IPF Investment Property Forum

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Index Smoothing and the Volatility of UK Commercial Property

Executive Summary

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This research was commissioned by the IPFET and IPF Joint Research Programme

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This research was commissioned and partially funded under the auspices of the IPF Educational Trust and IPF Joint Research Programme. The three-year programme supports the IPF's wider goals of enhancing the knowledge, understanding and efficiency of property as an investment class. The initiative provides the UK property investment market with the ability to deliver substantial, objective and high quality analysis on a structured basis. It will enable the whole industry to engage with other financial markets, the wider business community and government on a range of complementary issues.

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The research team

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The project steering group

The IPF appointed a project steering group to guide and assist the research team. They gratefully acknowledge the contribution from the Chairman – Robin Goodchild (LaSalle Investment Management) – and Richard Barkham (Grosvenor), Martin Cumberworth (Prudential Portfolio Managers), Nick Mansley (Morley Fund Management) and Charles Follows (IPF).

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Executive summary

The study is an investigation of smoothing in UK valuation indices for commercial property. The report addresses four principal questions:

- Why do we think property indices are smoothed and understate risk?
- What alternative desmoothing techniques are available, and what is the best estimate of adjusted property risk?
- How much do upward revisions to property risk affect the weighting of property indicated by asset allocation models?
- What desmoothing methods are used by leading fund managers and investment advisors, and is there a consensus view on property risk?

Why do we think property indices are smoothed? (Section 2)

The view that valuation indices understate risk rests on several, mutually supporting, sources of evidence:

- The valuation process, which relies on backward-looking comparables and is surrounded by a substantial measure of uncertainty, and is therefore likely to result in individual property valuations which vary less than market prices.
- The aggregation of individual property valuations into an index may also introduce smoothing of the variation in market prices, because different valuers react with varying lags to price signals.
- Statistical analysis of index results shows characteristics consistent with those hypotheses: a degree of predictability, or serial correlation, in property performance from one period to the next.
- Comparisons against other asset classes, which on index results show property risk below that on gilts, whereas the fundamental nature of property cash flows and property's rate of return are both consistent with a risk above gilts.
- Finally, the practical consideration that asset allocation models fed with index results indicate implausibly and unattainably high weightings of property in mixed-asset portfolios.

Desmoothing techniques (Section 3)

The majority of desmoothing methods proposed by different authors rest on the theory that current property valuations are a weighted average of new market evidence and previous valuations. On this view, a desmoothed estimate of property can be recovered from a series of valuations by the formula:

$$\text{True Return}_t = \frac{(\text{Valuation Return}_t - k \times \text{Valuation Return}_{t-1})}{(1 - k)}$$

Where k is a desmoothing coefficient taking a value between 0 and 1, which represents the weighting in current valuations of new market evidence. We have tested five alternative desmoothing techniques using this basic formulation. The results produced by desmoothing methods are influenced by several other choices such as the length of history used to calibrate the analysis, and the target characteristics of the desmoothed returns series.

Results from extensive tests of the full range of these alternative methods and data sets show that:

- With different choices of method and calibration, the indicated adjustments to property risk vary from a lower risk than shown by valuation index figures up to a multiple of nearly three times the risk shown by index figures.
- Because more sophisticated methods are more likely to produce extreme results, and often demand more judgemental input, the simplest Lag 1 autoregressive desmoothing technique is the most robust.
- Our central, or preferred, estimate of property's historic standard deviation in annual total returns is 13% to 15%, or 1.3 to 1.5 times that observed in the unadjusted index results.

Impacts of desmoothing (Section 4)

The dominant practical application of desmoothing property returns is to offer a more credible comparison of property with other asset classes, and to make property a better fit in standard asset allocation models. We have tested the impacts of varying desmoothing assumptions on the property weights indicated by models based on Mean Variance Portfolio Theory (MVPT) and Asset Liability Modelling (ALM).

Desmoothing results in a significant change in the relationship between property and competing asset classes:

- Our preferred estimate of property standard deviation at 13% to 15% puts property risk in its expected position between equities and gilts, and also results in higher correlations with equities and gilts returns.
- The increase in correlations with equities and gilts, however, tend toward upper limits well below 1, so that property retains substantial diversification benefits even at extreme levels of desmoothing.

MVPT models run on historic data and, in a variety of formulations, continue to indicate high property weights with all but the most extreme desmoothing assumptions:

- In models with varying specifications the indicated property weights remain in the range of 20% to 65% (depending on time period covered) when our preferred estimates of desmoothing are applied.
- The weight of property falls below 10% only if property risk is assumed to be over 20%, more than double that shown by index figures.

Tests of ALM models using different specifications of liabilities and degrees of risk tolerance show that:

- With property risk adjusted to our preferred level, the indicated property weight falls in the range of 12% to 20% in the different types of ALM portfolio, and the property weight falls below 10% only if the assumed property risk is more than doubled.
- Overall the property weights indicated by ALM methods are below those produced by MVPT models when run over the same period, but still above the typical weights of institutional investors.

Industry practice in desmoothing and asset allocation (Section 5)

A survey of 13 leading fund managers, asset allocators and advisors was undertaken to gather opinions on the importance of desmoothing, use of desmoothing methods, and the incorporation of property in multi-asset portfolios.

There was general agreement that the historic property risk is understated by valuations indices, and should be adjusted.

- A majority of firms use their own estimates of risk, mostly produced by the simplest Lag 1 autoregressive desmoothing method.
- Estimates of true property risk averaged 13.8%, with almost all in the range 13% to 15%, falling in line with our own preferred estimate of risk.

The forward-looking assumptions used in asset allocation modelling reflected this view:

- Over a five to 10 year horizon, property returns were on average expected to run just under 7%, with an expected standard deviation a little over 13%, slightly higher correlations between property and other assets from those observed historically.
- Run with these expected return profiles, quantitative asset allocation models indicated property weights from 15% to as high as 50%. The typical advice to clients offered by respondents was, however, a recommended property weight in the range 10% to 15%.

Findings and conclusions (Section 6)

There is an overwhelming case that property valuation-based indices are smoothed, and property risk should be adjusted. That case rests on the consistency between theoretical, empirical and practical perspectives rather than any one piece of evidence.

Desmoothing methods are, unfortunately, capable of producing a wide range of risk estimates, dependent upon the choice of method and data set. Our central, preferred estimate of historic property risk is 13% to 15%, or 1.3 to 1.5 times that observed in the valuation index. The most robust desmoothing method is the simplest Lag 1 autoregressive filter, calibrated over the period from 1971 onward.

The consensus among leading practitioners is that property risk should be adjusted, with historic estimates averaging 14%, and forward looking estimates averaging 13%. Both our own tests of asset allocation models under a range of formulations, and the results reported by practitioners, show that even after upward adjustments to property risk quantitative models indicate property weights of at least 10%, and usually significantly higher. Desmoothing does not, therefore, remove the case for property weights in multi-asset portfolios higher than currently held by all but the largest property investors.

1. INTRODUCTION

The property investment industry relies heavily on indices of market performance. Indeed, it is unlikely that commercial property could maintain a major role in investment portfolios without credible measures of the returns generated by the asset class. But, although it is generally accepted that standard indices of property performance understate the risk of property investment (Booth and Marcato, 2004), there is a large measure of uncertainty as to methods of adjusting that risk, or the extent to which it should be adjusted. This report, which summarises a full technical report from the study, addresses four questions:

- Why do we think property indices are smoothed and understate risk?
- What alternative desmoothing techniques are available, and what is the best estimate of adjusted property risk?
- How much do upward revisions to property risk affect the weighting of property indicated by asset allocation models?
- What desmoothing methods are used by leading fund managers and investment advisors, and is there a consensus view on property risk?

Academic researchers agree that valuation based indices understate property risk, but produce widely varying figures on how much risk is understated. A recent review of academic articles on the topic showed different authors recommended the risk, as measured by the IPD UK Annual Index, should be multiplied by factors anywhere from 1.5 to 3.5 (Geltner et al, 2002). Nor is there an academic consensus on the methods which should be used to adjust the numbers. The leading UK textbook on property investment, after an extensive discussion of the question, concludes 'we still don't know the best way to remove smoothing from a valuation index' (Brown and Matysiak, 2000).

This leaves the topic of property risk in a state of undesirable uncertainty. The level of risk is, of course, a central input to the primary choice on which the property industry is expected to offer informed advice to investment clients: how much property should they hold in their portfolios? Different assumptions do more than change the direct comparison of the risk of property with other asset classes. They can also change the correlation between property returns with those on other asset classes, and thus the portfolio diversification benefit which is one of the primary attractions to investors. The lack of a well-informed and accessible view on the question, and if not a consensus view on what the true level of risk is then at least a well-justified range of estimates, is damaging to the credibility of property as an asset class. At worst, it could leave the industry open to the accusation of misrepresentation, particularly as property is being more widely marketed to small investors.

The study does not set out to devise a new technique for adjusting risk, or to recommend the use of any one method. Any estimate of 'true' or adjusted property risk remains in part a matter of judgement, and leaves room for alternative views. In that spirit, the Desmoothing Project Spreadsheet available alongside this report includes all the property data sets used in the work, with tools which allow the user to apply assumptions different from our own.

Our overall objective is to provide a basis for a broad industry consensus on the correct representation of property risk. Throughout, the approach to the research has been to synthesise previous work on the subject and to demonstrate the implications of desmoothing applied to the key sources and methods used by practitioners.

2. WHY DO WE THINK PROPERTY INDICES ARE SMOOTHED?

The view that valuation indices understate risk – that they are a 'smoothed' depiction of market behaviour – rests on several, mutually supporting, propositions and pieces of evidence. It is asserted that the fundamental source of smoothing lies in the valuation process itself and also in the aggregation of valuations into indices. Supporting evidence for smoothing comes from the way valuation indices behave and from the comparison of property returns and risks with those of other asset classes, which runs counter to the behaviour predicted by financial theory. And there is a final practical case that property performance results need to be adjusted to produce plausible property weightings from the investment industry's asset allocation models.

Smoothing for an individual property arises if valuations are a damped response to movements in market prices. Thus Blundell and Ward (1987) depict current valuations as a weighted average of two types of information: new market evidence and the last valuation so that:

Current Valuation = (1 – k) x Market Price + k x Last Valuation

where k is the weight of a previous valuation in the current valuation.

A value of k equal to 0 would indicate therefore a valuation wholly based on current market evidence, and hence a true market price. Quan and Quigley (1991) suggest that blending previous valuations and current market evidence is a rational way of dealing with uncertainty in the interpretation of transactions comparables. This depiction of the valuation process gets some support from studies of the way valuers react when fed varying information on past valuations, as reviewed in Hanz (2004).

Smoothing may also arise from the compilation of individual property valuations into an index (Brown and Matysiak, 2000). If different valuers have a varying reaction time to the same market signals, a given change in market prices will ripple through the valuations of individual properties over time, so that in a weighted index the price change will be attenuated. So index results could be smoothed even if there were no smoothing in individual valuations.

The existence, and the extent, of smoothing arising from valuer behaviour and from index compilation is difficult to measure without access to large sets of data on individual properties which are not available in the public domain. Strong supporting evidence, however, comes from the behaviour of index results. Basic financial theory (Fama, 1965) holds that in an efficiently priced asset market it is impossible to predict current returns solely from those in past periods. In other words, it will be impossible to identify a statistical relationship between current and prior returns.

Table 1: Serial correlation in IPD returns

	Annual 1971 – 2005	Annual 1981 – 2005	Monthly 1987 – 2005	Quarterly 1987 – 2005
Serial correlation	0.28	0.42	0.87	0.85
t statistic	1.66	2.17	25.93	13.60
p value	0.06	0.02	0.00	0.00

Property index results, however, do show a strong statistical linkage – serial correlation – between returns in successive periods (Table 1). Large positive serial correlations indicate high returns in one period tend to be followed by high returns in the next and vice versa. This pattern is in line with what would be expected from smoothing in valuations or through index aggregation: a one period change in market values is being spread out over several periods in the

valuation index. Very high serial correlation in monthly and quarterly returns in the UK, and in annual returns from non-UK countries, indicate returns are very heavily smoothed. For annual returns in the UK, however, the results suggest a rather weaker smoothing effect, with a lower level of statistical significance over longer runs of history.

Additional weight is given to the argument that risk is understated when the results from property indices are compared with other asset classes. Both the fundamental nature of property cash flows, its mix of fixed-income and equity characteristics and realised returns on property between those on gilts and equities, suggest that property risk should stand above gilts but below equities. Index results, however, show property risk little more than two-thirds that on gilts, an implausibly low figure (Table 2).

Table 2: UK risk (standard deviation) by asset class

	Property	Equities	Gilts	T Bill
1951-2005	9.4	27.6	13.6	3.7
1971-2005	10.3	0.7	14.5	3.6
1981-2005	8.4	15.1	12.1	3.5
1991-2005	9.9	30.7	14.2	3.6

Source: Barclays Capital Equity / Gilt Study, Scott(1996), IPD

The final source of evidence that property risk is understated is practical rather than theoretical or statistical. Because property risk against other asset classes does not fit with the relationship expected from financial theory, many studies (for example, Lee, 2003) have demonstrated that asset allocation models produce implausibly high weights of property in optimal asset portfolios. On our calculations, using unadjusted index figures on return and risk, the optimum portfolio of UK assets (defined by the maximum Sharpe ratio) would hold a property weighting from 30%, and up to 80%, depending on the period over which the exercise is estimated.

Table 3: UK optimised portfolio weights

		Weightings by asset class			
	Return% - Risk %	Property	Equities	Gilts	Cash
1951-2005	11.8 - 9.8	77%	19%	0%	4%
1971-2005	12.4 - 7.8	61%	10%	7%	22%
1981-2005	12.3 - 7.3	49%	29%	21%	2%
1991-2005	7.9 - 1.7	31%	0%	2%	67%

Source: Scott, IPD, Barclays Capital Equity-Gilt Study

Together, there is a strong theoretical, empirical and practical case that valuation indices understate property risk, with a consistent picture from varying perspectives. Overall, therefore, the evidence leaves the analyst faced with a choice. Either the application of many of the financial theories applied to all other asset classes to the analysis of property has to be abandoned, or index results have to be taken as an imperfect measure of property returns.

3. DESMOOTHING METHODS AND PROPERTY RISK

Academic articles running back over nearly 20 years have proposed a variety of desmoothing methods to adjust property risk. Different authors have applied varying methods, and run their analyses on different periods of index history, or on index results produced at different frequencies. These differences account for the lack of consistency in estimates of property risk produced by different authors. The study has aimed to pin the estimate of property risk into a narrower and more robust central range by testing a set of standard methods across the choices of time period, index frequency and calibration methods available to the analyst.

The techniques used to adjust, or desmooth, property returns mostly rest on Blundell and Ward's (1987) formulation of property valuations as a weighted average of current market evidence and previous valuations, coupled with the degree of serial correlation in index results. Converting from the capital values to total returns, a desmoothed estimate of total returns can be recovered from a series of index returns by the formula:

$$\text{True Return}_t = \frac{(\text{Valuation Return}_t - k \times \text{Valuation Return}_{t-1})}{(1 - k)}$$

Where k is a desmoothing coefficient taking a value between 0 and 1, which represents the weighting in current valuations of new market evidence.

We have tested five specific desmoothing methods, drawn from the extensive literature on the topic. The simplest desmoothing technique (the Lag 1 autoregressive method) – uses a fixed value of k applied to returns in successive periods (Geltner, 1993a). More elaborate methods of the same basic formula take into account additional lags, or a hypothesised relationship between property risk and that on equities (a Lags 1-n method and Equity Volatility method respectively, both from Fisher, Geltner and Webb (1994). Two additional methods allow for varying values of the desmoothing coefficient, with upswings and downswings in the market (a Market States method from Chaplin, 1997), or by changes in the extent of observed serial correlation over time (a Time Varying method from Brown and Matysiak ,1998).

None of the methods offer a purely statistical solution to the question of how much property risk should be adjusted. All of them depend on the choice of a value for the desmoothing coefficient k, which cannot be directly observed (at least without extensive analysis of individual property data). In addition to the choice of method, the results produced by desmoothing are influenced by several other choices such as the length of history used to calibrate the analysis, the frequency at which returns are measured (annual, quarterly or monthly) and the target characteristics of the desmoothed returns series.

Taken in combination, these options form a large matrix of results and potential conclusions on desmoothing and adjusted property risk. The large set of choices accounts for the wide range in estimates of adjusted property risk (from 1.5 to 3.5 times that shown by index figures) apparent in the academic literature. Table 4 gives an illustrative set of estimates of property risk for the IPD UK Annual Index based on a combination of methods, time periods, and alternative criteria for setting a value of the desmoothing coefficient based on the serial correlation remaining in the desmoothed returns series.

3. DESMOOTHING METHODS AND PROPERTY RISK

Table 4: Standard deviations in desmoothed returns

	Scott / IPD Actual	Lag 1 Method	Lags 1&2 Method	Equity Volatility	Market States	Time Varying
Strong desmoothing (residual serial correlation = 0)						
1951-2005	9.4	**13.6**	**11.9**	**13.8**	**15.8**	..
1971-2005	10.3	**15.3**	**14.8**	**15.4**	10.4	**16.9**
1981-2005	8.4	**21.1**	**11.0**	7.6	**24.2**	**13.9**
1991-2005	7.0	8.5	5.3	7.9	8.5	9.1
Moderate desmoothing (residual serial correlation = 0.25)						
1951-2005	9.4	9.9	9.2	**13.8**	10.4	..
1971-2005	10.3	10.7	10.5	**15.4**	11.2	10.7
1981-2005	8.4	**12.0**	7.5	7.6	**12.2**	9.9
1991-2005	7.0	7.1	5.0	7.9	7.0	7.1
Neutral desmoothing (Parameters set by index serial correlation)						
1951-2005	9.4	**13.0**	**11.9**	**13.8**	**14.0**	..
1971-2005	10.3	**13.8**	**10.7**	**15.4**	**15.3**	**15.8**
1981-2005	8.4	**13.2**	7.5	7.6	**14.1**	10.5
1991-2005	7.0	8.5	5.0	7.9	8.1	**10.3**

Source: Scott, IPD

Note: figures in bold show desmoothed volatility higher than Index at 10% significance level

The three panels of the table show alternative criteria for setting a value of the desmoothing coefficient k, which affect the final estimate of property risk. The strong desmoothing criterion sets of value of k which leaves no serial correlation in the desmoothed property returns. It may be taken as an upper estimate of risk because it assumes an information efficient market with no frictions from the time or costs of executing transactions. The moderate desmoothing assumption allows some serial correlation in returns to reflect the large transactions delays and costs which apply to property investment (Brown and Matysiak, 2000). The neutral desmoothing case (following Geltner, 1993b) sets no prior target for serial correlation, but sets values for k from the serial correlation characteristics of the index.

Results from these desmoothing alternatives show a wide range dependent on method and time period: the indicated adjustments to property risk vary from lower risk shown by valuation index figures up to a multiple of nearly three times the risk shown by index figures. Taking into account results for monthly and quarterly index frequencies as well as the annual frequency shown in Table 4, our analysis has aimed to narrow that range to a robust central estimate, which is the most consistent across index frequencies, runs of history and choice of calibration strategy. The IPF Desmoothing Project Spreadsheet available alongside this report contains all the data sets and formulae used in the analysis, to allow others to make their own judgements.

Our principal conclusions on desmoothing methods are:

- Desmoothing can be applied either to capital values or total returns. Although desmoothing capital values is technically more correct, it adds complexity and potential errors in the compounding of income return. In practice, there is no significant difference in the estimates of risk from desmoothing at the level of total returns.

3. DESMOOTHING METHODS AND PROPERTY RISK

- The simplest Lag 1 autoregressive desmoothing technique is the least likely to produce extreme and implausible results, and involves less judgemental inputs, than the more elaborate desmoothing techniques and is therefore our preferred method.
- The choice of time period over which desmoothing methods are applied has a substantial impact on results. We believe the period 1971 to 2005 is the most reasonable run of data to use, because it avoids structural breaks in longer index series and the dominance of the late 1980s to early 1990s cycle in the characteristics of shorter series.

Our preferred, or central, estimate of the appropriate adjusted property risk has been taken from the range of desmoothing techniques, length of return histories and target characteristics of the desmoothed returns (such as tolerance for remaining serial correlation). There is no single factor on which the best estimate of adjusted property risk can be based. Rather, the preferred estimate rests on a combination of characteristics such as consistency over varying periods, index frequencies and calibration criteria. Taking these factors together, we identify a central tendency toward estimates of adjusted risk which, in terms of standard deviation, fall in the range 13% to 15% per year, or 1.3 to 1.5 times the standard deviation seen in the original index. These figures form our best estimate of the range in adjusted property risk.

Outside of the technical aspects of the desmoothing process, this estimate of adjusted property risk is to some extent supported by other approaches to the problem, and by comparison with other asset classes. Preliminary results from a transactions based, rather than valuation based, UK index estimate risk at the lower end of our preferred range at 12.5%; the volatility in property share values suggests (after taking account of leveraging) a volatility of 15%, at the upper end of the range and a standard deviation of 13% to 15% puts property risk back in the expected range between gilts and equities.

4. DESMOOTHING IMPACTS ON THE PROPERTY WEIGHT

The dominant practical application of desmoothing property returns is to offer a more credible comparison of property with other asset classes and to make property a better fit in standard asset allocation models. We have tested the impacts of varying desmoothing assumptions on the property weights indicated by models based on Mean Variance Portfolio Theory (MVPT) and Asset Liability Modelling (ALM).

The comparison with other assets shows that:

- Desmoothing which increases the standard deviation of property into our central range of 13% to 15% moves property closer to its expected relationship with other assets, setting property risk close to or slightly above gilts over the last 35 and 25 years.
- These adjustments, however, leave the Sharpe ratio on property close to or slightly below that on equities over periods longer than 25 years, without the added premium for property illiquidity and costs expected from fundamental pricing theory.
- Desmoothing also dilutes some of the diversification benefits of property against other assets, increasing its correlation with gilts and equities but decreasing its correlation with cash.
- Even at extreme levels of desmoothing, however, property's correlations with gilts and equities tend toward an upper limit, so substantial diversification benefits are retained.

Desmoothing increases property risk and reduces diversification benefits against gilts and equities, therefore reducing the weighting to property indicated by Mean Variance Portfolio optimisations. The impacts on property weightings in a portfolio otherwise made up of UK gilts, equities and cash have been tested over historic periods from 25 to 55 years. Table 5 gives a summary set of results, showing how the property weighting in portfolios with the maximum Sharpe ratio varies with the degree of desmoothing.

Table 5: Property desmoothing and weights in MVPT optimised portfolios

	Index figures	Neutral desmoothing	Extreme desmoothing
		Period: 1951-2005	
Desmoothing coefficient	0.00	0.31	0.54
Property std dev	9.4	13.0	20.0
Property weight	0.77	0.58	0.17
		Period: 1971-2005	
Desmoothing coefficient	0.00	0.28	0.49
Property std dev	10.3	13.8	20.0
Property weight	0.61	0.47	0.32
		Period: 1981-2005	
Desmoothing coefficient	0.00	0.42	0.61
Property std dev	8.4	13.2	20.0
Property weight	0.49	0.23	0.07

Source: own calculations from Scott, IPD, Barclays Capital Equity Gilt Study

4. DESMOOTHING IMPACTS ON THE PROPERTY WEIGHT

- Overall, it is clear that desmoothing modifies the case for property in a mixed-asset portfolio, but falls a long way short of destroying that case.
- The property weight in optimal portfolios falls below 10% only if extreme desmoothing assumptions – more than doubling property standard deviation – are applied over the last 25 years.
- Applying desmoothing assumptions in our preferred range, the indicated property weighting sits between a minimum of 8% and a maximum of 60% across portfolios optimised for a wide spread of returns and risks in all periods from 25 to 55 years.
- The property weights in the portfolios providing the maximum Sharpe ratio run from 23% over the last 25 years up to 58% over the last 55 years. Though these weightings are below those indicated if original index figures are used, they remain far above the weights actually held by investors over any of those periods.

In an ALM formulation, the optimum portfolio minimises the risk of a shortfall in asset values against liabilities. Table 6 shows the indicated property weights from ALM exercises with alternative target variables for liabilities and degrees of risk tolerance. These exercises are limited to the years 1983 to 2005, the period for which Index Linked Gilts used in the analysis have been available in the UK.

- Liabilities are defined by per capita national income (PCNI), representing a simple fund objective of maintaining the spending power of beneficiaries in line with national average income.
- Alternatively liabilities are defined by the value of an Index Linked Gilts (ILG) portfolio, approximating a minimum risk strategy of matching a future stream of liabilities with risk-free holdings of ILGs of matched duration.
- In the minimum risk cases, the optimum portfolio is that which minimises the standard deviation of the surplus of assets over liabilities.
- In the moderate risk cases, representing a more typical investor, a risk tolerance has been set by the maximisation of a utility function specified by the average surplus of assets over liabilities minus 0.5 times the standard deviation of that surplus.

4. DESMOOTHING IMPACTS ON THE PROPERTY WEIGHT

Table 6: Property desmoothing and weights in ALM portfolios 1983 to 2005

	Index - no desmoothing	Preferred desmoothing	Extreme desmoothing
Desmoothing coefficient	0.0	0.4	0.6
Property std deviation	8.7	13	20
Case 1: Liabilities defined by PCNI, minimum risk and no constraints			
Property weight %	18	12	8
Case 2: Liabilities defined by ILG, minimum risk and no constraints			
Property weight %	5	2	1
Case 3: Liabilities defined by PCNI, minimum risk, 10% maximum cash weight			
Property weight %	40	15	3
Case 4: Liabilities defined by ILG, minimum risk, 10% maximum ILG weight			
Property weight %	19	12	7
Case 5: Liabilities defined by PCNI, moderate risk tolerance			
Property weight %	39	20	5
Case 6: Liabilities defined by ILG, moderate risk tolerance			
Property weight %	31	17	5

Source: own calculations from IPD, Barclays Capital Equity Gilt Study, ONS

Although the indicated property weightings in optimal portfolios are below those indicated by MVPT modelling, the ALM analysis generates broadly similar overall conclusions:

- Indicated property weightings in the optimal portfolio again fall below 10% only in extreme desmoothing assumptions, raising standard deviation to more than double that observed in the index.
- Apart from the most extreme risk-averse portfolios, applying desmoothing assumptions in our preferred range indicates an optimal property weighting in the range of 12% to 20% with varying forms of liability definition and levels of risk tolerance.

On both MVPT and ALM results, desmoothing returns is a partial rather than a complete solution to the property asset allocation problem. It reduces indicated property weightings from the highly implausible levels produced by unadjusted index figures, but leaves them still uncomfortably in excess of the average exposure of institutional investors. These average weightings reflect, however, the lower liquidity and higher costs of investment in property than in other assets. It is notable that the larger insurance and pension funds, more able to carry those disadvantages, are more likely to have held property weightings over 10% through the last decade.

5. INDUSTRY PRACTICE ON DESMOOTHING AND THE PROPERTY WEIGHT

The survey element of the study was designed to cast more light on the perceptions of index smoothing issues by leading property analysts or asset allocation specialists, the desmoothing methods and assumptions they use and their implications for recommended property weightings.

The survey was limited to larger, prominent property fund managers (eight interviews), advisors on asset allocation working in investment houses or as consultants (three interviews) and general property market forecasters and advisors (two interviews). All businesses interviewed devote substantial resources to research. The responses therefore intentionally capture best practice as represented by leading businesses and not a span or average across the whole of the industry. Within each firm, interviews were conducted with the senior researchers, strategists, managers or consultants best placed to comment on both the technical work on property performance and how property is presented to their in-house or third-party investment clients. Interviews were conducted face to face using a questionnaire with a mix of structured and open-ended questions.

A first set of questions, with responses summarised in Table 20, elicited general views on the smoothing debate. Overall the consensus was that true property risk is an important and unresolved issue for the industry, though on balance not a burning or critical problem. A large majority agreed that historic figures on risk shown by valuation indices should always be adjusted.

Table 7: Attitudes to property index smoothing issues

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Total
The property industry has not paid enough attention to index smoothing	0	2	3	7	1	13
The property industry should have a consensus view on property risk	0	6	1	5	1	13
My business has investigated the smoothing issue thoroughly	1	1	0	9	2	13
Our view is that historic figures on property risk should always be adjusted	0	0	3	9	1	13

In line with those sentiments, a majority of firms are using adjusted estimates of property risk based on their own research. There is a strong preference for simplicity in desmoothing methods, with only one respondent using anything more complex than Lag 1 autoregressive techniques.

Table 8: Use of desmoothing methods

	Responses
Never use adjusted risk figures	1
Unquantified qualifications	2
Quantified adjustments from external source	1
Quantified adjustment from own estimates	9
Total	13

5. INDUSTRY PRACTICE ON DESMOOTHING AND THE PROPERTY WEIGHT

There was also a strong consensus on the appropriate estimate of historical property risk:

- Across 11 respondents producing quantified estimates of historic risk, the historic standard deviation came out at an average of 13.8%, with only one setting an estimate outside the range of 13% to 15%.
- This consensus estimate matches our own preferred estimate of moderate desmoothing which sets adjusted risk at 1.5 times the standard deviation shown by index figures of 9% to 10%.

All but one of the respondents applies property risk and return figures in multi-asset portfolio modelling in some way. Three are directly responsible for running full models for in-house or external clients; five provide inputs and advice on property performance to in-house or external asset allocators and four run some form of allocation modelling for general information or advice to third-party clients.

Table 9: Expected asset returns, risks and property correlations

	Average	Maximum	Minimum
Property			
Return	6.7	8.5	5.7
Standard deviation	13.4	16.0	10.0
Equities			
Return	7.9	9.0	7.0
Standard deviation	18.8	25.0	15.0
Correlation with property	0.32	0.40	0.15
Gilts			
Return	4.4	5.3	4.0
Standard deviation	7.8	10.0	6.0
Correlation with property	0.27	0.40	0.20

These estimates were also reflected in the forward assumptions used to support recommendations on current property weightings to investors (Table 9).

- Assumptions on medium to long term risks and returns aligned strongly with the classic view that returns on risks on property will fall between those on equities and gilts, with expected property returns averaging just under 7%, and expected standard deviation a little over 13%.
- There was also a general assumption that future correlations between property and other asset classes will be somewhat higher than those observed on the historic index figures. The average expected correlation with equities was 0.32 and with gilts 0.27.

5. INDUSTRY PRACTICE ON DESMOOTHING AND THE PROPERTY WEIGHT

Even after upward adjustments to property risk and its correlations with other assets over those observed historically, quantitative modelling run by respondents still indicates a very high property weighting, which most adjust downward in their recommendations to clients:

- Run with expected asset return profiles, respondents found indicated property weights in the range of 15% to 50%. On the expected return assumptions they used, our own calculations suggest property weights for moderately risk-averse investors of 40% to 50%.
- The typical advice to clients offered by respondents was, however, a recommended property weight in the range of 10% to 15%. This was often supported by the observation that this weight puts recommendations in a comfort zone, in favour of weights well above those currently held by most clients, while below those indicated by purely quantitative models.

6. FINDINGS AND CONCLUSIONS

The study has aimed to set out in full the issues of methods and data surrounding the adjustment of property risk indicated by UK valuation indices. Its objective has been to distil from the range of possible methods and calibrations a robust estimate of adjusted property risk. This, we hope, will contribute to a wider understanding of the implications of varying views on property risk, and provide the basis for an industry consensus, or central estimate, of true property risk.

There is an overwhelming case that property valuation indices are smoothed, and property risk should be adjusted. That case rests on the consistency between theoretical, empirical and practical perspectives rather than any one piece of evidence.

Desmoothing methods are, unfortunately, capable of producing a wide range of risk estimates, dependent on the choice of method and data set. Our central, preferred estimate of historic property risk is 13% to 15%, or 1.3 to 1.5 times that observed in the valuation index. The most robust desmoothing method is the simplest Lag 1 autoregressive filter, calibrated over the period from 1971 onward.

Desmoothing, besides increasing the risk of property, also dilutes some of the diversification benefits of property in the multi-asset portfolio, increasing its correlation with gilts and equities, although decreasing its correlation with cash. Even at extreme levels of desmoothing, however, property's correlations with gilts and equities tend toward an upper limit, so substantial diversification benefits are retained.

For these reasons, while desmoothing modifies the case for property in a mixed-asset portfolio, it falls a long way short of destroying that case, or even of justifying the low weightings of property held by institutional investors over the last decade. Using mean variance portfolio optimisation techniques (MVPT), the property weight in optimal portfolios falls below 10% only if extreme desmoothing assumptions – more than doubling property standard deviation – are applied. With desmoothing at our preferred estimate, the property weights in the portfolios providing the maximum Sharpe ratio run from 23% over the last 25 years up to 58% over the last 55 years. Though these weightings are 15% to 20% below those indicated if original index figures are used, they remain far above the weights actually held by investors over any of those periods.

The alternative portfolio optimising approach of Asset Liability Matching (ALM) produces lower indicated property weights, but still weights well above the average for institutional investors. Apart from the most extreme risk-averse portfolios, applying desmoothing assumptions in our preferred range indicates an optimal property weighting in the range 12% to 20% with varying forms of liability definition and levels of risk tolerance.

On these results desmoothing techniques, unless they are pushed to the extreme end of a plausible range, look like a partial rather than a complete solution to the property asset allocation problem. MVPT methods leave indicated property weights above 20%, even when calibrated over the most unfavourable periods of property's performance relative to other assets.

The consensus among leading practitioners is that property risk should be adjusted, with historic estimates averaging 14%, and forward looking estimates averaging 13%. Both our own tests of asset allocation models under a range of formulations and the results reported by practitioners show that even after upward adjustments to property risk quantitative models indicate property weights of at least 10%, and usually significantly higher. Desmoothing does not, therefore, remove the case for property weights in multi-asset portfolios higher than those currently held by all but the largest property investors.

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