Risk reduction and diversification in property portfolios

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Mark Callender, Steven Devaney and Angela Sheahan examine the issue of how many properties are needed to track the market, one of the oldest chestnuts in property fund management.

This article presents the results of a new IPF research project analysing both risk reduction and diversification. Risk reduction is concerned with smoothing out the returns on a portfolio and it is a major priority for fund managers and investors seeking an absolute return target. Diversification is concerned with how closely the returns on a portfolio track the market and it is a key issue for fund managers and investors with a relative return benchmark who require a market return.

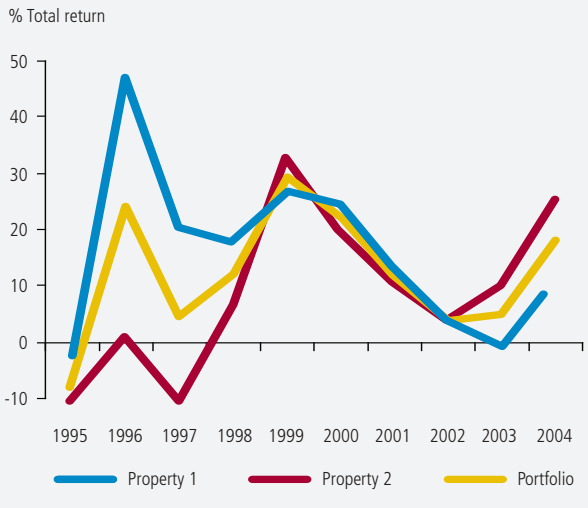
Individual property risk

All property investment involves an element of risk and investors have to deal with both systematic risks, which affect the value of all properties and specific risks, which are peculiar to an individual asset. Systematic risks include the state of the economy, changes in interest rates and the appetite of investors for property. Specific risks can be sub-divided into physical building risks and leasing risks. Physical building risk includes the design of a building, its susceptibility to obsolescence and its location. Leasing risks include lettings, expiries, renewals, the exercise of break clauses and tenant insolvencies. In general, leasing risks tend to have an immediate impact on performance, whereas the impact of physical building risks is more gradual.

Portfolio risk reduction

Risk on a property portfolio is usually measured by the standard deviation in total returns[1]. The bigger the ups and downs, the higher the standard deviation in returns. It is important to understand that portfolio risk is not simply the weighted average of individual property risks. Instead, it is a function of the standard deviation in individual asset returns, the weights of those assets and the extent to which the returns on the individual assets are correlated with each other. If the returns on the individual properties do not move completely in parallel, then the returns on the portfolio will be less volatile than the weighted average of the standard deviation in returns on each asset. In short, the whole is less than the sum of the parts. Figure 1 illustrates this phenomenon. The portfolio has a standard deviation of 11.4%, well below that of either individual property.

Figure 1: Risk reduction



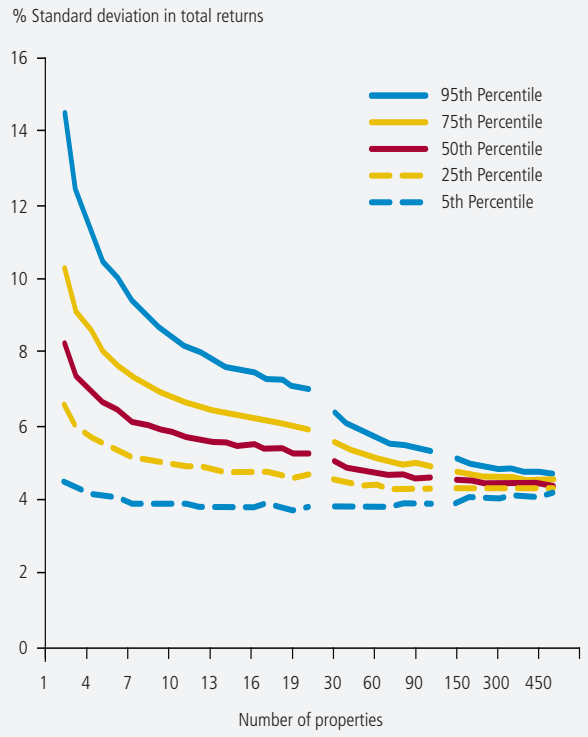
In order to investigate fully the relationship between the number of properties in a portfolio and volatility, the project team created a large number of hypothetical portfolios composed of actual properties and then measured their standard deviation in returns over the 10 years to end-2004. The approach relied upon identifying a sample of 1,700 assets in the IPD which had been held continuously between 1994 and 2004 and then randomly combining them to create thousands of hypothetical portfolios of different sizes. The simulations were run firstly for portfolios of two properties, then for portfolios with three properties and so on, up to portfolios with 500 properties.

Figure 2 shows the range in the volatility of returns for portfolios of different sizes. Some portfolios with only a handful of properties saw relatively stable returns, but others had very volatile returns. What the chart demonstrates is that as the number of properties in portfolios increased, so the incidence of funds with very volatile returns decreased.

Figure 3 shows how, on average, portfolio risk reduces as the number of properties in the fund increases. There are two main conclusions.

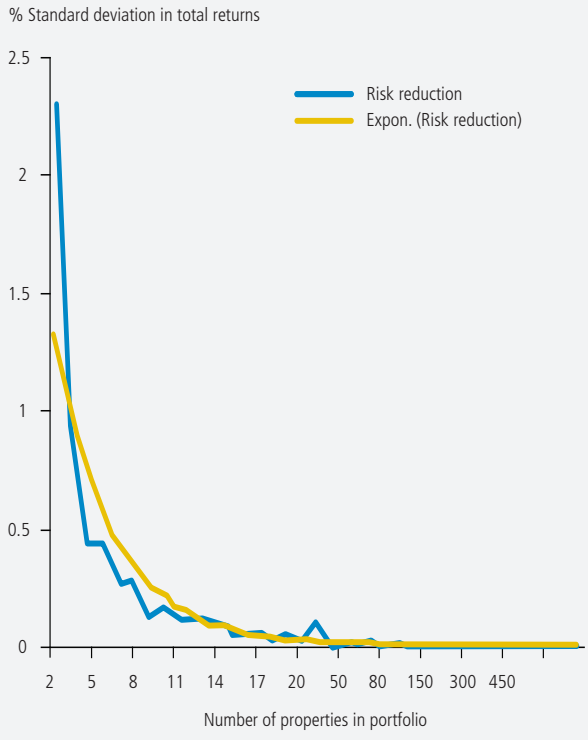
- Adding a second property to create a two property portfolio produces the single biggest reduction in risk and, thereafter, the marginal benefit of adding another property steadily diminishes. The standard deviation in returns on a portfolio with 30 properties should be two-thirds of that on a portfolio of three properties.
- However, although the marginal rate of risk reduction diminishes, it never quite reaches zero. Adding another property is always beneficial. It is therefore not possible to identify a particular size at which a portfolio can be said to have reached critical mass in terms of risk reduction.

Figure 2: Standard deviation in total returns



Note: The gaps in the lines reflect changes in the intervals at 20 and 100 properties.

Figure 3: Risk reduction – the change 1994 to 2004 for simulated portfolios in the standard deviation



Diversification

Whereas risk reduction reflects the reduction of both specific risk and systematic risk, diversification is only concerned with the reduction of specific risk from a portfolio and with how well a portfolio tracks the market. Statistically, diversification is measured by the square of the correlation coefficient (R^2) between the returns on a portfolio and the market. If all of the variance in a portfolio's returns is explained by the market (i.e. $R^2 = 1$), then it is only influenced by systematic risk and is fully diversified because there is no specific risk left.

Figure 4 presents the results of measuring diversification for the same hypothetical portfolios that were used to measure risk reduction. It shows both the R^2 coefficient and the tracking error relative to the IPD Universe between 1994 and 2004. The results reveal, for example, that the market typically explains 69% of the variation in returns on a portfolio with 20 properties and 89% of the variation in returns on a portfolio with 100 properties. A portfolio with 20 properties typically had a tracking error of 3% per year relative to the IPD Universe over the 10 years to end-2004, double the tracking error on a portfolio with 100 properties.

It is clear that the only absolute answer to the question of how many properties are required to track the market is the entire population of all investment properties. In practice, the 'right' size for a portfolio depends on the risk tolerance of the fund's investors and the degree of importance they place on tracking the benchmark average return. Unlike in sampling theory where percentages are used to reflect the degree of confidence in the results, there is nothing particularly significant about achieving a 90%, or 95% level of diversification.

Figure 5 takes the research a step further to investigate whether diversification is easier to achieve in some segments than others. The results are indicative because in certain segments such as shopping centres or City offices, the number of properties held continuously in the IPD between 1994 and 2004 is quite limited. In general, while the data on the number of properties reveal that it is easier to achieve diversification within a market segment than at the All Property level – because the All Property average reflects a mix of diverse segment trends – they tend to dispel the notion that diversification is easier to achieve in some segments and than in others. The exception is Rest UK offices where diversification is more difficult to achieve, probably because the segment covers a large geographical area and Bristol and Edinburgh offices have on occasion performed quite differently from offices in Birmingham, Glasgow and Manchester.

However, if the issue is how much it costs to achieve diversification, taking into account variations in lot sizes, then a different picture emerges. (See two right-hand columns in Figure 5). Thus, the cost of creating a specialist standard retail, or industrial fund which was 75% diversified against its benchmark would be around £100m at end-2005 capital values. By contrast, the cost of constructing a specialist retail warehouse, or office would be significantly higher at £200m-£300m.

1 The IPF report Risk Measurement and Management for Real Estate Investment Portfolios (2002) provides a comprehensive review of alternative definitions and measures of risk.

Figure 4: Diversification at the All Property level 1994 to 2004

	Number of properties in hypothetical portfolios								
	1	**5**	**10**	**20**	**50**	**100**	**200**	**400**	**500**
R-squared[2]	0.17	0.45	0.57	0.69	0.82	0.89	0.94	0.96	0.97
Average tracking error[3] (%)	–	5.35	4.06	3.06	2.09	1.54	1.14	0.86	0.78

Figure 5: Diversification at market segment level 1994 to 2004

	Number of properties required to achieve diversification of:		Average capital value	Portfolio capital value £m required to achieve diversification:	
	50%	75%	£m end-2005	50%	75%
Std. Retail – South East	3	16	6.9	21	110
Std. Retail – Rest UK	2	9	6.7	13	60
Shopping Centres[4]	3	12	84.9	255	1,018
Retail Warehouses	3	12	24.9	75	299
City Offices[4]	3	10	22.2	67	222
West-End Offices	3	11	16.2	49	178
Rest of S.E. Offices	4	14	15.6	62	219
Rest of UK Offices	6	30	9.9	59	296
Industrial South East	3	11	9.4	28	103
Industrial Rest UK	4	15	6.1	24	91
All Property	7	30	13.4	94	401

The Executive Summary of the report is available on the IPF website.

The full report can be purchased from the IPF. Please contact Research Director, Louise Ellison, at lellison@ipf.org.uk or call her on 020 7194 7925

2 The R-squared value is the proportion of the variance in portfolio returns that is explained by the market. The R-squared can range from 0 to 1.

3 Tracking error measures the standard deviation in the differences in returns between a fund and its benchmark. The data show the average annual difference in percentage points per year.

4 Results for shopping centres and City offices are limited by the small number of held properties.