Extreme Events in Commercial Property Returns

The IPD Monthly Index of Total Returns across all commercial property classes registered a fall of 3.56% in November 2007, the biggest drop in its twenty year history. The November 2007 falls within each class – office, retail and industrial - are also the largest recorded since the series began in January 1987.

	Biggest previous monthly fall	November 2007
All property	-1.76	-3.56
Office	-2.55	-3.63
Retail	-1.64	-3.88
Industrial	-1.43	-2.72

Table 1: Monthly Percentage Change in Total Returns, January 1987 – November 2007
Source: IPD and Volterra analysis

But in fact the situation is even worse than implied by the percentage changes alone. The November falls are so extreme that it is not possible to provide reliable estimates of the probability of them occurring using standard techniques.

The problem starts with the fact that the data are not normally distributed; formal tests for the existence of a Gaussian (or normal) distribution are rejected at the conventional significance level of 5 per cent.

If we could assume a normal distribution, Volterra's analysis shows that a fall of the size observed in November would only be likely to happen once every 15,000 years. We know theoretically that the true frequency is more than this – fat tails means there are more extreme events than a normal distribution allows, but the extreme nature of these falls is shown clearly by the difficulty of providing reliable estimates of their frequency even using advanced techniques.

Which ever way we look at it, the commercial property market is experiencing a highly unusual set of events.

A reversal of the downswing in property yields that resulted from capital values rising in relation to rental income has been anticipated for the past two years. But it is unlikely that anyone had expected the reversal to be so rapid or strong. As in other investment markets, only a return to more normal funding mechanisms can produce a return to normal pricing patterns. As our analysis indicates, however, what can be considered normal for commercial property market movements may be less normal – and more extreme – than the usual expectations would suggest.

Because the data are 'fat-tailed', the IPD Total Returns series contains more extreme observations in the tail than a Gaussian (normal) distribution allows. This is true even when the November observations are excluded from the analysis, indicating that the tendency to extreme movements is not a one-off for this series.

Surprisingly, even using a more sophisticated approach by calibrating the probability density functions of the data does not help in estimating the probability of the November observations. Density estimation is the construction of an estimate, based on observed data, of an unobservable underlying probability density function[1]. Even using the calibrated empirical distribution it is not possible to produce reliable estimates of the likelihood of the November observations, because they occur so far out in the tail of the distribution.

However an indication of the extreme nature of the November falls can be provided by calculating the number of standard deviations they are below the relevant mean value. For all property, this is 5.7 standard deviations, in office 4.7, in retail 6.4, and in industrial 4.4. For normally distributed data, by comparison, 99.7 % of observations can be expected to lie within 3 standard deviations of the mean.

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[1] Silverman, B. (1986) *Density Estimation*, Chapman Hall