51%</b>
<b>Top 15</b>	<b>56%</b>	<b>73%</b>	<b>60%</b>	<b>58%</b>	<b>69%</b>	<b>59%</b>
<b>Top 20</b>	<b>61%</b>	<b>77%</b>	<b>66%</b>	<b>64%</b>	<b>75%</b>	<b>65%</b>
<b>Top 25</b>	<b>66%</b>	<b>81%</b>	<b>70%</b>	<b>68%</b>	<b>79%</b>	<b>69%</b>
<b>Top 30</b>	<b>70%</b>	<b>84%</b>	<b>74%</b>	<b>72%</b>	<b>83%</b>	<b>73%</b>

Table 3, like Table 1 and Figure 1, shows that in 1998 institutional investment was concentrated in very few LAs, with the top five markets accounting for just over 40% of the institutional, as measured by number of properties or floor space, but 58% by value. The top 10 markets accounted for about half the number of properties and floor space, but more than two-thirds of the value, while the top 30 LAs accounted for three-quarters of the investment, by number and floor space, and 84% by value. All of this suggests that institutions invest in very few offices in each LA which are high value and high quality investments. These results for England and Wales are comparable with those in the US (see Shilton and Stanley, 1995; Shilton *et al.*, 1996; Liang and McIntosh, 2000; and Frost *et al.*, 2005).

The figures for 2003 show very little change from those for 1998, if concentration is measured by the number of properties or floor space. There is however a notable difference in the capital value figures between the two periods, especially for the top 10 markets, which show a substantial fall in value from 1998. This again supports the perception in Table 2 that institutional investors were rationalising their portfolios over this period.

While Tables 1 to 3 show that investors focus on a limited number of LAs when investing in offices and that this focus has narrowed over time, they do not show the extent to which their investment is an over- or under-representation of office investment in a particular local authority relative to some measure of spatial spread across England and Wales. In order to do this it is necessary to calculate location quotients (LQs). A number of different LQs are calculated for each of the 375 LAs in England and Wales for which data were available<sup>6</sup>: the number of offices; the market value; floor-space. The first three approaches use data in the numerator and denominator that are as close as possible to each other in each case. So for example, when the number of institutional office holdings from IPD is used in the numerator the number of hereditaments is the denominator. The second LQ uses the IPD market values of the offices in the numerator and rateable value (as a proxy for capital value) in the denominator. The third LQ uses institutional (IPD estimated) floor space and local authority floor space. These three sets of LQ estimates therefore provide a more detailed view of the results presented in Tables 1 to 3. The results of each LQ calculation for the 1998 and 2003 data are given in Table 4.

<sup>6</sup> The Isles of Scilly are not included in the analysis as they had no office hereditaments in either period and so would invalidate any LQ calculation.



**Table 4: Office LQs in England and Wales: 1998 and 2003**

<b>Panel A Including zeros</b>	<b>Average</b>	<b>SD</b>	<b>Skew</b>	<b>T-stat.</b>	<b>P-value</b>	<b>Count</b>
<b>1998</b>						
<b>No. of properties</b>	0.51	0.93	2.80	10.20	0.000	375
<b>Capital value</b>	0.26	0.50	3.14	28.77	0.000	375
<b>Floor space</b>	0.38	0.64	2.64	18.58	0.000	375
<b>2003</b>						
<b>No. of properties</b>	0.51	1.04	3.10	9.16	0.000	375
<b>Capital value</b>	0.32	0.61	3.08	21.64	0.000	375
<b>Floor space</b>	0.41	0.80	2.80	14.30	0.000	375
<b>Panel B Excluding zeros</b>						
<b>1998</b>						
<b>No. of properties</b>	0.74	0.88	2.06	4.21	0.000	208
<b>Capital value</b>	0.44	0.54	2.40	14.77	0.000	208
<b>Floor space</b>	0.61	0.64	2.04	8.73	0.000	208
<b>2003</b>						
<b>No. of properties</b>	0.80	0.93	2.01	2.76	0.006	167
<b>Capital value</b>	0.64	0.68	2.16	6.78	0.000	167
<b>Floor space</b>	0.74	0.79	1.79	4.17	0.000	167

Table 4 presents summary statistics for the LQ calculations in 1998 and 2003. As shown in Table 1, there are a large number of LAs that have no institutional office investment. Therefore Table 4 presents two sets of statistics for each variable. The first set is based on all observations including markets which have zero investment (Panel A). A second set of complementary statistics (Panel B) are presented for the subset of LAs which have non-zero institutional commercial real estate investment.

Panel A of Table 4 shows that all the LQ measures are significantly less than one. This indicates that institutional investors were not fully diversified in either 1998 or 2003, although there has been a marginal increase in the average values since 1998. The LQ based on capital value is exceptionally small in both periods (0.26 and 0.32 respectively), suggesting that institutional investment is even more concentrated by capital value than would be implied from the market hereditament count; rateable value or floor space and confirms the results in Table 3. All the LQs show significant positive skewness. This suggests that there are some very large LQ values in some LAs. This again reinforces the argument that a small number of office markets are the preferred locations for institutional investment. The results presented in Panel B of Table 4, which exclude those markets with no institutional allocation, although having higher average LQs compared with Panel A, still show that institutional real estate portfolios are significantly under-diversified. In addition, the positive skewness statistics indicate that even within the LAs that are favoured by institutions there are some markets that are more preferred to others. Finally, the Spearman rank correlation between the various LQ statistics is very high<sup>7</sup> and suggests that, with a few exceptions, the different data sets provide similar measures of institutional office concentration across the UK.

To make these LQ calculations comparable to those in the previous studies in the US the calculations are repeated, this time using the number of offices; the capital (market)

<sup>7</sup> For example, the average Spearman rank correlation in 2003 is 0.954 and 0.883 for the two data sets which include and exclude zeros.

value; floor-space from the IPD data in the numerator, but with employment as the denominator. The employment data for this analysis are taken from the ONS Nomis Labour Market Profile database [<http://www.nomisweb.co.uk/>]. The data used are Annual Business Inquiry Employee Analysis numbers of employee (available) jobs in each employment category. They do not therefore relate directly to the employed population living in an authority, but are a measure of net employment for each of these kinds of activity in each LA (see Table 6).

The results are presented in Table 5<sup>8</sup>. This gives the summary statistics for the LQ calculations in 1998 and 2003, using employment in the denominator. Table 5, for reasons already discussed, presents two sets of statistics for each variable, one based on all observations including markets which have zero investment (Panel A) and a second set for the subset of LAs that have non-zero institutional investment (Panel B).

This Table shows a broadly similar picture to that in Table 4. Institutional office investment is significantly under-diversified and UK investors focus on a small number of preferred markets. These employment LQs are also comparable with the results in the US (see in particular Malpezzi and Shilling, 2000). Nonetheless, the average employment LQs in Table 5 are all substantially larger than their equivalent values in Table 4. This implies that institutional office investment is more evenly spread across England and Wales in terms of employment than it is in comparison to the office hereditament count. In other words, institutions focus their office investment in high employment areas and larger offices, rather than areas with a smaller number of workers but a large number of small offices.

**Table 5: Employment LQs in England and Wales: 1998 and 2003**

<b>Panel A Including zeros</b>	<b>Average</b>	<b>SD</b>	<b>Skew</b>	<b>T-stat.</b>	<b>P-value</b>	<b>Count</b>
<b>1998</b>						
<b>No. of properties</b>	0.56	1.17	4.24	7.38	0.000	376
<b>Capital value</b>	0.44	1.46	8.34	7.37	0.000	376
<b>Floor space</b>	0.52	1.32	7.33	7.04	0.000	376
<b>2003</b>						
<b>No. of properties</b>	0.55	1.25	3.90	7.00	0.000	376
<b>Capital value</b>	0.48	1.39	5.20	7.24	0.000	376
<b>Floor space</b>	0.54	1.28	4.36	6.94	0.000	376
<b>Panel B Excluding zeros</b>						
<b>1998</b>						
<b>No. of properties</b>	0.72	1.01	3.35	4.05	0.000	208
<b>Capital value</b>	0.57	1.35	6.42	4.57	0.000	208
<b>Floor space</b>	0.67	1.19	5.93	4.01	0.000	208
<b>2003</b>						
<b>No. of properties</b>	0.77	1.01	2.67	3.00	0.003	167
<b>Capital value</b>	0.67	1.19	3.49	3.58	0.000	167
<b>Floor space</b>	0.75	1.05	3.04	3.02	0.003	167

The Spearman rank correlation between the LQ statistics based on employment data in Table 5 and those based the number of hereditaments, rateable value, and floor-space

<sup>8</sup> Initially Population was used as the denominator as in previous US studies (Malpezzi and Shilling, 2000 and Byrne, *et al.*, 2002), but this caused a serious problem for a number of markets, especially the City of London which has an extremely small population but an extremely high office allocation in institutional portfolios and so displayed an extreme LQ (in excess of 200!). The results using numbers of jobs (employment) are more supportable.

shown in Table 4 is very high<sup>9</sup> and suggests that the employment data LQs can be used as an appropriate measure of office concentration.

Figure 4 complements the earlier Figures and provides at least a partial explanation of the patterns of holdings seen in those maps. In Figure 4, the darker the shading, the higher the capital value/employment LQ.

The top two institutional office markets, are the City of London (14.1) and Westminster (10.2), i.e. the institutional investment, by value, in these areas is more than 10 times that implied by the LAs employment. They therefore represent the first tier of institutional office investment and demonstrate that these two office markets are unique in their own right, even within London.

There is then a clear break to the next market, Reading (8.8), and three other locations, Bracknell Forest (6.4); Watford (6.2); and Islington (6.1). These markets showing LQ level well above the next group but clearly below the top tier. The next level is made up of 13 LAs with LQs above 3 but below 6. Below this are a further 25 LAs with LQs above 1 but well below 3. This suggests that institutional investors prefer to invest in just 44 LAs (11.7%) in England and Wales<sup>10</sup>.

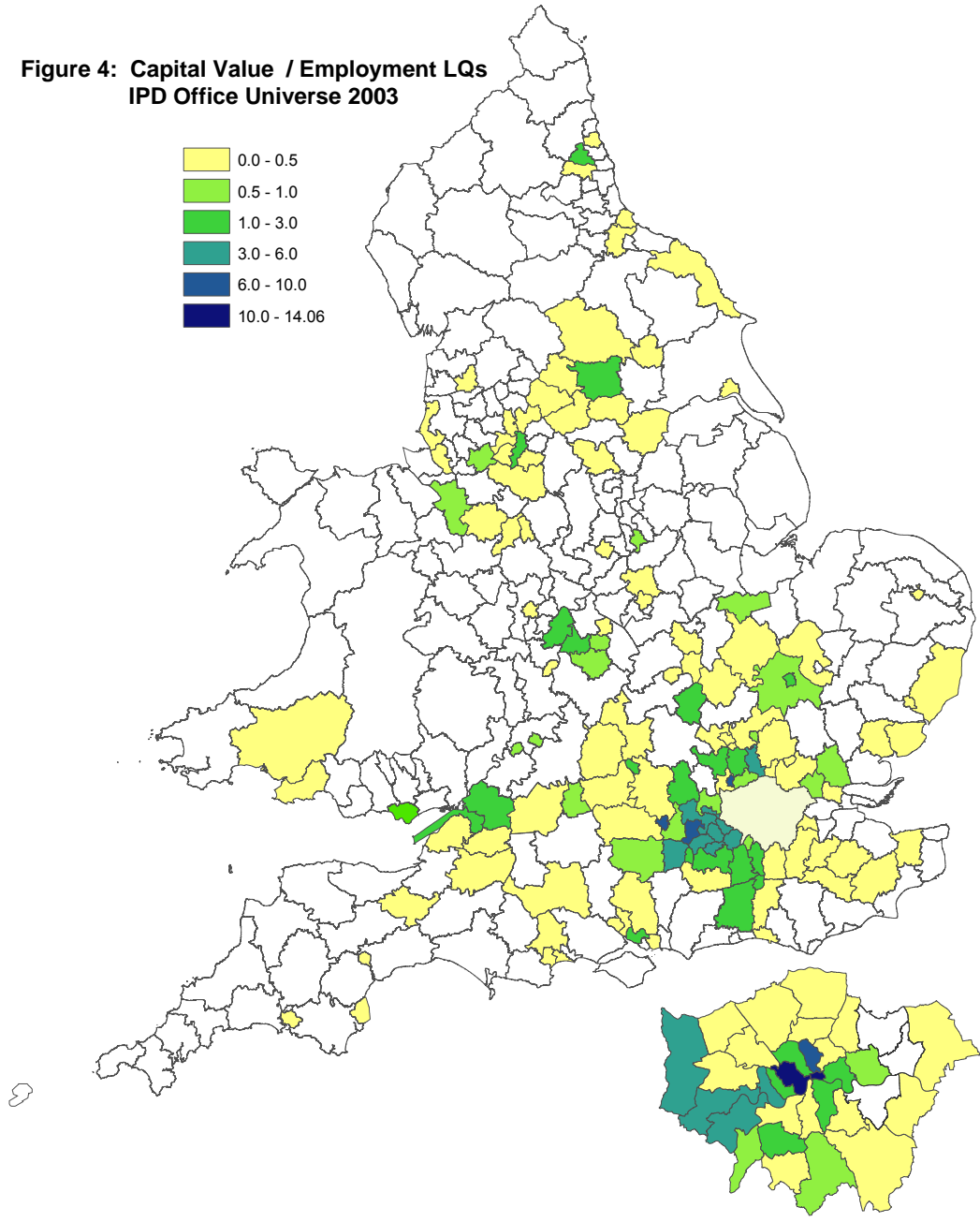
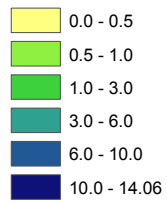
There are 22 LAs with LQs below 1 but greater than 0.5. Then there are 101 LAs with LQs below 0.5. These are areas in which, for whatever reason, the institutions have a presence but one that cannot be justified by the area's employment level. This leaves over 200 LAs with no institutional office holdings.

---

<sup>9</sup> The average Spearman rank correlation between the employment based LQs in 2003 and the LQs based on hereditaments, rateable value, and floor-space is 0.807 and 0.793 for the two data sets which include and exclude zeros.

<sup>10</sup> In fact these 44 are all in England with Cardiff ranked 52nd.

**Figure 4: Capital Value / Employment LQs  
IPD Office Universe 2003**



## The Characteristics of Institutional Office Markets

Previous studies show that the preferred markets for institutional real estate investment have distinctive economic features such as urban areas with high business services employment and a concentration on the largest cities. For England and Wales in 2003 the results are similar - as shown in Table 6.

**Table 6: The Characteristics of Institutional Investment Markets: 2003**

Characteristic / LQ	Zero	>0 <0.5	>0.5 <1	>1 <3	>3 <6	>6 <10	>10
<b>Average Rateable Value (£ 000)</b>	3952	16361	33788	87651	65510	93541	1304018
<b>Average No. of Hereditaments</b>	361	813	941	1880	931	1412	11560
<b>Average Floor Space (000m<sup>2</sup>)</b>	18	26	38	39	43	47	47
<b>Average Total Employment</b>	42895	82152	85837	142456	71961	98411	472324
<b>% in Manufacturing</b>	16.05	11.43	9.52	8.85	7.15	6.63	1.90
<b>% in Construction</b>	4.78	4.39	4.06	3.61	3.64	3.57	0.48
<b>% in Tourism</b>	8.52	7.59	7.13	7.25	8.22	5.41	7.97
<b>% in Distribution, Hotels &amp; Restaurants</b>	24.53	24.52	23.79	22.28	24.31	23.21	15.51
<b>% in Transport &amp; Communications</b>	4.94	5.41	5.30	6.90	7.99	7.69	3.35
<b>% in Finance, IT, Other Business Activities</b>	11.82	17.48	23.00	24.43	24.95	30.08	55.52
<b>% in Public Admin, Education &amp; Health</b>	24.82	24.41	22.44	21.97	17.44	19.17	9.85
<b>% in Other</b>	4.54	4.76	4.77	4.71	6.30	4.24	5.42

Table 6 uses the same categories as in Figure 4 and shows that institutions prefer LAs that have larger numbers of employees in Finance, IT, other business activities (FIRE) and tourism and substantially lower percentages in manufacturing and public administration, i.e. institutions invest in large urban areas with a high business services employment, matching the findings in the US. In addition, the LA has to have a large number of sizeable offices (hereditaments), i.e. investors want to invest in the bigger office blocks.

Given this basic distribution of office investment in England and Wales an attempt has been made to model the office investment data for 2003 using a regression-based approach with Capital Value/Employment LQ as the dependent variable against the variables set out in Table 6. The results are presented in Table 7.11.

The results in Table 7 show that the extent of office investment can be explained significantly by very few variables, i.e. rateable value (RV), average floor space (AFS), and the percentage of the urban areas employment in Finance, IT, other business activities (FIRE) and Public Administration, Education and Health (PADMIN). The coefficient of determination of the regression is high at 65%, the variables show the correct sign and are all significant at the usual levels.

<sup>11</sup> As is to be expected there is a good deal of multi-collinearity among the explanatory variables. As a consequence a number of models could and were developed but the model presented in Table 7 was chosen as it has the variables identified in Table 6 which discriminate among the LA's areas in terms of office investment by the institutions in the UK.

**Table 7: Regression Results**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
<b>Constant</b>	-0.61	0.24	-2.52	0.01
<b>RV</b>	0.00	0.00	14.77	0.00
<b>AFS</b>	0.03	0.01	5.70	0.00
<b>FIRE</b>	0.03	0.01	3.46	0.00
<b>PADMIN</b>	-0.01	0.01	-1.79	0.07

The main advantage of the analysis is that LAs that have either an over representation of institutional office investment or LAs that are under represented can then be identified. The results are shown in Table 8 for the top and bottom 10 LA's.

**Table 8: The Top and Bottom 10 LA's for Institutional Office Investment: 2003**

Top 10		Bottom 10	
<b>1</b>	Reading UA	<b>10</b>	Swindon UA
<b>2</b>	Watford	<b>9</b>	Blaby
<b>3</b>	Bracknell Forest UA	<b>8</b>	South Cambridgeshire
<b>4</b>	Richmond upon Thames	<b>7</b>	Harlow
<b>5</b>	Spelthorne	<b>6</b>	Halton UA
<b>6</b>	Islington	<b>5</b>	Wokingham UA
<b>7</b>	Elmbridge	<b>4</b>	Lambeth
<b>8</b>	Windsor and Maidenhead UA	<b>3</b>	Camden
<b>9</b>	Runnymede	<b>2</b>	Vale of White Horse
<b>10</b>	Surrey Heath	<b>1</b>	Tower Hamlets

**Note: UA – Unitary Authority**

The LQs in Tables 4 and 5 show which LAs have most investment relatively, but do not indicate whether this investment is inconsistent with the characteristics of the LA. For example although the City of London has the highest LQ, the regression characteristics of this LA are very close to those that the institutions prefer. Consequently the regression analysis identifies the City of London as an ideal location for institutional investment in that it has a great number of large financial service offices. In contrast the regression analysis identifies Reading as having institutional office investment greatly in excess of its locational characteristics. This is presumably due to the ownership of large amounts of office space by Prudential which treats Reading effectively as its second headquarters. On the other hand, Tower Hamlets ranks as the most under-represented LA, in this case because, although Tower Hamlets contains Canary Wharf, most of that office space is owner occupied or in non-IPD ownership.

## **5. Conclusions**

Over the last ten to fifteen years many researchers have examined the structure of the major commercial real estate investment markets, paying much attention both to the extent to which risk diversification is possible in the market and to attempts at devising strategies that allow fund managers to decide 'where' (as well as when) they should invest in order to take maximum advantage from diversifying. In the growing literature on spatial real estate diversification strategies, an important sub-set of research has

started to examine whether institutional investors concentrate their real estate holdings in preferred regions when diversifying their portfolios.

In summary, the data in the UK, in so far as they are available, that is, from the IPD universe, indicate that investors have either ignored the warnings of the impact of portfolio investment in areas displaying a similar economic base, or find it difficult for one reason or another to follow such advice. As a consequence many institutional commercial real estate portfolios are concentrated, and therefore must not be diversified efficiently.

In particular, institutional investors focus on a very few (urban) areas in England and Wales, (and indeed in Scotland and Northern Ireland) which display a limited set of economic characteristics; a large number of big offices spaces, and a heavy concentration of FIRE employment. In other words, institutional investment is concentrated in the biggest (most liquid) financial office market areas, confirming anecdotal indications.

The role that institutional investors play in structuring the built environment within regions is complex and varies enormously from area to area. Although this paper seems to suggest that the manner of stock selection, at least in respect to office investments is rather uncomplicated, more work is necessary to understand the impact that any local market's socio-economic characteristics have on institutional office investment decisions. Research in this area is currently being pursued by the authors.

### **Acknowledgements**

This work is based in part on data provided through EDINA UKBORDERS with the support of the ESRC and JISC and uses boundary material which is copyright of the Crown.

The authors would like to thank IPD, and Steven Devaney in particular, for providing the 'full' data sets on offices for the two years studied. The usual disclaimers apply.

## References

- Andrew, M., Devaney, S. and Lee, S. (2003) *Another Look at the Relative Importance of Sectors and Regions in Determining Property Returns*. Working Papers in Real Estate & Planning 14/03, Department of Real Estate & Planning, University of Reading, Reading.
- Byrne, P.J., Lizieri, C.M. and Worzala, E. (2002) The Location of Executive Suites and Business Centers in the United States, *Journal of Real Estate Portfolio Management*, **8**, 3, 255-270.
- Frost, C., Schioldager, A. and Hammond, S. (2005) *Real Estate Investing the REIT Way*, *InvestmentInsights*, Barclays Global Investors.
- Hamelink, F., Hoesli, M., Lizieri, C.M. and MacGregor, B.D. (2000) Homogeneous Commercial Property Market Groupings and Portfolio Construction in the United Kingdom, *Environment and Planning A*, **32**, 232-344.
- Hartzell, D., Hekman, J. and Miles, M. (1986) Diversification Categories in Investment Real Estate, *AREUEA Journal*, **14**, 2, 230-253.
- Hartzell, D., Shulman, D. and Wurtzebach, C. (1987) Refining the Analysis of Regional Diversification for Income-Producing Real Estate, *Journal of Real Estate Research*, **2**, 2, 85-95.
- Hess, R. and Liang, Y. (2005a) *Strategies of Focus and Opportunities; Trends in Public-Market Real Estate Penetration 1998 to 2000*, Pramerica Real Estate Investors, [www.Pramericarei.com/prei](http://www.Pramericarei.com/prei)
- Hess, R. and Liang, Y. (2005b) *Size Tiered Economic Geography: An Update*, Pramerica Real Estate Investors, [www.Pramericarei.com/prei](http://www.Pramericarei.com/prei)
- Holden, M.P. and Redding, K.G. (1994) The Geographic Distribution of REIT Properties, *Real Estate Review*, **24**, 1, 33-41.
- Hoesli, M., Lizieri, C. and MacGregor, B.D. (1997) The Spatial Dimensions of the Investment Performance of UK Commercial Property, *Urban Studies*, **34**, 9, 1475-1494.
- IPD (2004) *UK Local Markets 2004*, London, Investment Property Databank.
- Isard, W., Bramhall D.F., Carrothers, G.A.P., Cumberland, J.H., Moses, L.N., Price, D.O. and Schooler, E.W. (1960) *Methods of Regional Analysis: An Introduction to Regional Science*, New York, Wiley.
- Jackson, C. and White, M. (2005) Challenging Traditional Real Estate Market Classifications for Investment Diversification, *Journal of Real Estate Portfolio Management*, **11**, 3, 307-321.
- Key, T., McBurney, D. and Moore, B. (1998) *Commercial Investment Property - Towards a Comprehensive Geography*, Presented at the Cutting Edge Conference, Leicester. RICS Research, London, Royal Institution of Chartered Surveyors.
- Lee, S.L. and Byrne, P.J. (1998) Diversification by Sector, Region or Function? A Mean Absolute Deviation Optimisation. *Journal of Property Valuation & Investment* (incorporating the *Journal of Property Finance*), **16**, 1, 38-56.



- Liang, Y. and McIntosh, W. (2000) *The Spatial Distribution of Commercial Real Estate Investment*, Pramerica Real Estate Investors, [www. Pramericarei.com/prei](http://www.Pramericarei.com/prei)
- Mahoney, J., McCarron, S., Miles, M. and Sirmans, C.F. (1996) Location Differences in Private and Public Real Estate Investment. *Real Estate Finance*, Summer, 52-64.
- Mueller, G.R. (1993) Refining Economic Diversification Strategies for Real Estate Portfolios, *Journal of Real Estate Research*, **8**, 1, 55-68.
- Mueller, G.R. and Ziering, B.A. (1992) Real Estate Portfolio Diversification Using Economic Diversification, *Journal of Real Estate Research*, **7**, 4, 375-386.
- Nelson, T.R. and Nelson, S.L. (2003) Regional Models for Portfolio Diversification. *Journal of Real Estate Portfolio Management*, **9**, 1, 71-88.
- Office of the Deputy Prime Minister (2005) *Commercial and Industrial Floorspace and Rateable Value Statistics 1998-2004*, London, ODPM.
- Shilton, L. and Stanley, C. (1995) Spatial Filtering: Concentration or Dispersion of NCREIF Institutional Investment, *Journal of Real Estate Research*, **10**, 5, 569-82.
- Shilton, L. and Stanley, C. (1996) Spatial Concentration of Institutional Ownership: New Wave Atomistic or Traditional Urban Clustering, *Journal of Real Estate Research*, **12**, 3, 413-428.
- Shilton, L., Stanley, C. and Tandy, J. (1996) The Top Thirty Counties of Institutionally Owned Real Estate, *Real Estate Review*, **25**, 4, 54-59.
- Smith, A., Hess, R. and Liang, Y. (2004) *Size Tiered Economic Geography: A New View of the US Real Estate Markets*, Pramerica Real Estate Investors, [www. Pramericarei.com/prei](http://www.Pramericarei.com/prei).
- Strutt & Parker (2005) *Business Park Index Summer 2005*.
- Redfearn, C.L. (2000) *Industrial Composition and the Correlation of Outcomes in the Markets for Owner-Occupied Housing*, Lusk Center for Real Estate Working Paper, 1-30.
- Viezer, T.W. (2000) Evaluating 'Within Real Estate' Diversification Strategies, *Journal of Real Estate Portfolio Management*, **6**, 1, 75-95.
- Wilkerson, B. (1998) Where REITs Gather, *Mortgage Banking*, July.
- Ziering, B. and Hess, R. (1995) A Further Note on Economic Versus Geographic Diversification, *Real Estate Finance*, **12**, 3, 53-60.