IPF Research Programme 2006-2009

Risk Management in UK Property Portfolios: A Survey of Current Practice

Research Findings

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December 2007

This research was commissioned by the IPF Research Programme 2006 - 2009

Investment Property Forum

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This 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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RISK MANAGEMENT IN UK PROPERTY PORTFOLIOS
A SURVEY OF CURRENT PRACTICE

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RISK MANAGEMENT IN UK PROPERTY PORTFOLIOS: A SURVEY OF CURRENT PRACTICE

Research Team

Malcolm Frodsham, IPD

Research Steering Group

John Gellatly, BlackRock
Tony Key, City University, Business School
Charles Follows, ING Real Estate Investment Management
Louise Ellison, Investment Property Forum

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SUMMARY

This report presents the results from a survey investigating the measurement and management of risk in UK commercial property portfolios.

It builds upon two previous IPF publications:

- In 2000, *The Assessment and Management of Risk in the Property Investment Industry* identified, for the first time, the long list of risk factors recognised by fund managers, but did not examine the processes used to manage risk.
- In 2002, *Risk Measurement and Management for Real Estate Investment Portfolios* set out the measures and methods applied to the management of risk in other asset classes which, the report suggested, set a rigorous standard to which property managers should aspire.

This new research aims to update the classification of risk factors from the 2000 report, and to discover how risk management techniques currently used in property portfolios match up to the rigorous approach recommended by the 2002 report.

For this study, face to face interviews were conducted with senior managers and researchers in 20 leading fund management businesses, together accounting for £145bn of assets under management. Below, a summary of the survey results is followed by a discussion of the issues raised and likely developments in risk management processes they suggest.

Results: Risk at the portfolio level

All the organisations covered use some form of top-down monitoring of portfolio composition as a primary level of their risk measurement. The responses classified in the table below draw a distinction between the long list of portfolio characteristics which may be monitored, and the generally smaller set of characteristics for which quantified limits for risk exposure are set.

	Formal monitoring	Set quantified limit
Portfolio structure		
Type / Region segmentation	16	11
Property type	10	7
Regional location	6	4
Exposure to largest properties	15	12
Concentration of largest tenants	15	12
Security of income profile		
Timing of lease expiries	17	3
Timing of rent reviews	11	1
Minimum yield	10	4
Tenant risk		
Full credit rating	6	1
Other covenant strength indicators	5	1
Tenant business sectors	2	0
Exposure via indirect investments	18	13
Development exposure	6	1

SUMMARY

- The most common risk factors monitored are the property type/regional composition of the portfolio (typically split into nine to 13 market segments), the concentration of the portfolio in the largest properties and largest tenants, and the security of income.
- Security of income is most often measured by lease expiry profile, with around half of the organisations also taking into account the profile of rent reviews and minimum yield.
- Most respondents set quantified limits for risk exposure in terms of segment structure and concentration in the largest assets, but specific targets for security of income are set by only a quarter of organisations.

Results: Forecasting and portfolio cash flow forecasting

All respondents use economic and property market forecasts as an input to their assessment of future portfolio risk.

- Property market forecasts are produced in-house by 12 of the 20 organisations, and of the eight relying on external forecast providers only two do not adjust the forecasts to reflect a house view.
- For the majority (15 out of 20) the market forecasts are an input to portfolio level cash flow modelling, with the remaining organisations using forecasts only for asset level cash flow analysis.

Results: Asset level discounted cash flow forecasting

All respondents use discounted cash flow (DCF) analysis when evaluating individual assets, but with varying practices on the time period and degree of detail used in that analysis.

- Half of the organisations always run a 5-year DCF; the remainder use 3-year cash flows, or analysis periods matched to the next major 'lease event'. In two cases, in-perpetuity cash flows were used as the standard.
- All respondents evaluate assets against required returns, or hurdle rates, which are specified at the all property level by half the respondents and at the sector/segment level by the other half.
- But there is wide divergence in risk adjustments in asset level appraisals: nine managers do not make quantified risk adjustments to cash flows on the grounds that risk factors are too difficult to quantify and risk is more appropriately dealt with by scenario testing, sensitivity analysis or qualitative judgements.
- The remaining 11 respondents consider a wide range of asset level risks as shown in the table below, with all of them factoring in the volatility of rental value growth and void risks and the majority also taking account of other factors such as tenant default and variation in exit yield.

	Adjust required return	Adjust expected cash flow	Either return or cash flow	Out of 11 respondents
Volatility of market rental growth	55%	27%	18%	100%
Lease events				
Void risk	36%	45%	18%	100%
Rent reviews	36%	36%	9%	82%
Break clauses	45%	36%	9%	91%
Tenant default	55%	18%	9%	82%
Depreciation	55%	9%	18%	82%
Refurbishment/Redevelopment potential	64%	18%	9%	91%
Potential contamination	55%	0%	9%	64%
Leasehold interest	64%	0%	0%	64%
Exit price	73%	18%	0%	91%

SUMMARY

- Among these respondents, practice varied on whether risks were reflected in adjustments to the hurdle rate (eg increasing the risk premium for riskier assets) or in the expected cash flows (eg decreasing cash flow for riskier assets).
- Of the 11 managers making quantified risk adjustments, five set no specific guidelines for the range or probability of different outcomes, five set guidelines based on general historic analysis, and only two used guidelines based on back-testing of their own properties.

Issues and conclusions

Overall, these results show that property fund managers follow a common broad approach to risk which is based on investment processes at both the portfolio and the asset level, operated within a general framework of market forecasts and discounted cash flow appraisal.

But within that general picture there are big differences in the details:

- Nine out of 20 managers are not using quantitative risk management techniques at both portfolio and asset levels, and even in organisations that do utilise such techniques they are often given less weight than scenario based asset appraisals.
- Only three fund managers are using advanced statistical methods (like Monte Carlo simulation) which would be regarded as standard practice in other asset classes.

The lack of adoption generally of more sophisticated methods does not reflect a lack of concern about risk, or a lack of knowledge about risk management methods. The barriers to more sophisticated risk management in property are perceived as:

- The lack of robust data to quantify the risk characteristics of property assets.
- Methodological problems in applying formal risk adjustments to property appraisals which are potentially influenced by many interlocking market, leasing, tenancy and physical factors.

Property managers may still stand accused, at the worst, of incorrectly assessing risk, or at the minimum of failing to address potential biases in their investment decisions introduced by implicit rather than explicit methods of dealing with risk. Organisations that do utilise quantitative risk adjustment techniques were often not producing guidelines, providing data analysis to calibrate the process or back testing the results to measure the success rate of the decision making process. It is not surprising that these organisations often referred to internal confusion regarding the correct use of the process and in particular how to populate each field to avoid 'double counting' for risk.

1. INTRODUCTION

In June of 2006 IPD were commissioned by the Investment Property Forum (IPF) to undertake a survey of large fund managers aimed at identifying how risk is currently measured and controlled in UK commercial property portfolios.

The structure of this report is as follows:

- The remainder of this introduction sets out the background to the research questions and the survey method used.
- Section 2 discusses from first principles the nature of risks in property portfolios and how they may be controlled.
- Section 3 provides a full set of results from the survey in the form of responses on four specific areas of the investment process.
- Section 4 is a discussion of the results with conclusions on the current strengths and weaknesses of property risk management and the main lines for future development.

1.1 Research questions and background

This survey has two aims:

- To match the current practice of risk control matched against the characteristics of the asset class.
- Identify from the practice of leading industry practitioners the likely path of development of those investment processes going forward.

In principle the commercial property investment process should be like that used for any other asset class; the investor is seeking to make a return in a risk controlled manner. However, commercial property has particular characteristics that will influence the balance of techniques that need to be applied in the investment process.

The IPF has commissioned two previous surveys on risk measurement and control; the March 2000 report, *The Assessment and Management of Risk in the Property Investment Industry* and the November 2002 report *Risk Measurement and Management for Real Estate Investment Portfolios.*

The key findings of the 2000 IPF report were that the risks in property investment were *'diverse', 'painfully varied'* and *'in many respects unique'* and that these risks were *'being attacked through a highly restricted and perhaps inappropriate set of methods and techniques'*.

In particular the 2000 IPF report emphasised that the fund manager is responsible for risk management at the operational level and so we should not expect to apply the approaches utilised within equity markets directly to property fund management. The report concluded that there was a requirement for the *"development of more powerful risk assessment and control methods that start to match the complexity of the asset and the multi-level concept of property risk".*

The 2002 IPF report took up this challenge and concluded that the risks from property could only be managed within an overall framework or risk management process; *'It is wise to use a number of complimentary approaches to risk assessment, all grounded in a rigorous and preferably quantitative framework. In other words a 'risk process' should be developed rather than a single technique being applied. This is common in securities markets.'*

1. INTRODUCTION

The 2002 IPF report also concluded that *'the identification of the sources of risk is particularly important'* in commercial property. The report goes on to recommend that an investment process should therefore be an eclectic mix with a *'…quantitative statistical framework but also techniques such as stress testing and a rigorous analysis of subjective issues…'*

Although the previous two reports both questioned organisations directly about the risk controls they employed neither set their questions directly within the framework of an investment process. This survey directly asked the custodians of the investment process within large property fund management organisations specifically how risks were measured and controlled.

The current practice of risk control can then be matched to the characteristics of the asset class and we can identify from the practice of leading industry practitioners the likely path of future development of those investment processes.

1.2 The survey method

The March 2000 survey targeted a range of individuals within organisations to identify the perception of risk amongst individuals at various stages of the investment and management process of commercial property. The November 2002 IPF report *Risk Measurement and Management for Real Estate Investment Portfolios* concludes that these risks can only be managed within an overall framework or risk management process. This latest survey has therefore been designed to identify how risk is managed within the investment process as a whole rather than through the perceptions of individuals working within just a part of this process.

The stages of the research programme were as follows:

- A survey form was designed aimed at identifying how risk is measured and controlled within an investment process.
- Interviews were organised with 20 institutional property investment houses drawn from a list of the 25 largest institutional property investment houses ranked by assets under management in the UK.

The responses were analysed to:

- Review the current practice of risk control in large fund management organizations
- Pinpoint the weaknesses within those investment processes
- Identify the innovations utilised by a few organisations and the likely future development of those investment processes

The survey focused solely on fund managers of own-account and third party property investment portfolios (Table 1). The largest institutional investors in the UK were chosen to ensure both that the survey was targeted at organisations which would have a defined investment process and also would cover investors that controlled the majority of assets within the UK commercial property investment market.

1. INTRODUCTION

Table 1: Survey respondents

Arlington Property Investors	AXA Real Estate Investment Managers	Black Rock
DTZ Investment Management	F&C Property Asset Management plc	Henderson Global Investors
Hermes	ING Real Estate Investment Management	Invista Real Estate Investment Management Ltd
LaSalle Investment Management	Legal & General Property	Morley Fund Management
Prudential Property Investment Managers	Royal London Asset Management	RREEF Ltd
Schroder Property Investment Management	Scottish Widows Investment Partnership	Standard Life Investments
Threadneedle Property Investment Ltd	UBS Global Asset Management	

This excluded smaller investors, overseas investors and investors utilising debt or acquiring exposure to commercial real estate through listed securities or unlisted vehicles. The 20 organisations were therefore not intended to be representative of all investors in UK real estate. However, the total UK funds under management of the 20 organisations represented were £145bn at the time of the survey, a very significant proportion of the UK property fund management industry.

The representatives of the organisations interviewed were predominantly from the research and strategy sections of their businesses, which are typically responsible for the design of the property investment process but are usually not directly responsible for its use or implementation. The survey results will therefore identify the risk management approach developed in the more analytical section of the UK fund management industry and not the implementation of that approach.

The survey was conducted using a semi-structured interview approach, using the questionnaire attached as Appendix B. All interviews were conducted face to face by the IPD Research Director over a period from October to December 2006.

2. UNCERTAINTY AND RISK

This report aims to match the current practice of risk control with the characteristics of property as an asset class. This section outlines the characteristics of property and how the identification and characteristics of the key risk drivers should determine the balance between qualitative and quantitative techniques applied for risk control.

2.1 The choice between qualitative and quantitative risk control techniques

An investment in a property asset delivers a return in the form of an income stream, but that income stream is uncertain. There is uncertainty as to the possible events affecting the income stream and uncertainty as to the probability of the outcomes from these events.

Risk is the combination of this uncertainty over the probability of events and their consequences. If the range of possible events is known then risk can be identified and controlled by qualitative risk controls.

If the range of possible events is known and the probability distribution of the outcomes of these events can be estimated, then the risk can be managed using quantitative techniques.

So the balance between qualitative and quantitative techniques used in commercial property risk management should depend on whether the probability distribution of the outcomes of events can be estimated.

2.2 The sources of risk

The events that constitute the risks to the income stream from commercial property can be divided into three primary categories. Firstly, the events associated with the leasing process, eg a lease renewal. Secondly, the events associated with the impact upon the functional usefulness of the asset, eg a change in tenant aesthetic requirements. Thirdly, events associated with changing the physical fabric of the asset, ie refurbishment and redevelopment.

Table 2: Three sources of risk to the income stream from commercial property

Leasing process	Functional usefulness	Change to physical fabric
Rent reviews Breaks Lease expiries Tenant default	Legal, technological and aesthetic changes Infrastructure changes Physical deterioration	Refurbishment Redevelopment

The events that constitute the risks in commercial property can be divided into three primary categories. Firstly, the events associated with the leasing process, eg a lease renewal. Secondly, the events associated with the impact upon the functional usefulness of the asset, eg a change in tenant aesthetic requirements. Thirdly, events associated with changing the physical fabric of the asset, ie refurbishment and redevelopment.

Table 3: What determines events that are the source of commercial property risk?

Leasing process	Functional usefulness	Change to physical fabric
Mostly contractual, although tenant default determined by the wider economic environment and manager has discretion to alter, eg re-gearing a lease	Mostly determined by the technological and organisational changes in the wider economy	Controlled by the Manager – the decision to carry out and the nature of the project ie pre-let versus speculative

So the universe of possible events affecting the income stream from commercial property can be identified, but their timings are a combination of contractual, determined exogenously and also driven by the actions of the fund manager.

2.3 Measuring risk

The historical outcomes of the events that are the source of risk to the income stream from commercial property can be measured; the change in rent and the length of void periods, the degree of functional obsolescence and also the financial return of refurbishment and development for example.

Table 4: Measuring the outcomes from the sources of risk to the income stream from commercial property

Leasing process	Functional usefulness	Change to physical fabric
Change in rent at re-letting Length of void periods Etc.	Depreciation Change in rental value commanded by buildings in the location relative to other locations	Financial return from refurbishment and development

The outcomes of many events will vary due to the demand and supply conditions, eg the rent achieved at letting. The demand side influences vary for different property types and regions, for instance consumer spending will drive demand for retail space and financial and business service growth will drive demand for offices. The supply variables also vary by property type and location, underpinned by planning restrictions and the substitutability of a property in one area for another.

The historical outcomes for City of London offices should not therefore be used to estimate the risks for unit shops in provincial towns, but it is appropriate to use the historic outcomes for assets of the same property type and region and their relationship to economic variables to estimate expected future outcomes.

However, outcomes are also known to vary according to the quality, or functional usefulness, of the asset. So the rental values and leasing terms have varied historically for brand new buildings versus older less attractive stock of the same type within the same area. In addition rental and leasing trends diverge for the best and least attractively located stock. A quality, or asset life cycle dimension must therefore be incorporated into quantitative techniques used in the investment process – estimates based on new buildings should not be applied to older buildings.

Table 5: Sources of risk/influences on outcomes

Leasing process	Functional usefulness	Change to physical fabric
Mostly determined by the wider economic environment but actual impact is dependent on contractual leasing terms	Mostly determined by technological and organisational changes in the wider economy but results vary by asset's flexibility, physical quality and location quality	Determined by the wider economic environment and manager's decision as to the nature of project to be undertaken

So the risk management process in commercial property has to manage events that are associated with the lease, changing tenant requirements and refurbishment and redevelopment. These events can be managed qualitatively but to be managed quantitatively the techniques used have to adapt for a mix of events that are contractual, exogenously determined or in the control of the fund manager. The quantitative technique must also adapt for outcomes that vary due to economic factors, location quality and as the building moves through its life cycle from new to obsolete.

2. UNCERTAINTY AND RISK

The data to power these models must be sourced. Its collection is complex, the observations few in number, infrequently measured and time series short.

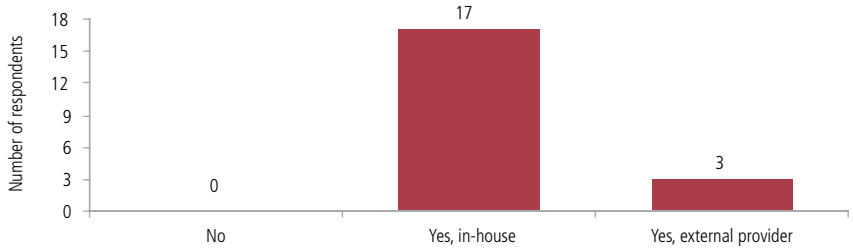
The quantitative risk management techniques must also cope with the physical nature of property assets. Individual commercial property assets are large and individual portfolios are constructed of individual assets. The portfolio outcomes of combining individual assets with known risk characteristics can only be measured if 'summing' the risks of individual assets of unequal size.

3. FULL SURVEY RESULTS

The survey was divided into three parts. The first part dealt with questions concerning portfolio risk analysis (the top-down approach). The second part of the survey concerned the use of cash flow modelling. Part three questioned the risk adjustment process at the asset level (the bottom-up approach)

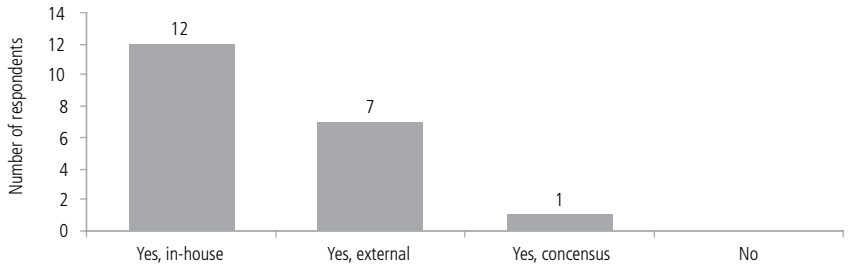
3.1 Portfolio risk analysis (top down)

Figure 1: Do you use formal forecasts of macroeconomic activity in your investment decision making process?



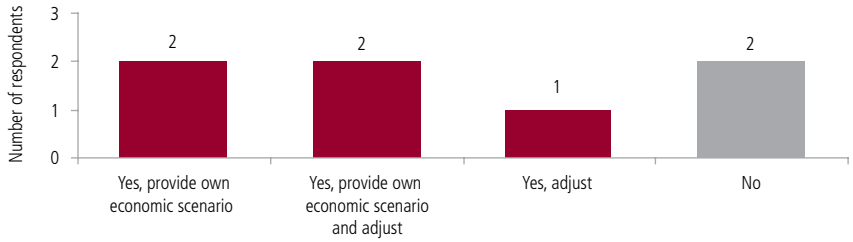
All 20 organisations utilised a forecast of economic variables in their investment decision making process; 17 organisations generated their own economic forecast and three sourced from an external provider. Many of the in-house economic forecasts were sourced centrally from within the fund management 'house' rather than specifically produced within the real estate department.

Figure 2: Do you use forecasts of the real estate market in your investment decision making process?



All organisations used forecasts of returns for the real estate market in their investment process. The majority of organisations, 12, used forecasts produced in-house, with seven using forecasts sourced from external forecasting houses. The remaining respondent organisation expended considerably less resources and used the IPF Consensus Forecast.

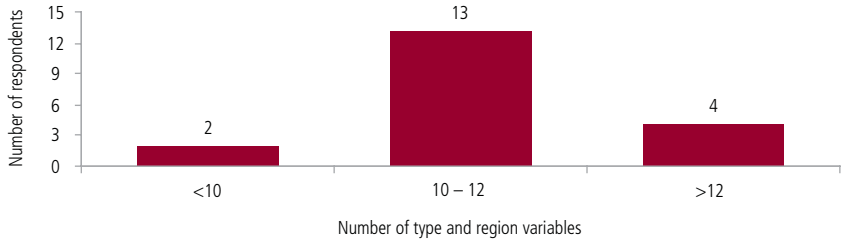
Figure 3: If you use an external provider, do you customise the forecasts provided?



3. FULL SURVEY RESULTS

Of the seven organisations using externally procured real estate forecasts, only two utilised the external forecast in an unadjusted form. Of the other five, two provided their own economic forecasts to the external forecasting house, one 'adjusted' the externally provided forecast to their own view of the property market outlook and the remaining two organisations both provided their own economic scenario to be utilised in the models and then also adjusted this output to their own views.

Figure 4: How many categories of type and region variables are used to structure your property portfolios?



All respondents agreed that their organisations structured their portfolios to benefit from diversification. This question was explained to respondents as any form of top-down structuring of the portfolio, rather than as an explicit measurement of the diversification attributes of the portfolio structure.

All respondents reported the use of a combination of property 'type' and property 'region' descriptors in the categories used for portfolio construction.

The spread in the number of categories was tight; 16 organisations used a segmentation of the market of between nine and 13 categories, although several respondents mentioned that the smaller portfolios managed by the organisation utilised a smaller number of categories for portfolio construction.

Many organisations produced forecasts of a much greater number of categories than were used in portfolio construction.

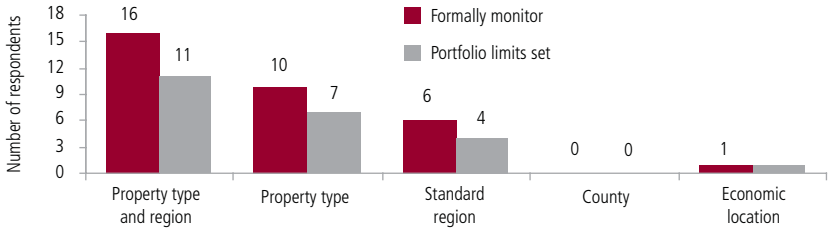
Respondents were asked about the portfolio risks formally reported to clients. If the organisation actively measured and reported on a facet of the portfolio then this is evidence that the risk is identified and can potentially be controlled. If these controls were in the form of portfolio limits then this is a form of qualitative risk control.

Dimensions other than type and region were used within several organisations. The dimensions mentioned can be broadly defined as:

- The degree to which the asset's location is 'prime' (eg prime, secondary or tertiary)
- The condition of the building (eg brand new specification through to obsolete)
- The income characteristics of the current leasing contracts (eg unexpired lease term, vacant or over rented.

3. FULL SURVEY RESULTS

Figure 5: What portfolio level risk factors do you formally monitor and set risk levels for?



Respondents were asked which of the portfolio level risk factors identified in the 2000 IPF risk survey were incorporated into their organisation's risk management process. The 2000 IPF risk survey ranked risk factors according to the number of times cited by respondents. This survey sought to clarify the importance placed on different risk factors by determining which factors are actually formally monitored by organisations and which factors had specific risk controls placed upon them restricting the fund managers' discretion.

Such rules may be laid out in an Investment Management Agreement between the fund manager and the trustees (or similar body) or in a fund Investment Memorandum. The question left room for interpretation by respondents as to what 'formally monitor' and 'risk limits set' actually meant in the context of their organisation.

Respondents repeatedly stated that risk controls and risk monitoring varied according to fund type and fund objectives. So the risk controls and risk monitoring for an internal, balanced fund client were different for those for an external, specialist or absolute return fund.

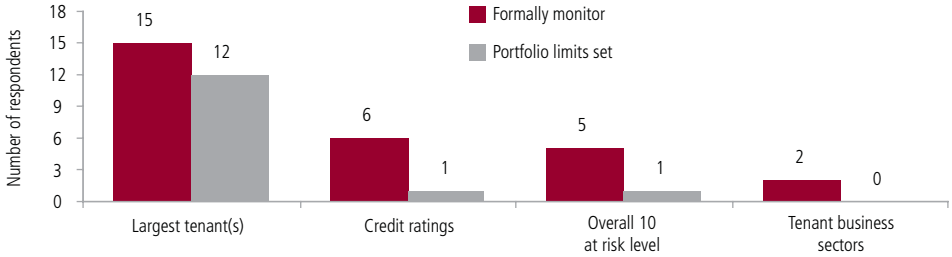
The notes to the actual questionnaire stated that respondents should respond on behalf of the 'main' fund, however, in practice this proved difficult for many organisations as they did not have a fund significantly larger than the other funds under management. The results displayed below should therefore be interpreted as being for a larger balanced fund.

It had already been determined that all organisations used categories of assets differentiated by type and region for structuring portfolios. Sixteen organisations formally monitored these weightings, but only 11 set portfolio limits constraining the fund manager.

Half of the organisations also formally monitored the fund weightings by property type, with a further six also formally monitoring the weightings by region separately.

No organisations formally monitored location down to a finer county level and only one respondent monitored exposure to locations defined economically rather than by standard government regions.

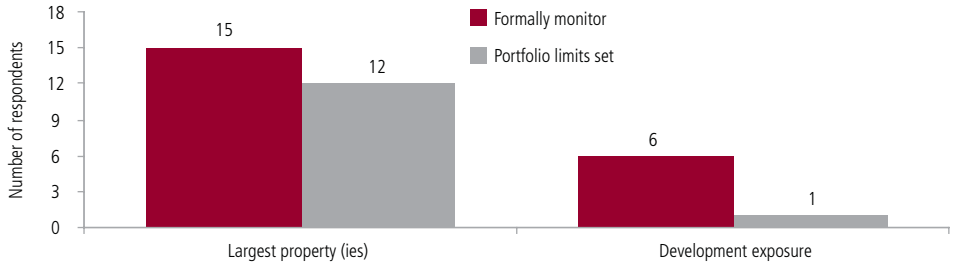
Figure 6: What other measures of diversification do you monitor?



Three quarters of organisations formally monitored the largest tenant or tenants and 12 set formal portfolio limits on the concentration of largest tenants.

Other measures of tenancy risk based on credit ratings or business sectors were formally monitored by a much smaller number of organisations. Many organisations reported that such information was however available to, and also used by, the fund manager.

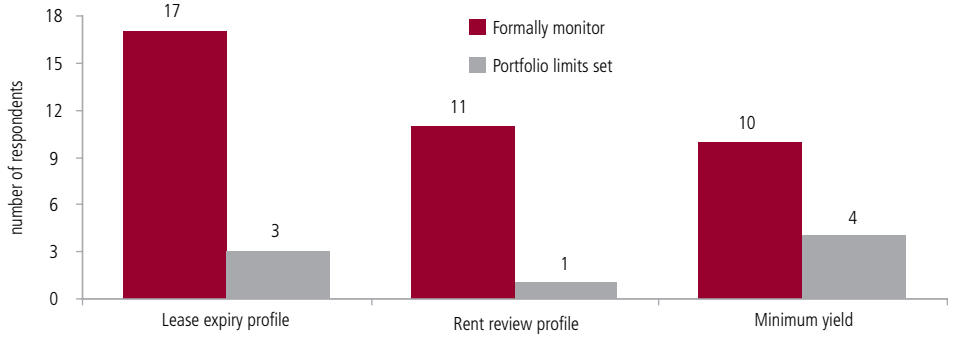
Figure 7: Largest properties and development exposure



Three quarters of organisations formally monitored the largest property or properties and 12 set formal portfolio limits.

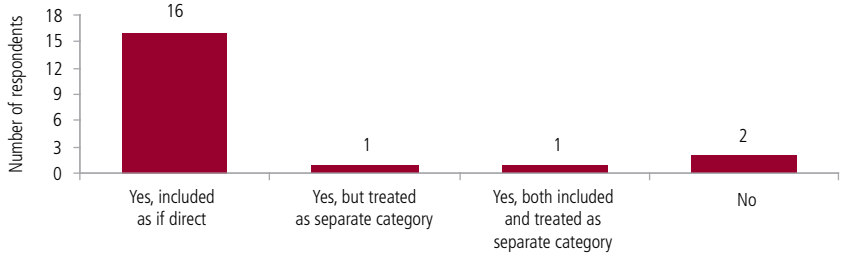
A much lower number of organisations, six, formally monitored the development exposure and only one set formal portfolio limits for that exposure.

Figure 8: Income profile



Seventeen organisations formally monitored the portfolio lease expiry profile, 11 the rent review profile and 10 the portfolio yield. However, the number of organisations setting portfolio limits was much smaller, with only one setting portfolio limits regarding the rent review profile.

Figure 9: Do you include the weightings of indirect vehicles in monitoring the portfolio structure?

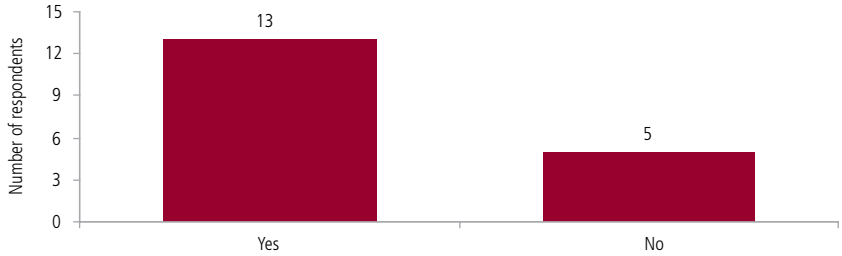


Indirect vehicles are unlisted co-investment property investment vehicles such as limited partnerships or property unit trusts. The term is not used to include listed property securities which are rarely incorporated into institutional UK property funds.

Over three-quarters of organisations included the assets within the fund holdings of indirect vehicles when monitoring portfolio structure. Two organisations did not include the assets within indirect vehicles when monitoring the portfolio structure, one other treated the assets within indirect vehicles as a separate category and another organisation both included the assets within indirect vehicles as though directly held and also measured portfolio structure solely on direct assets.

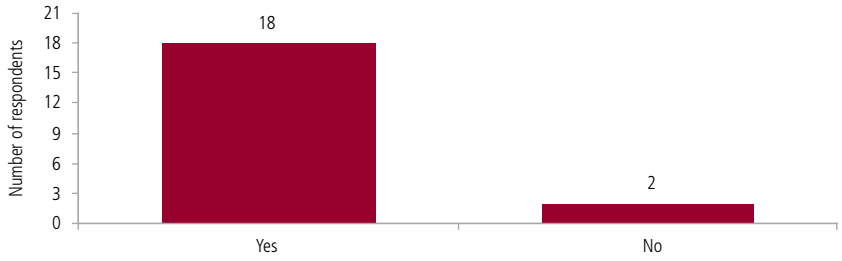
Portfolio limits concerning the weightings in indirect vehicles were set by 13 of the 18 organisations monitoring the portfolio structure of indirect vehicles.

Figure 10: Do you set portfolio limits concerning the weightings in indirect vehicles?



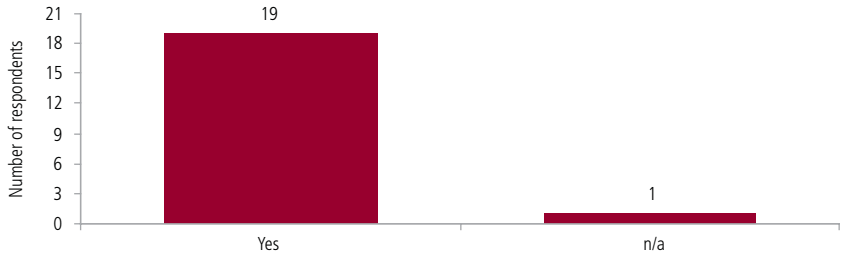
A wide array of features of indirect vehicles were used in differentiating categories of such vehicles for risk management. Such categories included balanced versus specialist vehicles, open versus closed ended structures, on-shore and off-shore. However, six respondents referred to the degree of fund manager 'control' over the vehicle (through a high ownership percentage or as the organisation was the operator) as a key differentiating feature of indirect vehicles.

Figure 11: Do you monitor the debt level of the portfolio?



Only two organisations did not monitor the level of debt within the portfolio either by direct portfolio gearing or through holdings of indirect assets. All organisations monitored the level of debt when this was used at the individual asset level.

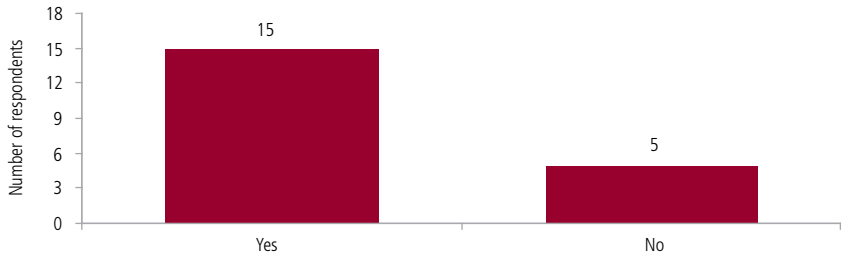
Figure 12: Do you expect to use derivatives for risk management purposes?



Although all respondents expected their organisation to use derivatives (only one organisation currently had no mandate to do so), most respondents indicated that this was for liquidity management purposes rather than for risk management.

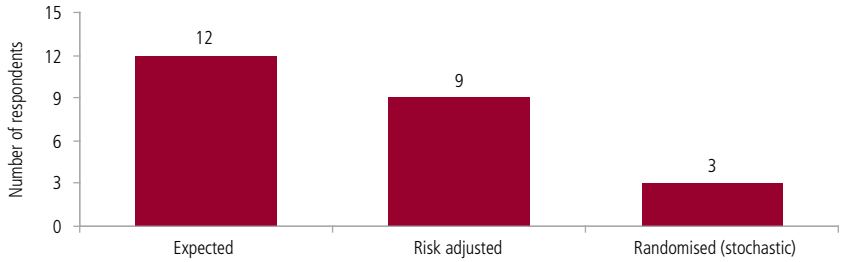
3.2 The use of cash flow modelling

Figure 13: Do you model the income from your portfolios?



Cash flow or income modelling was used by three-quarters of respondents.

Figure 14: On what basis is the cash flow modelling done?

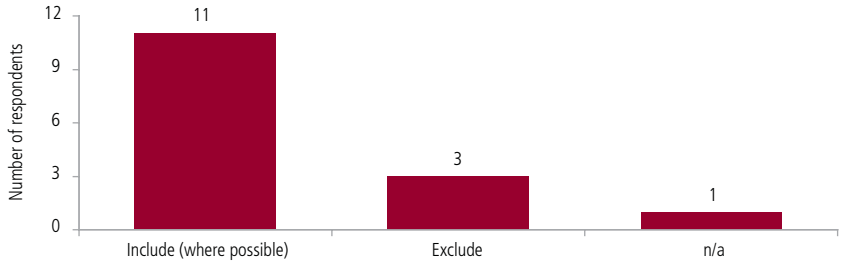


Of the 15 organisations using cash flow modelling, 12 modelled the expected cash flow from the fund whereby explicit assumptions are made for growth in the income stream, the length of void periods, rent frees or renewal rates for example

Nine organisations modelled risk adjusted cash flows whereby probabilities are placed on all possible outcomes. For example a 50% chance of lease renewal, a 30% chance of a three month void period and a 20% chance of a six month void period.

Three organisations went further and modelled cash flows using a randomised or stochastic approach whereby the outcome of each event is repeatedly sampled from a distribution of possible outcomes.

Figure 15: Do you include or exclude indirect property in cash flow models?

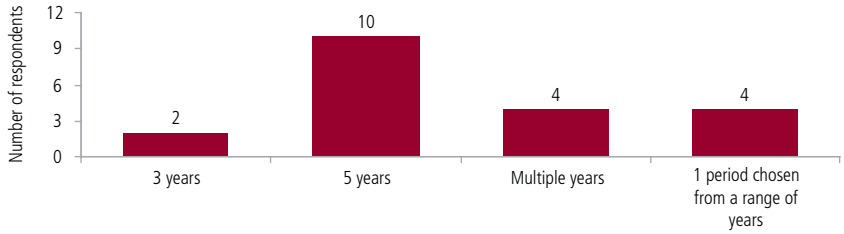


Of the 15 organisations modelling cash flows only three excluded the assets within indirect vehicles.

3.3 Asset level analysis (bottom up)

All organisations utilised some form of internal rate of return (IRR) or discounted cash flow (DCF) analysis when evaluating individual assets.

Figure 16: When evaluating equity real estate investment proposals, over what analysis period ("time horizon") do you usually base your analysis?



3. FULL SURVEY RESULTS

The evaluation period is the number of cash flows used in the IRR/DCF.

The importance of the evaluation period is the relative influence of the exit valuation to the cash flow assumptions within the analysis period; the shorter the analysis period the greater the importance of the exit valuation and the longer the analysis period the greater the importance of the cash flow assumptions.

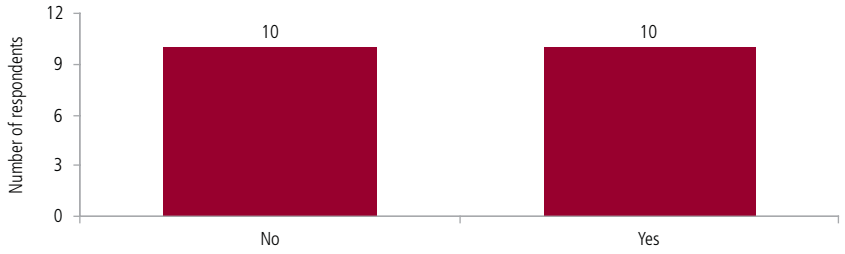
Of course the exit valuation is itself a discounted cash flow calculation, but typically this is a short form discounted cash flow with few explicit cash flow assumptions and most of the cash flow risk is therefore dealt with implicitly through the all risks equivalent yield.

The most common time horizon chosen over which to perform the analysis was five years with two organisations using a three year analysis period. Multiple analysis periods were used by four organisations and two respondents used very long-run or in-perpetuity cash flows. Such very long-run or in-perpetuity cash flow analysis periods remove the 'subjective' exit value from the equation altogether.

One respondent using very long-run/in-perpetuity cash flows used the results to compare to estimated 'market' valuations and so exploit the potential mispricing implicit in a typical short form DCF used by valuers.

The remaining four respondents specified a flexible approach to the analysis period and two of these respondents specifically mentioned matching the analysis period to the next major event affecting the income stream.

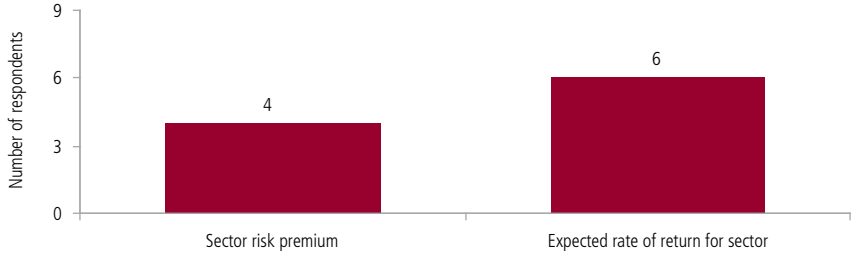
Figure 17: Do you set a hurdle rate of return, or required rate of return, at the sector level?



The hurdle rate of return used for appraising individual assets can be set at the all property or sector level (the next set of questions deals with the adjustment of this rate for individual asset characteristics). The choice split the respondents in two; with half using a sector based hurdle return and half an all property based hurdle rate.

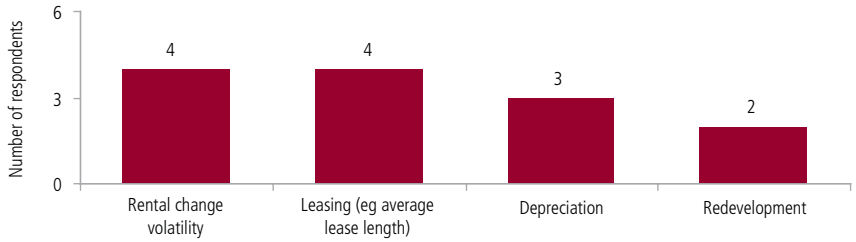
The sector hurdle rate can be set at the projected IRR for the sector or a rate related to the risk of the sector– ie buy assets where the expected asset return is above that expected by the sector or above a rate reflecting the risks of the sector.

Figure 18: What is this hurdle based on?



Of the 10 respondents using a hurdle rate of return set at the sector level, four used a hurdle rate of return adjusted for the risk of the sector, six utilised the projected IRR from the sector.

Figure 19: What is the sector risk premium hurdle based on?



The four organisations using a sector risk premium based this risk premium on sector rental change volatility and leasing characteristics, three adjusted for the depreciation risk in the sector and two for the redevelopment potential.

An asset's future income stream and the price that investors will be willing to pay for that income stream in the future are not known with certainty, so investors have to make an allowance for this uncertainty in evaluating an asset's projected cash flow and exit valuation.

This uncertainty can either be accounted for as an adjustment to the return required from the investment or as an adjustment to the return expected from the investment.

- Risk adjusting the required return would add a higher margin to the asset's required return the more uncertain the cash flow or exit valuation.
- For example if an asset is expected to generate 5% pa rental growth, but this projection is based upon improvements in the location that are not certain to occur, then the required return can be adjusted higher in order to ensure that the asset generates a high enough return to reflect the risk of the rental growth used in the appraisal not being achieved.
- Risk adjusting the benefits would adjust downwards the asset's expected cash flow and exit valuation the more uncertain they are to be achieved.
- This can be achieved formulaically by assigning probabilities to potential outcomes and multiplying these probabilities by each associated cash flow and exit value outcomes. So if there is a 50% chance of a location achieving 5% pa rental growth due to improvements in the location and a 50% chance that these improvements do not occur and the asset achieves only 1% pa rental growth, then the expected rental growth used in the appraisal should be 3% pa (50% * 5% + 50% * 1%).

For events occurring beyond the cash flow period risk adjusting the benefits can either be achieved by adjusting the cash flow used in the exit valuation or by adjusting the exit yield. As previously discussed several organisations either chose analysis periods that matched the next major event or used very long term analysis periods. This reduces the reliance on adjustments to the exit yield and focuses the risk adjustments on the cash flow within the analysis period.

3. FULL SURVEY RESULTS

When conducting an asset appraisal the expected benefits are always likely to have some form of risk adjustment simply through the use of conservative assumptions. It was very difficult in the survey to distinguish as to whether the organisations were risk adjusting the projected IRR or producing a conservative projected IRR, as the results are indistinguishable in practice. It is important, however, that organisations are aware of the basis on which appraisals are produced so that competing investment opportunities can be compared on a consistent basis.

The respondents reported a spectrum of approaches to accounting for risk in an individual asset appraisal; from a formal assessment of both required return and projected IRR through to no explicit use of either risk adjustments to the required return or projected IRR at all. As discussed above, it was not possible to determine how many conservative or risk adjusting assumptions were made by organisations that did not utilise a formal risk adjustment process to the projected IRR.

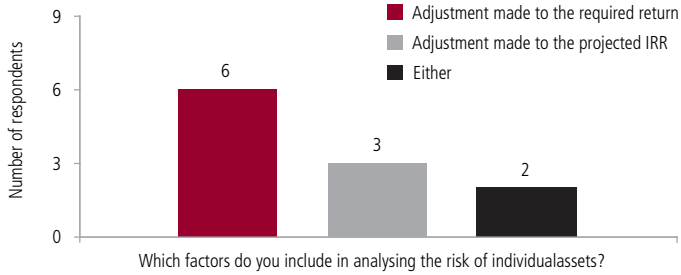
The organisations that did not formally utilise risk adjustments at the asset level incorporated either scenario analysis or some form of decision making committee that discussed the risks associated with the projected IRR. Several respondents from organisations that did not risk adjust at the asset level commented that it was too difficult to make the appropriate adjustments and that was why their organisation used scenario testing instead.

The respondents were asked whether the risks associated with a range of factors were incorporated into the asset analysis process through risk adjusting the projected IRR (in the cash flow or exit yield) or through an adjustment to the required return.

Many respondents allowed either approach for many of the variables to be used. The danger of such an approach is 'double counting'; with compounding risk adjustments made to both the projected IRR and the required return for the same factor. This problem was mentioned by several respondents.

Formal adjustments for uncertainty at the asset level were made by only 11 organisations; in broad terms: seven organisations solely adjusted the required return, two solely adjusted the projected IRR and two adjusted either the expected or required return.

Figure 20: Factors used in asset level analysis

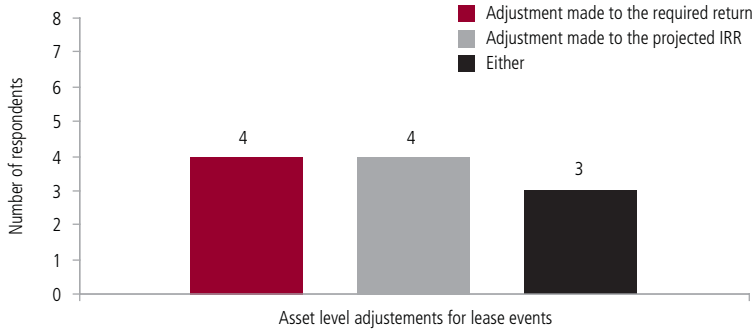


Economic factors affect tenant demand (for example GDP growth) and the actions of other investors affect new supply; these factors are determined in aggregate at the macro level and are the drivers of sector rental value change. However, these factors also vary significantly at the micro level with demand and supply conditions varying between towns and also by pitch within towns. So the rental change from an asset is not certain to match that of the sector.

The uncertainty regarding the rental growth prospects for the asset relative to the forecast for the asset's sector can be accounted for by adding to the required return (or lowering the required return if a very cautious assumption has been used) or risk adjusting the projected IRR by using a growth assumption that balances the upside and downside risks to the rental growth forecast for the asset.

All 11 organisations using asset level risk adjustment adjusted explicitly for rental volatility at the property or micro level; six solely through adjustments to the required return, three solely through the projected IRR and two used either approach (see figure 20).

Figure 21a: Asset level adjustments for lease events

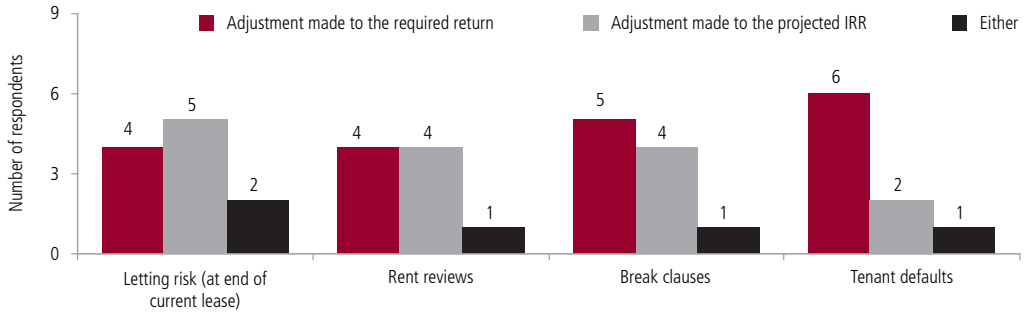


Market rental value change does not feed uniformly into the income stream of individual assets; the effects are filtered through the leasing process, with the outcome and timing of reviews, breaks and expiries determining the actual income stream to investors.

The uncertainty concerning the outcome from a lease event can therefore either be accounted for by adjusting the required return upwards, if say the tenant has a weak covenant, or downwards if say the rent reviews are fixed. Or the uncertainty can be accounted for by adjusting the cash flow through, say, a void period in the cash flow to reflect the risk of a void period following lease expiry.

All 11 organisations using asset level risk adjustment adjusted explicitly for lease events; four solely through adjustments to the required return, four solely through the projected IRR and three used either approach.

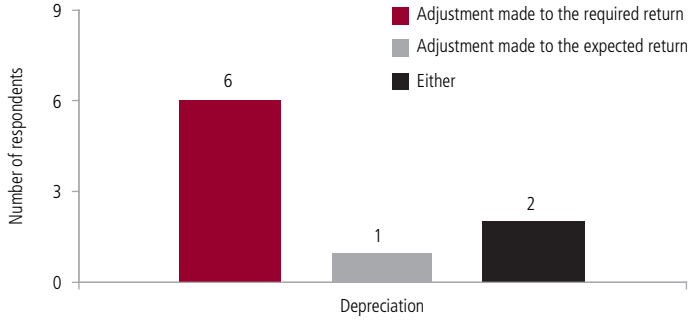
Figure 21b: Explicit asset level adjustments for lease events



Drilling down into the different lease event categories we can see if the organisations were more or less comfortable with using either adjustments to the projected IRR or the required return for each type of lease event as all 11 organisations adjusted explicitly for letting risk, 10 for break clauses, nine for rent reviews and nine for tenant default.

The factor most adjusted for through the projected IRR was letting risk, (five organisations), and the factor least adjusted for was tenant default risk, (two organisations).

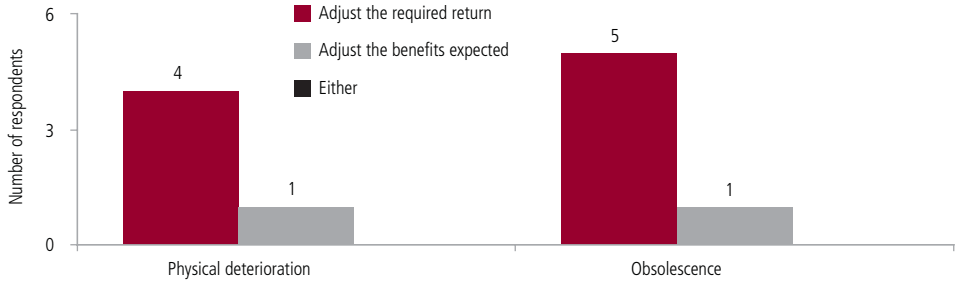
Figure 22a: Asset level adjustments for depreciation



The effect of depreciation on an asset's cash flow is not certain and will impact differently on assets due to such factors as modern versus older specifications, expensive versus basic fit outs and flexible versus inflexible building structures.

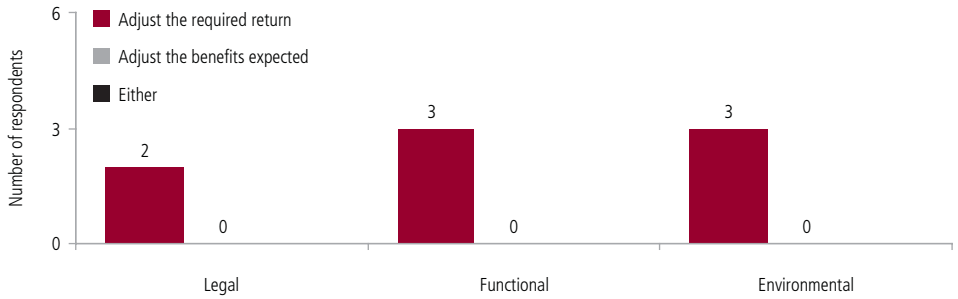
It should be noted that depreciation can also be accounted for in the rental change assumption for the asset so it is possible that some organisations implicitly reflected depreciation through the asset's rental growth assumption.

Figure 22b: Explicit asset level adjustments for depreciation



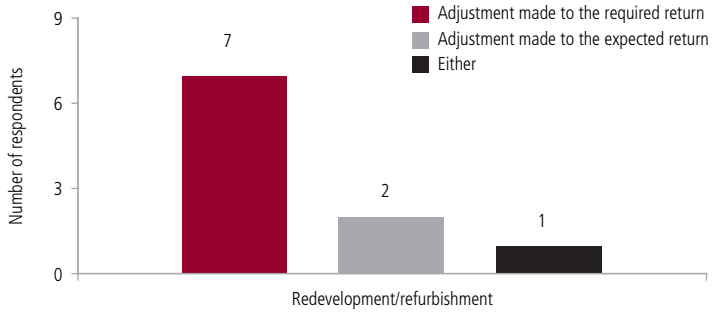
Nine of the 11 organisations adjusted explicitly for depreciation; five made a finer distinction for physical depreciation and six for obsolescence. All bar one of the organisations adjusted for both physical depreciation and obsolescence risks through an adjustment to the required return.

Figure 22c: Explicit asset level adjustments for obscolescence



Obsolescence can be broken down into its legal, functional and environmental (or aesthetic) causes. Three of the six organisations that explicitly recognised obsolescence broke down the obsolescence assumption into both functional and environmental causes and two included legal causes. All adjustments made were to the required return.

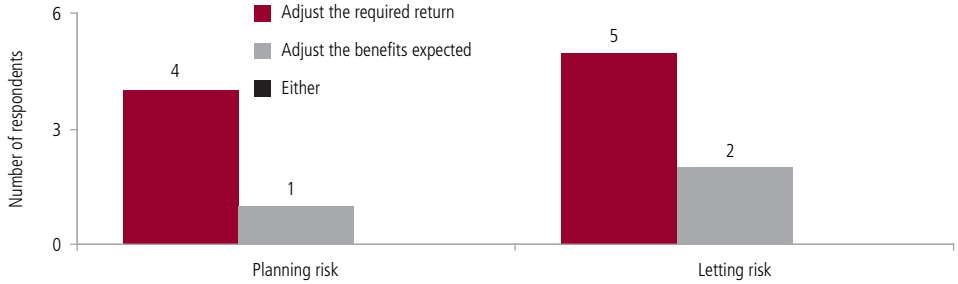
Figure 23a: Asset level adjustment for refurbishment/redevelopment



If properties have depreciated significantly or there is potential planning gain through a change of use, then the option to redevelop/refurbish adds a potential upside to the future income stream, although there is also some potential downsides from planning and letting risk.

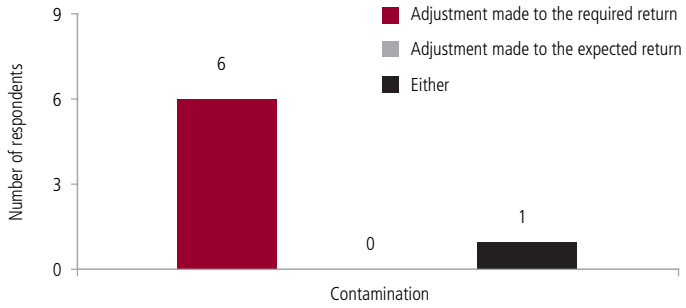
Ten of the 11 organisations adjusted explicitly for redevelopment/refurbishment risks. Seven of the organisations adjusted for the risks through an adjustment to the required return, two through the cash flow and one allowed either approach.

Figure 23b: Explicit asset level adjustments for refurbishment and redevelopment



Five organisations explicitly broke the redevelopment/refurbishment risk down into adjusting for planning risk and seven for letting risk.

Figure 24: Asset level adjustments for contamination

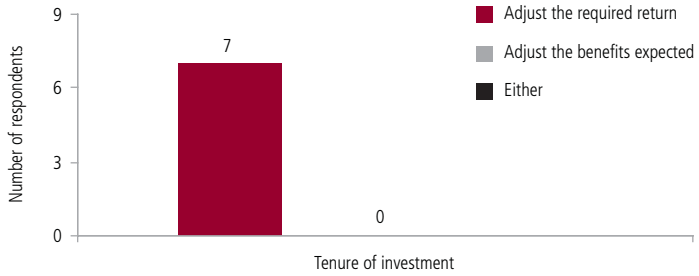


Several respondents regarded the existence of contamination as an issue for the due diligence process. This implies that the uncertainty regarding the level of contamination can be removed through surveys, insurance or indemnities and regular inspections by property managers.

Seven of the 11 organisations adjusted explicitly for potential contamination. Six of the organisations adjusted for the risks through an adjustment to the required return with the remaining organisation allowing either an adjustment to the required return or the projected IRR.

No organisations explicitly broke contamination down into adjusting for asset contamination, site contamination or the activities of tenants (despite the warnings of Buncefield!).

Figure 25: Asset level adjustments for tenure

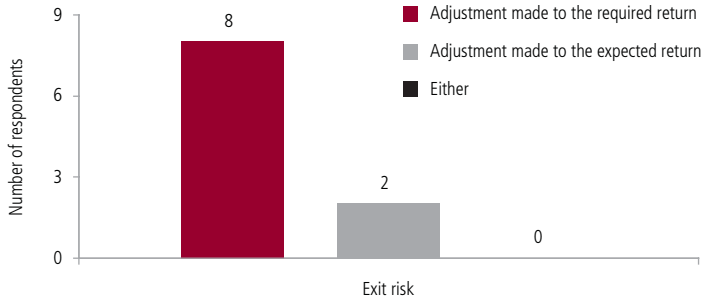


Leasehold tenure adds another layer of complexity and restrictions to a manager's ability to most effectively combat depreciation and maximise the potential upside from redevelopment.

Seven of the 11 organisations adjusted explicitly for tenure, all through an adjustment to the required return.

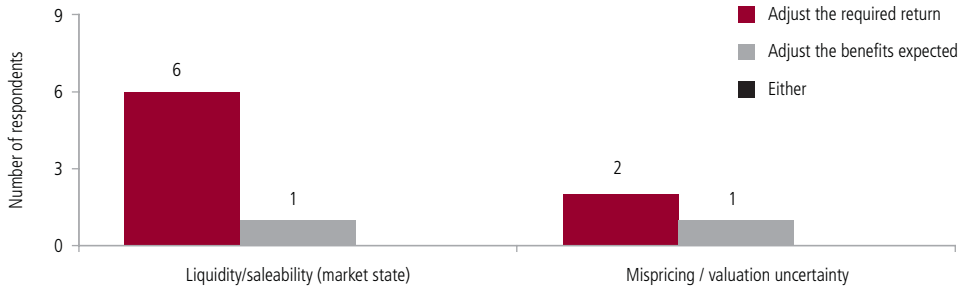
Ten of the 11 organisations adjusted explicitly for the uncertainty of achieving the exit valuation. Eight of the organisations adjusted for the risks through an adjustment to the required return with two organisations adjusting through the exit price used.

Figure 26a: Asset level adjustments for exit risk



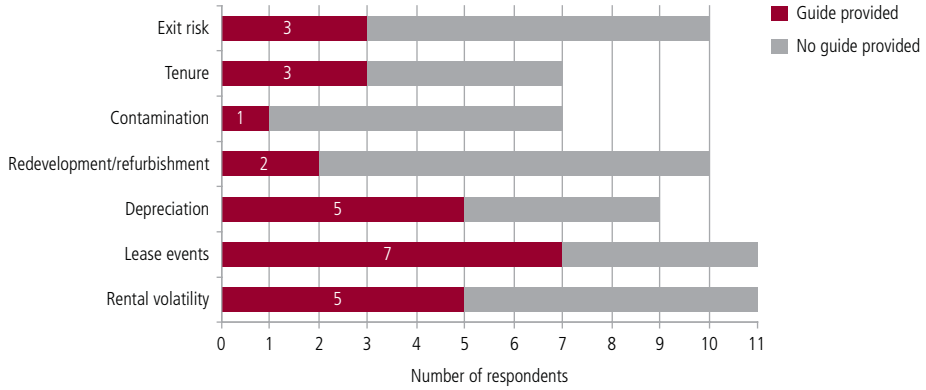
Seven of these eight organisations explicitly broke the risk of not achieving the exit price down into adjusting for liquidity/saleability (market state) and three for mispricing/valuation uncertainty.

Figure 26b: Explicit asset level adjustments for exit risk



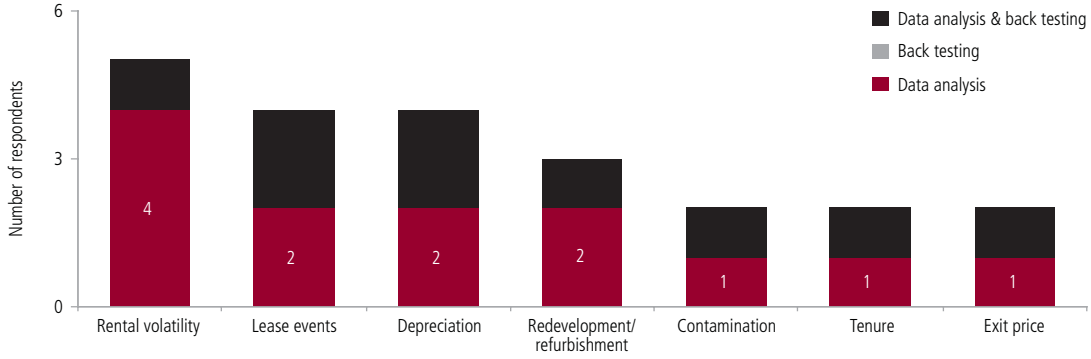
To utilise fine adjustments to an asset's expected or required return much needs to be known about the potential outcomes and the probabilities of these outcomes occurring.

Figure 27: Calibrating the factors used in asset level analysis



Only seven of the 11 organisations that formally adjusted for uncertainty produced a guide to the range of adjustments to be made. A guide was provided by all seven of these organisations for lease events – although all 11 organisations formally adjusting for uncertainty adjusted for these factors. Only one organisation provided a guide to the adjustments to be made for contamination despite seven of the 11 organisations formally adjusting for this risk at the asset level.

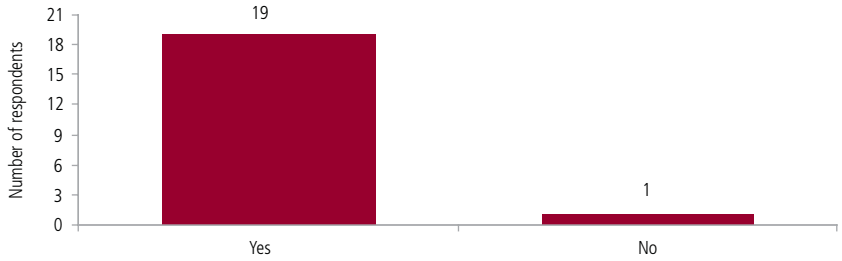
Figure 28: Methods used to calibrate adjustments



To calibrate such a guide to the risk adjustments that should be made at the asset level either data analysis or back testing can be used. Data analysis would include any numerical analysis, such as the distribution of the outcomes from a sample of assets historically, whilst back testing would analyse the outcomes of assets historically appraised to analyse the accuracy of the predicted outcomes.

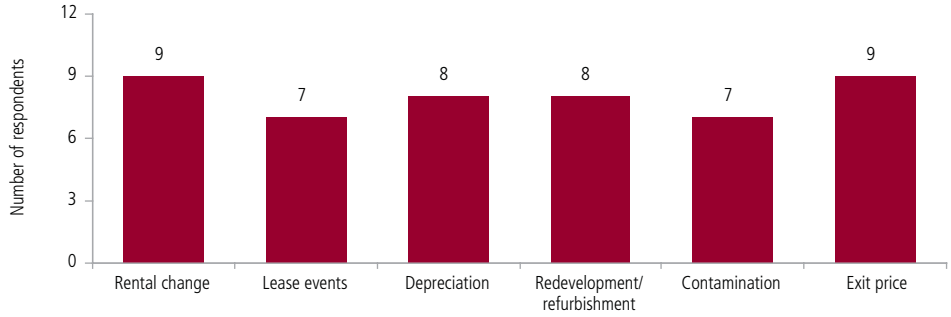
Of the seven organisations with a guide, data analysis was used by five with two organisations also utilising back testing.

Figure 29: When evaluating equity real estate investment proposals, do you use sensitivity analysis?



Sensitivity analysis was used both by organisations that utilised asset level risk adjustments and those that did not – in fact by all but one of the organisations.

Figure 30: On what variables (do you use sensitivity analysis)?



Rental change and exit price were the most common variables tested with sensitivity analysis.

4. CONCLUSIONS

The survey aimed to identify how risk is currently measured and controlled in UK commercial property portfolios.

The survey found that the sources of risk in commercial property portfolios are not comprehensively identified and that the techniques adopted to manage these risks at the portfolio level were mainly qualitative. A significant gap was found in qualitative risk controls that identified development exposure but the survey did find widespread qualitative recognition of the impact on portfolio risk of large individual assets.

The inability of the industry to even identify and measure the portfolio exposure to development is perhaps the greatest industry risk blind spot identified. Perhaps this result is because organisations recognise that the answer is not as simple as measuring the capital value of developments currently under construction. The real exposure includes the development exposure of assets close to the end of their functional life or ripe for profitable redevelopment and the choice of measurement variable is not straightforward – there is a choice of the current capital value, the projected future capital value and the construction cost to name just three possibilities.

The use of qualitative rather than quantitative portfolio risk management techniques is due to both the lack of sufficient data to quantify the risk return characteristics of the asset class and a lack of a quantitative portfolio management technique that adjusts for the nature of property risk.

Previous studies have identified the deficiencies of property data but this has tended to focus on the time series' available and the frequency of the data; rather than the need for data that measures not only the impact of economic factors on risk but also the impact of changing contractual lease terms and redevelopment on risk. This presents both a risk measurement challenge and also a challenge to the design and implementation of a risk management technique.

At the asset level the survey found that quantitative risk management techniques are used in around half of organisations. However, even in organisations that do utilise such techniques they are often given less weight than scenario based asset appraisals.

Organisations that do not fully utilise quantitative risk adjustment techniques in the asset analysis process are at risk of incorrectly assessing risk and as the assumptions used are all implicit they are also unable to identify if bias has been introduced into the decision making process. Are such appraisals really subject to peer review and can the organisation really claim that all decisions are subject to a rigorously applied risk analysis framework?

Organisations that do utilise quantitative risk adjustment techniques were sometimes not producing guidelines, providing data analysis to calibrate the process or back testing the results to measure the success rate of the decision making process. It is not surprising that these organisations often referred to internal confusion regarding the correct use of the process and in particular how to populate each field to avoid double counting for risk.

The widespread use of scenario testing by both organisations that did and did not utilise quantitative risk adjustment techniques demonstrates more confidence in the identification of the sources of asset risk than the quantification of those risks and how to account for them.

4. CONCLUSIONS

The challenge ahead

The clear danger is that investment decisions could be taken that do not meet every client's objective; that of effective risk management. In practice this can mean that the pursuit of a particular deal could become more important than the acquisition of an asset for a price that reflects the associated asset risks.

The industry has a simple challenge to improve the management of risk; improve risk measurement to correctly quantify the true uncertainty of property returns and develop techniques to utilise this data to accurately price risk.

The benefit of a well specified risk management process will not only be better management of risk but also a better framework for devising and explaining how the fund strategy delivers superior risk adjusted returns – or Alpha.

Two new techniques are front runners to deliver a quantitative risk management process: portfolio level cash flow modelling and option pricing.

Portfolio level cash flow modelling can explicitly measure the economic impacts on risk and the impact on portfolio risk of the existing leasing contracts, depreciation and redevelopment. Although this technique needs to be further developed to then quantify the risk contribution of any one factor or asset to total portfolio risk.

Option pricing is a sophisticated version of scenario testing that applies a probability distribution to the outcome of all cash flow impacting events over the life time of an asset. This is a complicated approach because the list of options available is influenced by economic factors, the age of the asset and the actions of the fund manager.

It is arguable that such is the complexity of property risk and the physical nature of property assets that risk is better managed with qualitative techniques. Accordingly, we should not be surprised by finding deficiencies in quantitative risk management techniques.

Particular challenges to quantitative risk management are set by the acquisition process for commercial property which is by bidding rather than screen based trading with prices provided by a market maker. Opportunities are also finite and diverse, so the exact portfolio fit of a particular property type, size and lease terms is never going to be available. All decisions are therefore based on compromise against the ideal asset to fit the portfolio. Finely tuned optimised allocations mean little within this acquisition environment.

Further challenges to quantitative techniques are set by high transaction costs, both transaction fees and the time taken to transact. These costs will outweigh the reduction in risk from rebalancing the portfolio for one asset's change in characteristics. The more likely response to a change in an asset's risk characteristics due to a tenant going bust or changing tenant requirements is the management of the asset in terms of reducing the void period and making a profitable redevelopment.

A further barrier to the development of any quantitative risk management technique is the slow feedback on the sources of the success or failure of decisions. Acquisition prices are appraised infrequently after purchase and the prices of assets after sale cannot be known systematically. Assets are also bought for long hold periods – returning to an individual appraisal decision after five years will find that many changes in process and personnel have also occurred.

Indeed the industry itself may change to reflect the risk management challenges rather the techniques used. The move towards constructing portfolios from indirect assets is growing and specialist managers are controlling

increasing proportions of many sectors of the property market. The larger the spread of assets the less the influence of contractual factors, depreciation and development and the more the risk depends upon economic impacts. With known acquisition prices for units in a pooled vehicle the portfolio risk management decision looks more like that of an equity fund manager.

So the future is intriguing: will quantitative risk management techniques adapt to cope with commercial property or will the structure of the commercial property industry itself adapt instead?

4.1 Further work

Further work in the management of risk in property should focus on improving risk measurement techniques to correctly quantify the true uncertainty of property returns.

The survey identified two front runners: portfolio level cash flow modelling and option pricing.

Further work should evaluate the effectiveness of cash flow modelling and option pricing in incorporating the impact of the wider economy, existing leasing contracts, the age of the asset, depreciation and the actions of the fund manager.

APPENDIX I: **CONTRIBUTORS**

Organisation name	Name of contributor(s)	Job title of contributor(s)
Arlington Property Investors	Andrew Smith	Deputy Managing Director
AXA Real Estate Investment Managers	Alan Mooney	Head of Strategy & UK Research
Blackrock	John Gellatly Catriona Allen Jason Isaacs	Head of Indirect Property Investment Fund Analyst Fund Analyst
DTZ Investment Management	Chris Saunders	Head of Investment Strategy
F&C Property Asset Management plc	Ian McBryde Sue Bjorkegren	Director, Property Funds Head of Property Research
Henderson Global Investors	Ray Adderley	Head of Investment Analytics
Hermes	Paul Gowans	Real Estate Analyst
ING Real Estate Investment Management	James Crutcher Stephen Pyne	Researcher Chief Investment Officer
Invista Real Estate Investment Management Ltd	Mark Long	Director of Property Investment Strategy & Research
LaSalle Investment Management	Robin Goodchild	Head of European Strategy
Legal & General Property	Clara Westlake	Researcher
Morley Fund Management	Stuart Milford	Senior Property Analyst
Prudential Property Investment Managers	Ben Sanderson	Director of Property Research
RLAM	Henry Watkinson	Senior Fund Manager
RREEF Ltd	Nigel Bennett	Director, Investment Strategy
Schroder Property Investment Management	Paul Taylor	Head of Direct Investment
Scottish Widows Investment Partnership	Stewart Cowe Vicky Watson	Property Research Manager Senior Researcher
Standard Life Investments	Anne Breen	Head of Property Research
Threadneedle Property Investment Ltd	Chris Morrogh	Fund Manager, PUT
UBS Global Asset Management	Alan Patterson	Director, Pooled Property Funds & Research

APPENDIX II: SURVEY QUESTIONNAIRE

Section 1: **About you and your organisation**	
Q1: Name of contributor	
Q2: Job title of contributor	
Q3: Organisation name	
Q4: Type of organisation Fund manager, property company, bank	
Q5: Approximate value of UK real estate under management, £m	
Q6: Do you adjust for riskiness in the analysis of equity real estate investments?	No, many thanks for completing this Survey Yes, please proceed to section 2

Section 2: **Portfolio risk analysis (top down)**	
Q7: Do you forecast the real estate market? *(central house view)*	
• No • Yes, in-house • Yes, external provider (please specify)	☐ ☐ ☐
Q8: If you use an external provider, do you customise the forecasts provided?	
• No • Yes, provide own ecomomic scenario • Yes, adjust forecast output	☐ ☐ ☐

Q9: Do you use formal forecasts of GNP growth, inflation and other macroeconomic activity in your investment decision making process?	
• No • Yes, in-house • Yes, external provider (please specify)	☐ ☐ ☐
Q10: Do you structure your property portfolios to benefit from diversification?	
• No • Yes What dimensions are used? *(eg type of region, number of segments)*	☐ ☐ ☐

Q11: What other portfolio level risk factors do you normally monitor and set risk levels for?
(if policy not set at house level please answer for main fund, formally monitored includes incorporated into client reporting, portfolio limits set would normally refer to the IMA)

	Formally monitor	Portfolio limits set	Dimension used *(relative/absolute)*
Type and region			
Proprty type and region	☐	☐	
Proprty type	☐	☐	
Standard region (Scotland, North East etc.)	☐	☐	
Tenancy level			
Largest tenant(s)	☐	☐	
Credit ratings	☐	☐	
Overall tenant risk level	☐	☐	
Tenant business sectors	☐	☐	
Property metrics			
Largest property(ies)	☐	☐	

Development exposure	☐	☐	
Income factors:			
Lease expiry profile	☐	☐	
Rent review profile	☐	☐	
Minimum yield	☐	☐	
Other: *(void)*			
Please specify	☐	☐	

Q12: Do you include the weightings of indirect vehicles in monitoring the portfolio structure?

- No ☐
- Yes, treated as separate category ☐
- Yes, included as if direct ☐

Q13: Do you set portfolio limits concerning the weightings in indirect vehicles?

- No ☐
- Yes ☐

  Do the limits vary by type of vehicle ☐
  eg listed indirect , unlisted indirect, joint venture?
  If so why?

Q14: Do you monitor the debt level of the portfolio?

- No ☐
- Yes ☐

  Do you include the debt within indirect vehicles? ☐
  Do you monitor the debt of the individual properties? ☐

Q15: Do you expect to use derivatives for risk management purposes? *(allow liquidity)*

- No ☐
- Yes ☐

Section 3: **Income/cash flow modelling**	
Q16: Do you model the income from your portfolios?	No, please proceed to section 4 Yes,
Q17: On what basis is the cash flow modelling done? Please tick each box that applies	
• Expected • Risk adjusted • Randomised (stochastic)	☐ ☐ ☐
Q18: Do you include or exclude rental change expectations?	
• Include • Exclude • Both	☐ ☐ ☐
Q19: Down to what level is the cash flow modelling done?	
• Sector • Property • Tenancy	☐ ☐ ☐
Q20: Do you include or exclude indirect property?	
• Include • Exclude	☐ ☐
Section 4: **Asset level analysis (bottom up)** The risks associated with the income stream and the exit price can either be accounted for implicitly as an adjustment to the yield (an adjustment to the return required from the investment) or explicitly as an adjustment in the cash flow (an adjustment to the benefits expected from the investment). Such a risk adjusted cash flow would assign probabilities to potential outcomes and multiply by expected cash flow outcomes.	
Q21: When evaluating equity real estate investment proposals, over what analysis period (time horizon) do you usually base your analysis (years)?	
Q22: Do you set a hurdle rate of return, or required rate of return, at the sector level? • No, please go to Q26 • Yes	
Q23: What is this hurdle based on?	
• An adjusted risk premium • Expected rate of return for sector • Other, please specify	☐ please go to Q24 ☐ Please go to Q25 ☐ please go to Q26

Q24: Which factors do you include in building up this risk premium from the sector?	
• Rental change volatility • Leasing (eg average lease length) • Depreciation • Redevelopment	☐ ☐ ☐ ☐

Q25: Which factors do you include in analysing the risk of individual assets? (tick each box that applies or leave both boxes blank if factor is not used in analysis)

	Yield (adjust the required return)	Cash flow (adjust the benefits expected)
Rental change volatility at the property or micro level:	☐	☐
5. Lease events: *Do you differentiate by type of lease event:*	☐	☐
• Letting risk (at end of current lease)	☐	☐
• Rent reviews	☐	☐
• Break clauses	☐	☐
• Tenant defaults	☐	☐
5.1 Depreciation *Do you differentiate by type of depreciation:*	☐	☐
• Physical deterioration	☐	☐
• Obsolescence	☐	☐
Do you differentiate by type of obsolescence:		
- Legal eg DDA, EU Energy Directive	☐	☐
- Functional	☐	☐
- Environmental eg accessibility by public transport, energy ratings	☐	☐
5.2 Redevelopment / Refurbishment *Do you differentiate by:*	☐	☐
• Planning risk	☐	☐
• Letting risk	☐	☐
Contamination *Do you differentiate by:*	☐	☐
• Asset contamination/deleterious materials	☐	☐
• Site contamination/environmental factors	☐	☐
• Activities of tenant	☐	☐

6. Tenure of investment interest	☐	☐
Exit price: *Do you differentiate by:* ● Liquidity/saleability (market state) ● Mispricing / valuation uncertainty	 ☐ ☐	 ☐ ☐

Q26: Do you have a guide to the range of the adjustments that should be made?	
● No, please go to question 28 ● Yes	☐ ☐

Q27: On which variables and how do you calibrate these adjustments (back-testing, data analysis)?		
	Range provided	How calibrate?
Rental change		
Lease events		
Depreciation		
Redevelopment/refurbishment		
Contamination		
Exit Price		

Q28: When evaluating equity real estate investment proposals, do you use sensitivity analysis?
● No, please go to end of survey ● Yes

Q29: On which variables?	
	Sensitivity analysis used
Rental change	☐
Lease events	☐
Depreciation	☐
Redevelopment/refurbishment	☐
Contamination	☐
Exit Price	☐

Many thanks for completing this questionnaire.

The results will be presented at the IPD/IPF November Conference and a copy of the results will be published by the IPF and mailed to you when completed.

Investment Property Forum
New Broad Street House
35 New Broad Street
London EC2M 1NH

Telephone: 020 7194 7920
Fax: 020 7194 7921
Email: ipfoffice@ipf.org.uk
Web: www.ipf.org.uk

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