

The causes of portfolio risk

This article is based on the study carried out by Gerald Blundell, Malcolm Frodsham and Roberto Martinez Diaz under the IPF Research Programme. The full report, 'RISK WEB 2.0 – an investigation into the causes of portfolio risk' is available on the IPF website, www.ipf.org.uk

Traditionally the property industry has defined portfolio risk in terms of the tracking error of portfolios – the extent to which through time the portfolio return deviates from benchmarks. However these variance-based measures of risk suffer from a number of drawbacks:

- They are non-diagnostic; a tracking error gives no indication of what caused it;
- They are retrospective; measures of variance depend on long strings of past data which in all probability relate to properties no longer in the portfolio;
- The underlying assumptions of using standard measures of variance frequently imply a market that is much more efficient than empirical observation has found it to be; and
- Past volatility is a poor predictive guide to future relative performance; the past is not a good guide to the future.

It was to overcome these problems that the concept of a Risk Web was launched in 2003. This is a diagram that charts portfolio scores on 12 risk factors relating to tenant quality, lease length, stock concentration and so on. Each portfolio has a profile on the Risk Web, which is compared to its benchmark so that the relative risk exposure across a range of measures can be identified.

The advantages of the approach are that it was clear what factors were behind the risk; it looked forward, not backwards; and it dealt in terms that managers could use to adjust their portfolio's risk. The selection of the factors was partly justified by the analysis of how the factors correlated with subsequent differences in portfolio returns, but owing to the absence of data was in part conjectural.

The objectives of this study are threefold:

- To update the original 2003 Risk Web 1.0 analysis now that longer and more extensive time series are available, with a view to developing a better understanding of what causes portfolio risk and how these causes vary through the cycle; plus introducing factors such as leverage that were not included in the original study.
- To develop quantitative models of portfolio risk to see how much can be systemically explained. It should be noted that this is not a forecast of market risk per se; it is an attempt to predict how a portfolio will behave relative to the market's ups and downs. In this study, portfolio risk is defined as this residual difference in performance between the portfolio and the market; the greater the difference, the greater the risk.



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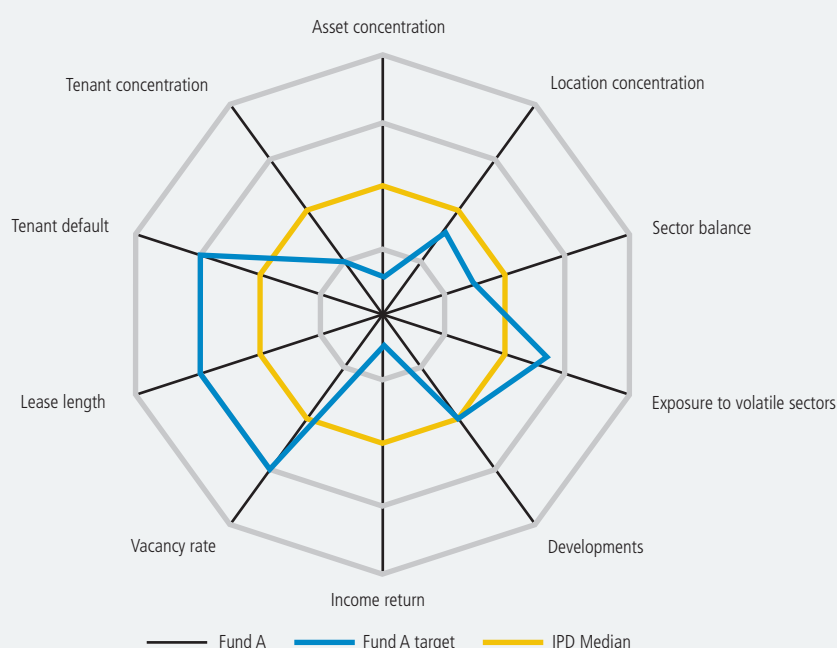


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Figure 1: Risk Web 1.0, 2003



- To identify those evergreen risk factors usually present through the cycle.

Study approach

The study identified 43 factors potentially pertaining to portfolio risk and drawn from IPD's records. They related to some 250+ portfolios over the period from 1998 to 2009. The factors fall into eight groups. The first five measure the diversification in the portfolio in different dimensions; locations, type, remaining lease length, tenants and lot size. In each of the five cases, four alternative measures of diversification are tested. The other 23 factors are classified broadly under growth, income and manager activity. All of the factors included in Risk Web 1.0 are included, plus a number of tenant-related factors that could not be analysed in 2003.

These factors were correlated against portfolio risk in subsequent years. For the purposes of this study, risk is defined as the difference (positive or negative) between a portfolio's return and that of the unweighted average of the sample. This is referred to in the study as 'absolute' risk.

A positive difference (outperformance) is treated as just as risky as a negative difference. As well as absolute risk, two other definitions were used on occasion; 'nominal' risk with the plus and minus signs restored, and 'downside only' risk, where only negative differences were taken into account. These proved useful in identifying factors that only kicked in when capital values were under pressure.

The factors were analysed in three phases. First, all the factors relating to direct properties were correlated to differences in return based on direct properties only. This effectively repeated the Risk Web 1.0 approach. Then secondly indirect assets were taken into account. These are largely exposure to co-mingled vehicles of various sorts, but also include derivatives, quoted company shares and any asset not classified as a direct holding. The factor, described as '%indirect' was the only available proxy for the growing exposure of portfolios to vehicles, a factor not included in the original risk web. Thirdly, leverage was introduced into the analysis, focussing on the AREF sample of 50+ portfolios and using leveraged returns as reported by PPFI.

At both the second and third stage, answers to the same three questions were sought: How much did indirect assets and then leverage increase risk; Did their effects vary through time; and what effect did indirect asset and then leveraged returns have on the other factors?

The results of these exercises produced the basis for several models of future risk, some with interesting levels of significance. It also provided a short list of factors for a risk scorecard.

Results: Directly-held assets

Over the 11-year period studied, total return (TR) risk one year forward (TR1) rose steadily – in 1999 average TR1 was +/-

1.9%, by 2009 it was +/- 5.2%. The rise was due almost entirely to a rise in capital return differences (CG1), differences in income returns (IR1) being largely static at around +/- 0.7%. It probably reflects the increase in the presence of specialist funds, as segment concentration was also rising throughout the period; while vacancy rate followed a cyclical but rising pattern especially over the last couple of years. From 2006, when real capital returns went negative, TR1 and CG1 spiked upwards as portfolios' reaction to events diverged. At the same time, the portfolios' dispersion around these means increased, especially after 2005. In 2009, mean TR grew rapidly, as did the dispersion around it. It will be recalled that 2009 saw a rapid recovery in values driven by yield compression at the prime end of the markets. Clearly not all portfolios shared in the recovery.

Why should TR1 and CG1 have jumped so much in 2008 and 2009? Inspection of average factor values reveals that by the end of 2008 several risk factors were sharply higher. Apart from vacancy rate, 2008 saw a rapid increase in sales – net investment fell from +0.8% of end year value in 2007 to -7.2% in 2008. These factors could have caused fund returns to diverge in 2009.

So which evergreen factors proved to be significantly linked to TR1 more years than not? The majority are structural measures of various types of portfolio concentration, region, segment, property type, stock, tenant and the timing of lease termination. A consistent theme is the need to diversify in a number of dimensions to reduce risk, a key feature of Risk Web 1.0.

The full list of factors identified was reduced to 12 because some factors were highly correlated with other preferred factors. When two factors are highly correlated, they are effectively linked to the same part of TR. So to include both is to double count their influence. These 12 factors divide into two groups; nine evergreen ones that are significantly related most of the time and three that are cyclical, in that they become significant after periods when real capital values have been falling. The nine evergreen factors are as follows:

- Property type concentration
- Regional concentration
- Weighted type tracking error
- Lease length concentration
- % value of five largest assets
- average lot size
- tenant concentration
- relative equivalent yield
- TR1 in the year

Of these, only relative equivalent yield was linked using a downside only definition of risk – suggesting that relatively low yields may be associated with lower relative returns, but the reverse is not proven (that high yields link with higher returns).

The three cyclical factors and the years they were significant are as follows:

- % value in development: 1999, 2003, 2008, 2009
- relative covenant strength: 2002, 2003, 2008
- vacancy rate: 2002, 2003, 2005, 2008, 2009

The years when these factors significantly correlated with subsequent TR1 are mainly following a period when values were under pressure.

The study found that correlations tended to improve when a two or three year time horizon was used. A possible explanation is that property portfolio returns are frequently subject to idiosyncratic events such as a change in valuer, the addition or removal of very large assets, changes in manager, the tax environment etc. Over two or three years there is an increasing chance that the effect of these events will self cancel, leaving a greater proportion of potentially explainable variance in returns behind. The finding was reflected in the better quality of regression results when TR2 and TR3 were the dependent variable – lending weight to the practice of judging portfolios' relative performance and risk over several years, rather than just the latest one.

The typical tracking error in total portfolio returns is in the range of +/- 2% to 3% in any one year. In 2008/9 it has been substantially higher; greater market volatility has exposed greater differences in the way portfolios perform.

Factors relating to portfolio concentration are the most reliable indicators though time and across the different components of return. Factors relating to growth (development, covenant strength and vacancy rates) are most significant when real capital value is falling.

Analysis of multi factor models on recent years' data suggests that, although twelve of the candidate factors are linked to risk, they do not readily combine into a model that could be used for predictive purposes.

Adding indirect assets

Adding indirect assets' returns to direct ones marginally increased portfolio risk. This may be a function of indirect exposure to leverage, although the effect is offset by the extra diversification offered by some vehicles.

However only in two of the years did fund exposure to indirect assets significantly correlate with TR1. Using overall portfolio returns had little impact on the direct asset only results reported above.

The effect of leverage

Leveraged returns produced much higher levels of TR1 than either direct only or total asset returns. It also correlated strongly, positively and significantly with TR1, with the level of significance rising considerably over the last couple of years.

The study found that the level of LTV at end 2008 was significantly correlated with unleveraged returns, a co-efficient of 0.35. In other words, funds with relatively risky portfolios had been seeking to enhance their returns further with debt. Similar correlations were found in 2002, 2006 and 2007, years when some of this debt would have been originated.

The influence of debt through the cycle was analysed in terms of nominal and downside only measures of TR as well as absolute return differences, the measure largely adopted by this study. LTV is positively and significantly correlated in all but one year, 2005. The picture changes in the light of nominal measures. In the first part of the cycle, LTV is positively correlated; the extra risk paid off with higher returns. This changed in 2007, the correlation sign turns strongly negative as capital values fell and it stayed negative in 2008 and 2009.

Because the use of leverage directly affects returns, debt drowns out the effect of other sources of risk. In their absence, LTV dominates the causes of risk. This explains why apparently disparate asset classes suddenly started to show high correlations during the financial crisis. Although their fundamental characteristics and risks were different, the presence of debt rendered them as one; or if not that then similar enough for the values to move in concert.

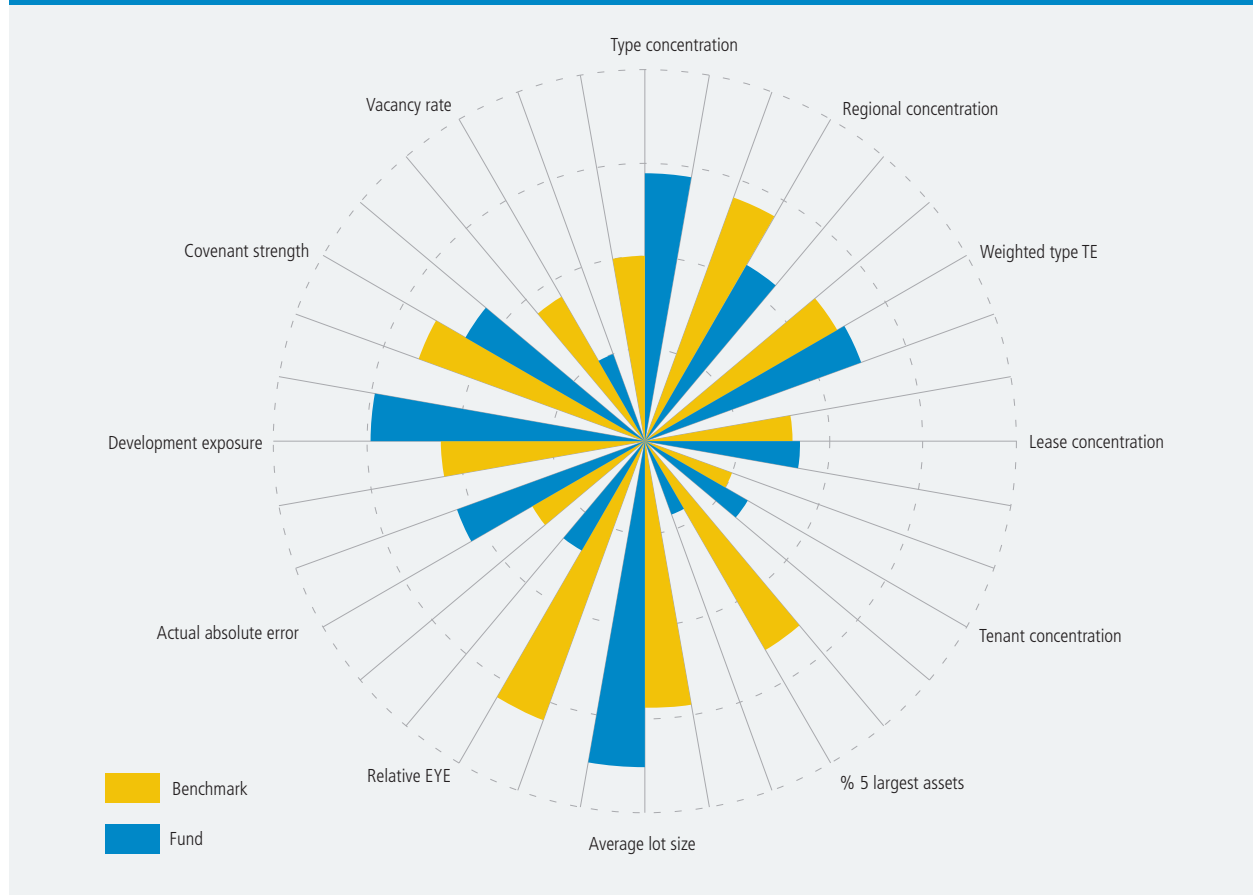
Adding debt to a portfolio increases its risk, a risk that rises exponentially as either debt is increased or values fall. A key band between 30% and 40% LTV seems to exist at end 2008. Below this band, modest levels of debt have a limited impact on risk; above it and as LTV rises risk soars.

While the results on leverage underline the logic of distinguishing between core plus, value added and opportunistic fund styles on the basis of leverage; they suggest that other factors might be taken into account as well when defining fund style. Through time it is clear the level of gearing varies both as a function of capital returns and also as a result of management decisions. It is therefore quite possible that the level of gearing could reduce relatively quickly, revealing again the risk factors previously masked by leverage.

Towards a risk scorecard

Although models of risk could not be developed that were robust through time, the results of the analysis did provide enough material for the development of a risk scorecard as a number of evergreen factors emerged as relevant in most years. In the full report there are several illustrative methods for compiling the individual factors together into a risk scorecard. The methods were back-tested against the actual portfolios

Figure 2: Risk Web 2.0, 2011



used in the study to ensure the overall scores emerging correlated with the actual TR1s experienced by the portfolios.

Concluding comments

What does this study tell us that we didn't know before?

First, we now know there is an alternative approach to dealing with risk than the retrospective, non-diagnostic study of past return volatility. The study has identified a set of factors that both practical experience and statistical analysis suggest influence future risk in portfolios. It was striking that only one variance based factor found its way into the final risk factors selected. Many of the volatility based measures failed to relate significantly in more than a few of the years covered by the study; and a number of them were strongly intercorrelated and so could not all be used. While this came as a surprise, perhaps on reflection it should not. After all, if past performance is a poor guide to the future, why should the volatility in that performance be any better?

Second, the study highlights the critical role of leverage. This has emerged as a feature of markets over the past decade and it is here to stay. The importance of leverage as such was not so much of a surprise as this is well documented; rather it is the way it drowns out the other risk factors by changing portfolio returns. Whilst they retain a latent influence waiting to be seen when the volume of leverage is turned down, any risk mitigation they offer is masked while leverage is in place.

It is hoped that the analyses reported here will stimulate thinking about risk in property and throw up new lines of analysis that the authors have not envisaged. For too long risk in property has been in thrall to conventional capital market theory; it is time property developed approaches more suited to its intrinsic characteristics as a distinct actively managed asset class.