The IPD Solvency II Review

Informing a new regulatory
framework for real estate

15th April 2011

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IPD Health Warning

The issues raised by Solvency II are of the most profound importance for the prudent delivery of institutional investment, after the joint shocks of a global financial crisis and synchronised economic recessions. For this reason we have drawn upon the leading edge of our own, and other people's research, in the preparation of this report, and leading edges must always keep moving. The research is therefore work in progress and, whilst it offers our best informed contribution today, it will inevitably progress towards newer results from improved methods applied to better data in months and years to come.

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Term	Definition
0.5% VAR	Value at Risk, 0.5% percentile
ALM	Asset Liability Modelling
CEIOPS	Committee of European Insurance and Occupational Pensions Supervisors
CP 74-09	CEIOPS Consultation Paper 74, 2009
CRE	Commercial Real Estate
EEA	European Economic Area
EIOPA	European Insurance and Occupational Pensions Authority (formerly CEIOPS)
EU	European Union
GAV	Gross Asset Value
IPD	Investment Property Databank Ltd
LTV	Loan To Value
NAV	Net Asset Value
OLS	Ordinary Least Squares
QIS 4,5	Quantitative Impact Study (from EIOPA)
SEC 40-10	Solvency II Calibration Paper, April 2010
SCR	Solvency Capital Requirements
TLI	Transaction Linked Index
VBI	Valuation Based Index

Executive Summary

This report offers a detailed review of the Solvency II risk based regulatory framework proposed for defining insurance company capital adequacy. The study focuses specifically upon real estate, and was funded by a consortium of seven key trade bodies, each supporting an aspect of insurance company investment in property and more broadly. The main findings of the study are as follows:

The complex and deeply embedded nature of property return delivery explains many of the problems of perfectly comparable risk documentation, and thus of risk based regulation. Industry successes in the face of these difficulties should not blind us to the genuine and major differences between real estate assets, portfolio structures and markets.

Our survey of 18 major European insurance businesses has demonstrated a widely shared commitment to property, both as a risk diversifier across assets, sectors and territories, and as a key source of secure income delivery.

A close review of the new EIOPA proposals shows that they have brought a meticulous and novel risk perspective to bear upon a more prudent approach to capital adequacy.

However, adopting the longest and most frequent property return history available (that of the IPD UK Monthly Index) as the baseline for all European portfolios no matter what their mix of market exposures, appears to us as an intermediate position which can be refined without sacrificing or even diluting the prudential aims of Solvency II.

EIOPA's reported asset class correlations also proved tricky to interpret, but property scores computed using IPD data never exceeded 0.5 for equities, and were more commonly negatively related to interest rates.

To better inform the new regulations, we created 10-year quarterly indices for all the main European property markets, enabling more effective correlation and cluster analyses. These showed how, in the deepest and most closely synchronised of global economic upheavals, those markets tracked three clearly distinct patterns of property investment response.

Adjusting the quarterly valuation based indices one step further, to allow for the transaction driven volatility intrinsic to illiquid real estate markets, revealed clear patterns of extra volatility, and thus tail values at risk above valuation determined levels. But again these varied markedly by country and by region.

IPD's recommendation on the basis of this work is therefore to add force to the principles which underpin Solvency II by refining the detail of the regulation in a way which is sensitive to the documented and complex diversity of property investment practice and performance across Europe.

If, for the sake of simplicity however, the broadest available pan-European property shock factor was requested of IPD, to be based on the best evidence of tail values at risk currently available, this would be no higher than 15%, but preferably allowing modest company model flexibility around this figure.

Rolling 12 month returns	Valuation Based Index		Transaction Linked Index	
	Standard Deviation	.5% VAR	Standard Deviation	.5% VAR
To December 2009				
Euro-zone only				
France	6.9	-2.3	9.7	-8.9
Netherlands	4.1	-2.5	7.7	-8.1
All Euro-zone	3.1	-0.1	7.8	-10.4
To December 2010				
UK only				
All Assets	14.2	-23.3	14.3	-23.2
To December 2009				
Pan-European				
UK + Euro-zone	5.8	-7.1	9.0	-13.3

Table 1: Headline 0.5% Tail Values at Risk from Dec-02 through Dec-09/10

Research and Results Overview

To help promote a prudential, risk aware and well informed approach to asset allocation, IPD has produced an overview of the proposed regulatory framework as it will apply to insurance based real estate portfolios; has surveyed major European insurance businesses on their responses so far to these proposals; and has undertaken a series of property market reporting enhancements to support the refinement of the regulations. Some of the headline findings in each of the research areas are summarised below.

Review of the regulatory framework

- The calculation of the property capital requirement given in SEC 40-10 is less robust than for other asset classes. Most obviously, the supporting data is confined to the UK market, in contrast to the global coverage of the interest rate and equity market analyses.
- The lack of clarity in QIS 5 over the treatment of both indirect vehicles and leverage is puzzling.
- There is a counter-intuitive suggestion that the use of the total return index is "conservative" because it assumes re-investment of rental yield into the same pool. This ignores the preservation of aggregate income in downturns by diversified lease structures.
- A modification to the real estate dampener would encourage more counter cyclical real estate investment strategies. Such counter cyclical investment would enhance investment returns by directing increased investment at low points in the real estate cycle and to disposing of real estate assets at high points in the real estate cycle.
- A property SCR based on an international portfolio would give equality of treatment with equities. It would also reflect the reality of increased cross-border investment in property portfolios over the last 20 years.
- The absence of a detailed description of the typical insurer and specific method makes it difficult to comment on the SEC 40-10 figures. Against the evidence of generally moderate correlations in annual property returns with equities and negative correlation with interest rates, the SEC 40-10 recommendations appear high.

Survey of initial insurance industry responses

- The Euro-zone domiciled insurers who responded to the survey almost unanimously consider the current 25% capital charge for property under the Standard Formula to be too high.
- In contrast, most UK respondents (and some respondents with domiciles outside the Euro-zone) were comfortable with the Standard Formula treatment and found it not dissimilar to their own analysis for the preponderance of their exposures.
- The respondents - regardless of firm domicile - believe the correlations used in the QIS 5 matrix are considerably higher than justifiable. Those who offered the results of their in-house analyses reported equity correlations of between 0.39 and 0.5. The fixed income correlations ranged into the negative.
- There is wide agreement among the respondents that a CRE portfolio benefits from geographic diversification.
- More than half of the respondents judge the Standard Formula in QIS 5 to be pro-cyclical. However, there is considerable disagreement as to how – or indeed if – this can be fixed. An interesting suggestion was that CRE should be allowed a 24 month time horizon to adjust solvency capital to compensate for the illiquidity of the assets.
- For a small but important number of respondents, Solvency II has already frozen all acquisition activity in real estate, pending a clearer view of the final regulatory framework.
- Almost all Euro-zone respondents are counting on being able to use an internal model and thus avoid what they feel will be punitive capital requirements on low risk assets. Nearly 30% of those intending to use an internal model have not commenced work yet or are still in the earliest stages of development.

- There is profound confusion regarding the treatment of indirect real estate under the Standard Formula – possibly due to obscure drafting in QIS 5. Some respondents think that a 'look through approach' means they can treat the real estate holdings in an unlisted vehicle in the same way as they treat direct real estate. Others think the vehicle immediately attracts a 49% capital charge.
- All of the respondents bemoaned the lack of adequate data. The problems are even more intractable for modelling non-UK markets. The limited data frequency - often only annual - and the absence of long time series data in many markets renders estimating the 0.5 percentile an exercise in spurious accuracy.

Improving the information base for Solvency Modelling

The aim of the third part of the project was to offer a constructive and comprehensive response by researching the possibilities of a broader, longer, more "market-sensitive" and frequently refreshed information base of European real estate investment returns and values.

A pan-European quarterly property index

- The development of quarterly performance estimation procedures on the back of IPD's main European database has enabled us to produce consistent histories for total returns, together with income and capital components, for all 15 IPD covered European markets, in most cases back a full 10 years.
- This new dataset facilitated the construction of a 12 market correlation matrix of performance over the decade to December 2009. A set of clustering procedures applied to this matrix demonstrated significantly varying patterns of response to the dominant global economic cycle, with three basic market clusters emerging.

The residential sector in European portfolio diversification

- The UK quarterly return series differs from the dominant European pattern in many ways, including the absence of any significant residential component.
- To address this difference the project team blended the IPD UK residential Index series into the main quarterly return pattern, and over a 10 year period to December 2009. When typical European residential weights are applied to UK residential returns, the recombined market pattern exhibits a noticeably reduced standard deviation.
- Removing residential returns from the pan-European series over the same period increases volatility, but only by a small margin.

Risk adjusting European indices using transactions evidence

- To address the much discussed smoothing effect observed in valuation based property indices, IPD, working with the University of Aberdeen, have developed a Transaction Linked Index (TLI) methodology that blends achieved sale prices with valuation histories.
- This method, applied separately to the UK and most recently to key European markets, offers an evidence based way of establishing the volatility of such markets and market groups. The work is fraught with operational difficulties and is far from complete, depending as it does upon large volumes of transaction data linked to a valuation history.
- Nonetheless, adjusting valuation based indices for the added volatility intrinsic to the lumpiness and illiquidity of real estate investment markets has already revealed clearly varying patterns of underlying transaction market instability, and thus significant differences in the implied tail values at risk across Europe.

Introduction

The unprecedented financial crisis which began to unfold in the summer of 2007 precipitated the most widespread and in some ways deepest global recession on record. It was therefore unsurprising that this triggered a fundamental reconsideration of financial regulation across Europe, North America and further afield. The proposed Solvency II regulations represent one crucial example of this reconsideration and will require the insurance sector for the first time to make explicit linkage between their capital provisions and the demonstrated risk associated with each of the asset classes in which they are invested.

Real estate investment has always figured significantly in the portfolios of insurance companies and, as a consequence of this, a key group of European Trade Associations, supporting both the insurance industry and real estate investors, approached IPD to provide essentially two types of research support for the review and refinement of the proposed regulations.

1. **An overview of the proposed regulatory framework** and a survey of the initial insurance industry responses to it. The overview has been designed to provide an academic research review of the scope, relevance and impact of the new regulations in the context of the currently available investment market information describing the performance of property throughout Europe.

    In addition the initial responses of the insurance industry to date are tapped through a qualitative survey of key members of the Solvency II teams in major companies throughout Europe.

2. **An enhancement of the property information infrastructure** required to permit a fair and prudent basis for risk related regulation. This second strand to the research has involved exploratory work by IPD aimed at extending its current range of performance measurement data services across Europe into two main spheres.

    The first of these has been the development of enhanced valuation based indices, reported on a consistent quarterly basis, for all major mainland European markets (to complement those already published for the UK, the Netherlands and Ireland). The second has taken the form of early stage developmental work aimed at linking transaction evidence with the valuation indices to address the demonstrated smoothing effects of real estate valuation upon market track records.

This report therefore provides a broad review of the EIOPA proposed approach to establishing capital requirements for real estate held in insurance company portfolios. It summarises the responses to a European scale survey of insurance company Solvency II team feedback. It describes the work completed to date exploring the possibility of developing a pan European quarterly direct property index from existing IPD data series. And it reports progress on IPD research into transaction-linked indices for the purpose of risk adjusting major European performance series using transactions evidence.

Overview of New Property Capital Requirements Proposed by EIOPA

This section is an initial review of the methods used to establish the capital risk weightings for property proposed in the CEIOPS (now EIOPA) document Solvency II Calibration Paper of April 2010 (referred to as SEC 40-10). There are only two elements of SEC 40-10 relevant to property:

1. A 25% capital requirement for property assets. The figure is derived from the left-hand 0.5% tail in the observed distribution of returns from the IPD UK Monthly Index from Dec 1986 to Dec 2009 measured at 12 monthly rests (Para 3.175).

2. Correlations between property and other asset classes, which set a correlation between property and equities at 0.75, and between property and interest rates as 0.0 for up stress, and 0.5 for down stress. The correlations are described as partial correlations for periods of financial market stress (i.e. periods when inter-asset correlations would be expected to be higher than average).

The calculation of the property capital requirement given in SEC 40-10 (Section 3.1.4) is less robust than for other asset classes. Most obviously, the supporting data is confined to the UK market, in contrast to the global coverage of the interest rate and equity market analyses.

On both these counts, calibration methodology for QIS 5 is more limited than that applied in QIS 4. The latter used data from a wider range of countries, made adjustments for index smoothing, and explicitly discussed distinctions between direct and indirect investments.

The lack of clarity in QIS 5 over the treatment of both indirect vehicles and leverage is puzzling and is causing confusion in the industry, a point picked up strongly in our survey. This confusion over how indirect forms of real estate investment should be treated may lead to an inconsistent treatment of real estate by individual insurance companies.

As a first step in this report, we attempted to replicate the analysis of the UK Monthly Index given in SEC 40-10.There is, however, some lack of precision in the description of that analysis in SEC 40-10.

*   We are unclear as to what time period is covered, so we have been unable to replicate the figures given in the document precisely.
*   The property market splits are incorrectly described: the "Office" results do not, as stated, exclude City Offices; the industrial or possibly warehouse sector is misleadingly labelled "Commercial".

It is also difficult to follow some of the more general discussion in SEC 40-10. In particular it asserts that the de-smoothed volatility of property returns should not be much lower than the MSCI equities return. On the contrary this is exactly what would be expected from an asset class with such a high income component to returns, which is secured by both the current occupiers under the terms of their leases and the additional security of securing an alternative tenant for the same asset (and indeed the option value of converting to an alternative use).

There is also a counter-intuitive suggestion that the use of the total return index is "conservative" because it assumes re-investment of rental yield into the same pool despite the fact that:

> *"In periods of severe stress, we may experience dramatic falls in property values combined with severely depressed rental yields, which in the worst case may collapse to zero. In this environment, the gap risk remains. Insurers may not be able to earn the minimum rental income equal to the risk free rate to match the underlying liabilities."*
> *SEC 40-10 Para 3.174*

While this can be true for individual assets, it ignores the preservation of aggregate income in downturns by diversified lease structures, and the fact that yields are generally boosted in downturns through larger falls in capital values than in rental incomes and rental values.

In the UK for example, over the estimation period consistent with SEC 40-10, the 0.5% VAR of income growth is a mere -2.8%. Similar income preservation is observed in other IPD country indices.

Replicating the EIOPA methodology

Despite some lack of clarity in the document, our own analysis of the IPD UK Monthly Index data is consistent with the results given in SEC 40-10 (see Table 2.1 & Table 2.2). We have reproduced the SEC 40-10 methodology, using the IPD UK Monthly Index series from Dec 1986 to Dec 2010. A total of 289 monthly return observations for this period are converted to 277 returns at 12 month rolling rests.

Table 2.1 Original Index - 12 Month Rolling Returns

	All Property	All Retail	PAS South East	PAS Rest UK	All Shopping Centres	All Retail Warehouse	All Office	City	Mid Town & West End	PAS Rest South East	PAS Rest UK	All Industrial	PAS South Eastern	PAS Rest UK
Maximum	31.5	27.4	31.1	26.5	24.6	42.3	37.0	34.4	48.0	37.0	48.0	44.2	43.1	48.9
50%	10.9	11.0	10.1	9.8	12.2	15.1	10.9	8.9	11.5	9.9	10.7	12.3	12.3	11.9
Mean	9.5	9.3	8.9	8.3	9.1	12.5	8.7	6.0	10.3	8.3	10.2	11.4	11.1	12.4
10%	-6.4	-6.2	-5.8	-5.1	-6.8	-9.4	-9.6	-20.2	-14.8	-6.9	-4.7	-3.0	-3.3	0.2
5%	-16.3	-16.9	-11.6	-14.9	-17.1	-19.1	-16.8	-23.6	-17.0	-15.3	-16.9	-14.7	-14.4	-15.3
1%	-25.5	-27.0	-18.5	-20.8	-32.4	-27.5	-26.0	-29.9	-28.7	-23.2	-22.8	-21.5	-21.9	-21.1
0.5%	-26.1	-27.8	-18.8	-21.5	-33.9	-28.2	-26.5	-30.6	-29.4	-23.7	-23.2	-21.8	-22.2	-21.4
SD	11.9	11.7	10.6	10.3	12.0	13.7	13.3	15.3	16.8	12.1	13.3	12.4	12.4	13.0
Skew	-0.9	-1.2	-0.5	-0.9	-1.7	-1.1	-0.5	-0.7	-0.2	-0.4	0.1	-0.2	-0.3	0.1
Kurtosis	1.0	1.5	0.1	0.8	3.2	1.3	0.2	-0.2	-0.1	0.3	1.4	1.3	1.0	1.7
Normal 0.5%	-21.1	-20.7	-18.4	-18.3	-21.8	-22.8	-25.5	-33.3	-32.9	-22.9	-23.9	-20.5	-20.8	-21.2

Table 2.2 Original Index - Calendar Year Returns

	All Property	All Retail	PAS South East	PAS Rest UK	All Shopping Centres	All Retail Warehouse	All Office	City	Mid Town & West End	PAS Rest South East	PAS Rest UK	All Industrial	PAS South Eastern	PAS Rest UK
50%	11.7	11.8	11.3	11.1	11.9	15.3	12.7	9.0	12.8	9.3	10.0	12.7	12.6	12.0
Mean	9.5	9.3	9.0	8.3	9.0	12.4	8.8	6.6	10.5	8.1	10.0	11.5	11.2	12.4
10%	-4.1	-3.6	-3.0	-3.1	-6.1	-5.4	-7.5	-13.3	-12.5	-5.3	-1.9	-1.7	-3.2	0.6
5%	-6.3	-7.5	-6.2	-6.6	-8.1	-10.4	-8.4	-24.0	-14.7	-5.9	-6.1	-4.1	-3.5	-4.8
1%	-18.8	-19.9	-15.1	-16.6	-22.1	-21.3	-19.4	-26.7	-22.6	-16.7	-17.3	-16.6	-16.6	-16.8
0.5%	-20.7	-21.7	-16.4	-18.1	-24.1	-22.9	-21.0	-26.9	-23.7	-18.3	-18.9	-18.4	-18.6	-18.4
SDp	10.8	10.4	9.9	9.4	10.8	12.2	12.4	14.9	15.8	11.3	12.5	11.7	11.7	12.4
Skew	-1.0	-1.4	-0.6	-1.1	-1.7	-1.5	-0.4	-0.7	-0.1	-0.3	0.3	-0.1	-0.3	0.3
Kurtosis	2.1	2.8	1.3	1.8	3.3	2.7	0.9	0.2	0.6	0.7	1.9	2.6	2.1	3.4
Serial	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Normal 0.5%	-18.4	-17.5	-16.5	-15.9	-18.9	-19.1	-23.0	-31.7	-30.1	-20.9	-22.0	-18.6	-18.9	-19.7

Table 2: Comparison of 12 Month Rolling with Calendar Year Results: IPD UK Monthly Index

- The 0.5% VAR calculated from the observed 12 month rolling results comes out at -26.08%; this is marginally higher than the SEC 40-10 figure of -25.74%.
- Note that it has not been possible to replicate the period as described in SEC 40-10, which is stated as 259 observations to the end of 2008. This does not match the number of observations in the Index series from end-1986 to end-2008.
- On our calculations based on the shorter 253 12 month results from Dec 1987 to Dec 2008, matching the dates specified in SEC 40-10, the 0.5% VAR result is -20.95%, not as severe as the -25.74% given in SEC 40-10.

It is possible that the inconsistency between SEC 40-10 and our results from what appears to be the same time period arises because SEC 40-10 used a different procedure to calculate the VAR – fitting a full distribution to the empirical pattern of 12 month rolling returns from the original data.

The substantial differences between figures calculated over different time periods, and the irregular distribution of the empirical results, indicate how sensitive the VAR result is to the period included in the estimation. Calculated from 1987 to the end of 2007, and thus excluding most of the last downturn, the 0.5% VAR produced by the SEC 40-10 methodology is radically different at only -7.82%. If, therefore, the same method had been used to produce the guidance for EIOPA QIS 4 published in December 2007, it would have produced a capital requirement of around -8%.

SEC 40-10 observes that there are insufficient differences in VAR across segments of the market to warrant the application of risk weightings specific to property types. This is at odds with common observations in the property industry that there is a wide risk spectrum across property types.

For the set of only four property types identified in SEC 40-10 (as noted above, partly mislabelled) the 0.5% VAR runs from -24% to -30%. There is no indication in the document of what EIOPA would view as a "significant" difference. Given the irregular nature of the empirical distributions, it is doubtful whether there is any meaningful statistical test of significance which could be applied.

With further intra-sector splits, the range is extended from -18% (shop units) to -33% (Central London offices). This scale of differences seems too large to be casually dismissed without further discussion. There is no test for significance of differences in results at the 0.5% bound, but F test for inequality in variances does show strongly significant differences from the all-property average and, for example, shop units and Central London offices.

SEC 40-10 makes no reference to the residual undiversified asset specific risk remaining in real estate portfolios due to the indivisibility of real estate assets. As real estate assets are large and their performance heterogeneous this residual specific risk can be large even in substantial portfolios.

Within SEC 40-10 no mention is made of higher risk forms of real estate activities, particularly development. The high risk nature of this activity, its association with previous financial crises, the higher potential lack of income from new development and the potential commitment to further capital expenditure should warrant its specific inclusion in the VAR estimates.

In summary:

- It has not been possible to reproduce exactly the figures given in SEC 40-10. Unstated adjustments may have been applied to the empirical results to generate a smoother "fitted" non-normal distribution.
- The range in the estimated VAR between sectors and particular segments based upon a combination of sector and region (Central London offices for example) would seem to warrant an adjustment to the SCR for portfolio structure based upon the level of diversification within the underlying portfolio.
- There has been an exclusion of the higher risk real estate activities, particularly development, from all calculations.

Indirect interests

The use of indirect investment in insurance fund portfolios is significant, accounting for 23% of UK portfolios.

The degree of liquidity has varied across the different forms of indirect vehicle structures, closed-ended versus open-ended, unit trust versus limited partnerships. The evidence from the UK is that it is the degree of leverage within these vehicles that explains the majority of the performance differentials between them.

Leveraged returns

It is possible however to 'see through' the indirect vehicles to the underlying portfolio and degree of leverage. This is a common service taken by real estate funds and does not represent a technical challenge for real estate investors.

The typical level of leverage within the vehicles owned by UK insurance funds is low, approximately 11% in the UK. Allowing a simple look-through to the underlying fund leverage and a VAR calibrated according to the overall fund leverage would ensure that incremental leverage is recognised in the calculation of the property capital requirement.

Adjusting for leverage, for example, can be calibrated very directly, with an accelerating increase in VAR for increased leverage. Assuming a constant margin over swap rates of 100 basis points, leverage of 40% changes a 26.1% VAR to 43.3%; with 49% leverage the VAR increases to 48.3% and with 60% leverage the VAR increases to 56.6%.

For the impact of leverage on the SCR we have assumed constant leverage. In practice, the degree of leverage varies according to changes in the capital employed, which varies according to the value of the equity employed. One impact of such an approach would therefore be the reflection of rising leverage as capital values fall, and falling leverage as capital values rise.

So, using the example of the IPD UK Monthly Index, the change in leverage through the year in 2008 when capital values fell 27.1% would have pushed leverage up from 40% at the start of the year to 68% by the end of the year. This movement in leverage would have pushed up the VAR from 42.6% to 64.5%.

	Start year leverage, %	Start year VAR	Capital growth, %	End year leverage, %	End year VAR
2000	40.0	43.3	3.1	38.0	42.3
2001	40.0	43.3	-0.4	40.3	43.4
2002	40.0	43.3	2.6	38.3	42.4
2003	40.0	43.3	3.9	37.5	42.1
2004	40.0	43.3	11.6	33.3	40.2
2005	40.0	43.3	12.2	33.0	40.1
2006	40.0	43.3	12.4	33.0	40.1
2007	40.0	43.3	-10.0	47.8	47.6
2008	40.0	43.3	-27.1	68.2	64.9
2009	40.0	43.3	-5.6	44.2	45.5

Table 3: Within Year Changes in Leverage due to Market Movement, IPD UK Monthly Index

A property dampener?

SEC 40-10 proposes, for equities, a dampener which adjusts the equity SCR to reflect the state of the market: the SCR rises when the return index is above a trend measured by a trailing average of its own values, and falls when the index is below that average. The adjustment factor to the SCR is the beta of a regression between index levels and their trailing average measure times the percentage difference between and index level at its trailing average. The adjusted SCR may be calculated against various lengths of trailing average, and is subject to a limit of +/- 10 percentage points against the standard SCR of 45%.

There is no discussion in SEC 40-10 of a similar adjustment for property. Again using the UK Monthly Index over the period 1986 to 2010, we have replicated the SEC 40-10 methods to demonstrate the impact of a similar adjustment. The method requires a large number of observations (to generate sufficient samples for the calculation of adjustment factors and betas) and would therefore be impractical in most other markets.

As demonstrated for equities in SEC 40-10, the adjustment method would result in SCRs calculated for UK property well above or below the standard rate of 25% for much of the period since 1986. Measured against 12 month trailing average values of the returns Index, the adjusted SCR would have fallen to its lower limit of 15% only at the extreme trough of October 2007 to June 2009. It would have returned to its 35% maximum cap very quickly thereafter, by January 2010 as illustrated in the chart below.

Graph 1: Solvency Capital Requirements over Varying Periods
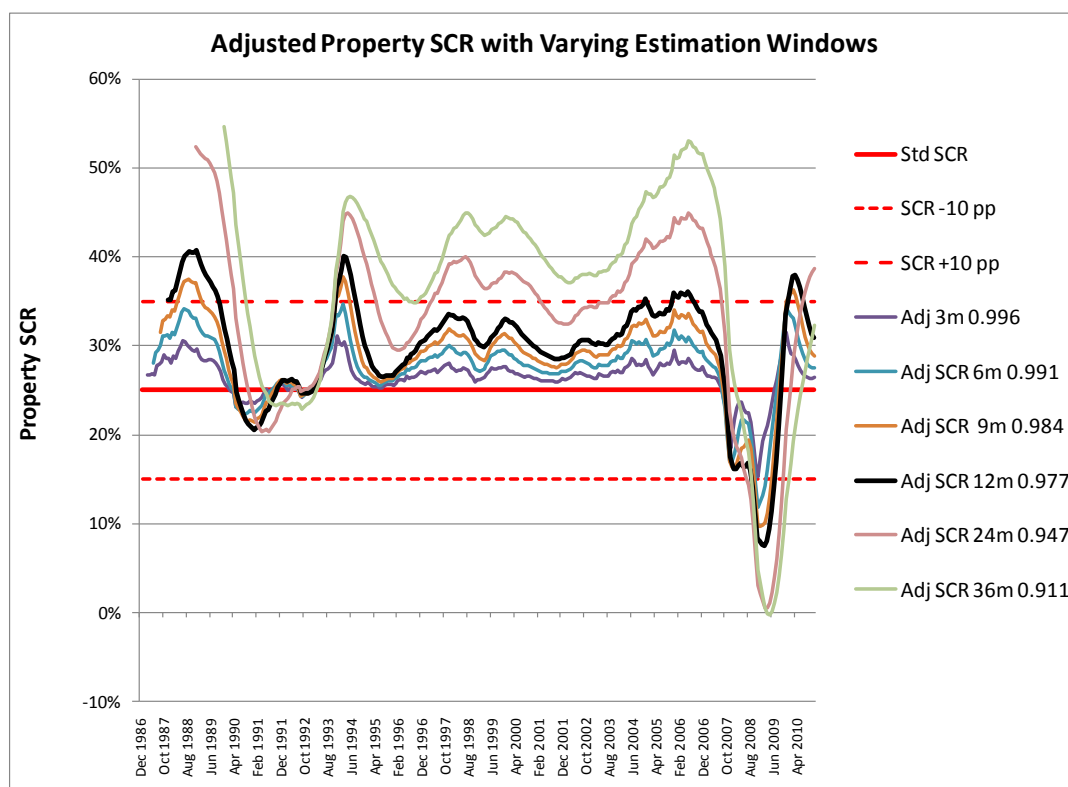
The equity dampener as proposed in SEC 40-10 appears to be fairly open-ended. It recommends a trailing window of 12 months for the adjustment formula, but seems to leave open further adjustments to the beta element of the calculation. It is therefore difficult to be conclusive about an appropriate adjustment for property consistent with the equity methodology.

Over the whole period, given the long sustained market upswing through most of the period 1994 to 2006, the impact of adjusting the SCR would not have been symmetrical. The adjusted SCR would have been above the standard 25% in 82% of the 277 recorded months, and at its capped maximum for 17% of the recorded months. Over the whole period, the average SCR would have been raised from 25% to 29%.

These outcomes of the adjustment process could be taken as a period-specific feature of the available market history. It is, however, plausible that property cycles do have a tendency to asymmetry, with long run-ups interrupted by sharp downward adjustments, which is generated by the alternation between rapid demand shocks on rental prices in downturns, with slow absorption of surplus space in upturns. If this is true, a "dampener" would be likely to result in systematically higher SCRs than a standard figure, and SCRs above the standard figure for the majority of the time.

Combining the tendency of a dampener to raise SCR more than decreasing it, and the nature of real estate property cycles, we would recommend pursuing a modification of the methodology to ensure that it applies the highest SCR value at peaks in the real estate cycle and the smallest SCR value at troughs in the real estate cycle. This feature would encourage more counter cyclical real estate investment strategies. Counter cyclical investment timing enhances investment returns by directing increased investment at low points in the real estate cycle and to disposing of real estate assets at high points in the real estate cycle.

On a macro scale encouraging such behaviour may not only increase the real estate returns of insurance funds but help smooth the over-shooting of prices at the peaks and troughs through the real estate cycle.

Applying the risk characteristics of the UK market to all countries

SEC 40-10 suggests that a risk measure based on UK monthly data may be generalised to all countries, and also that levels of risk are broadly comparable across market sectors, so the recommended reserve ratio does not discriminate across countries or across property types. This section examines the available data to test how far UK results may be safely taken to represent the actual risk faced by investors in other markets, and whether distinctions should be made for portfolios with varying exposure to property sectors.

The SEC 40-10 method depends on a large number of observations from which an empirical distribution can be calculated. For countries outside the UK, with at best quarterly data stretching back to 1978 (USA), and predominantly only annual data with less than 25 observations, the approach is clearly not possible.

We can only estimate the impact of measurement frequency using the UK data where the 0.5% VAR estimated from the higher frequency rolling 12 month results on the IPD UK Monthly Index is 1.26 times that from the calendar year data.

Using Index data for all countries with runs from at least 8 observations up to a maximum of 22 which are available over the period 1988-2009, we can observe that:

- There is a huge span in simple standard deviation in returns from 1.5% (Germany) to 17.1% (Ireland), and also in the coefficient of variation in returns from 0.35 (Finland) to 1.53 (Sweden).
- On both indicators, volatility tends to be higher (7% or above) in an "Anglo-American" group of markets, and remarkably low (5% or less) for a cluster of "Germanic" and smaller markets which include Finland and the Netherlands.
- Of the peripheral, emerging markets, data is only available for Ireland, which has shown both the highest rate of growth and the highest volatility of returns.

Since it is generally agreed that the valuation based indices are subject to valuation smoothing, it is tempting to assume that the large differentials in recorded risk are in part the product of varying degrees of smoothing.

But a technical solution by de-smoothing each country Index, as attempted in QIS 4, also presents considerable difficulties. Testing a standard de-smoothing approach (a Lag 1 de-smoothing filter calibrated by the first order serial correlation in observed returns) across countries demonstrates that a method which may provide a plausible estimate in one country leaves implausible estimates in others. Therefore, producing national risk measures based on de-smoothing techniques or factors specific to each country would result in arbitrary and inconsistent estimates.

A preferred approach would be to produce empirical estimates of volatility using a transaction linked index, as outlined in the following sections. If observations of sales transaction prices permit this approach then it could also be extended to the sector level within individual countries.

International diversification

It could be argued that the property SCR should be based on an international portfolio. This would give equality of treatment with equities, where the SEC 40-10 risk assessment is based on a global index. It would also reflect the reality of increased cross-border investment in property portfolios over the last 20 years.

In property, the diversification case is conventionally supported by well documented weak correlations in property returns across countries – for developed countries, much weaker than those found in equity and bond markets. Given moderate correlations, a substantial measure of risk reduction is attainable through cross-border investment. A simple pan-European indicator has been constructed and is described in detail later in this report - by taking both equally and market weighted composites of all countries covered by valuation indices (i.e. an increasing number over time as the coverage of countries has grown) and reported on a rolling annual basis to December 2009.

On a simple average basis, the equal weight European portfolio has a mean growth rate of 2.0% per annum and a standard deviation of 5.6% per year, equating to a 0.5% VAR of 8.0% (assuming a normal distribution). The market weighted equivalents do not differ substantially and are reported in the table below.

	Equal weighted	Market weighted
Capital growth, mean % pa	2.0%	0.2%
Standard deviation, %	5.6%	5.8%
VAR (0.5%)	8.0%	10.0%

Table 4: Pan-European property risk characteristics

As for the discussion of the de-smoothing of country indices above the de-smoothing techniques can be regarded as fairly arbitrary and an empirical estimate of the underlying volatility – provided in the transaction linked section of the report below - is to be preferred. Note all these figures precede any appropriate adjustment for higher frequency measurement or fat tails.

We would recommend that individual insurance funds adopt an international index consistent with whether their real estate investment exposure is national or international.

Property correlations

To estimate portfolio risks SEC 40-10 proposes a correlation between property and equities of 0.75, and 0/0.5 correlation between property and the upside / downside movements in interest rates.

These figures are taken from EIOPA CP 74-09, which defines correlations for these purposes as dependency between tail risks in paired asset classes. While this approach to equities is explained in the document, there is no explicit account of how the correlations for property have been arrived at, other than reference to a model of a typical European insurer.

The absence of a detailed description of the typical insurer and specific method makes it difficult to comment on the SEC 40-10 figures. Against the evidence of generally moderate correlations in annual property returns with equities and negative correlation with interest rates, the SEC 40-10 recommendations appear high. To the extent the SEC 40-10 proposal may have been influenced by UK data, it is also worth noting that the property-equity correlation in the UK is higher than in most other countries.

Correlation Property vs Other Assets 1990-2009	Interest rate	Equities
Australia	-0.42	0.06
Canada	-0.30	0.13
Denmark	-0.03	0.44
France	-0.13	0.00
Germany	0.80	-0.22
Ireland	-0.03	0.51
Italy	0.06	0.40
Japan	-0.11	0.30
Netherlands	-0.01	0.20
New Zealand	0.62	0.04
Portugal	-0.03	-0.04
Spain	0.14	0.17
Sweden	-0.33	0.14
Switzerland	0.86	-0.37
UK	-0.37	0.48
USA	0.35	0.14
	not all correlations cover the full 20 year time series	

Table 5: 20 year Property Correlations

To approximate the CP 74-09 methodology, we have examined the relationships between UK property and equity returns at the extreme downsides of the two asset classes. It is true that the extreme tails of the two distributions are much more strongly associated than the full sets of results. It would only be possible to take this analysis further if it were possible to identify a methodology to reliably quantify tail correlations from such small samples.

Initial Responses from the Insurance Industry

To compliment the direct review of the EIOPA proposals, a confidential survey was undertaken to ascertain what the potential impacts of Solvency II would be for insurers' real estate holdings if the Standard Formula is adopted as drafted in QIS 5. It was designed with the assistance of four insurers whose help was invaluable.

The survey proved a difficult exercise for insurers despite our lengthy pre-consultation on the formulation of the questions. In many cases respondents reported that senior managers from several different parts of the firm were required in order to complete all sections of the survey. It was apparent that many of those who are tasked with Solvency II preparations are not necessarily those familiar with the real estate asset class. It was also apparent that internal Solvency II preparation for fixed income and equities had taken precedence over preparations for real estate due to the relatively smaller exposure to the latter.

We received eighteen survey responses which we believe to be a reasonably representative sample. Many of the largest insurers with significant exposure to the asset class contributed along with a few smaller firms that hold specialised exposures. We enquired about the size of real estate holdings and the types of exposures held in order to evaluate the quality of our sample. Eight responses came from the UK and ten from Europe-ex UK. The latter responses were from Germany, France, the Netherlands, Austria, Norway and Spain. This provided some illuminating results given the decision under QIS 5 to use only UK IPD data for calibration of the solvency calculations.

For convenience the responses are summarized against each of the questions/issues raised in the survey.

1.   **Do you consider the current capital charge applied to real estate according to the standard formula (25%) to be appropriate? Please explain why you consider it appropriate or inappropriate.**

      The Euro-zone domiciled insurers who responded to the survey almost unanimously consider the current 25% capital charge for property under the Standard Formula to be too high. Their core exposures are to unleveraged assets with long leases taken by tenants with strong credit ratings in regions with a history of low volatility in capital values and income. Most claim this describes the type of exposure that constitutes the majority of their investments in the asset class.

      A typical response pointed out that the 25% capital charge was derived from data on the UK market which is far more volatile statistically than the main European markets where these insurers hold the bulk of their exposures. Further dismay was expressed regarding the absence of sensitivity to diversification gained through investing across sectors. Likewise, it was felt that the diversification benefits gained through investing cross-border were ignored.

      Dismay at the entire approach of the Standard Formula was also expressed due to the use of total return data in a manner that results in implicit over-emphasis on capital values. It was observed that the income element of real estate returns is considerably less volatile than capital values – even in markets such as the UK - and the Standard Formula takes no account of this. Where real estate is used to derive income to pay long term obligations such as annuities, it is this "stability of income return derived from a portfolio of leases" which is deemed to be a risk mitigating factor.

      In general, Euro zone respondents believe that the Standard Formula capital charge is based an overstatement of the risks attached to holding the types of property exposures that these insurers focus on. Capital charges of 10%-15% were reported as the results of internal analyses quoted by those Euro zone respondents who offered this information.

In contrast, most UK respondents (and some respondents with domiciles outside the Euro zone) were comfortable with the Standard Formula treatment and found it not dissimilar to their own analysis for the preponderance of their exposures. Several noted that the capital charge is not out of line if viewed in the context of the treatment proposed for other asset classes.

2.   **Do you consider that the current correlation matrix applied to real estate according to the standard formula is appropriate? Please explain why you consider it appropriate or inappropriate.**

The respondents - regardless of firm domicile - believe the correlations used in the QIS 5 matrix are considerably higher than justifiable. Those who offered the results of their in-house analyses reported equity correlations of between 0.39 and 0.5. The fixed income correlations tended to be negative, i.e. even the sign was different to the correlation used in QIS 5. The majority described the correlation matrix as "unjustified by the data" and "too high, even allowing for the need to use dependencies which allow for tail events rather than normal conditions correlations".

3.   **Do you think that a geographically diversified real estate portfolio provides higher diversification benefits (not currently recognised under the standard formula)?**

There is wide agreement among the respondents that a CRE portfolio benefits from geographic diversification. 94% of respondents believe that the benefits are material, particularly across countries and regions that are less economically synchronised.

Many emphasised that markets have varying risk-return characteristics even within regions such as the Europe (e.g. the London market exhibits markedly different characteristics from the Munich market). The insurer chooses markets on the basis of the Group's risk appetite and should be able to reflect this risk appetite in its solvency capital requirement.

In a similar vein, some argue that since economies are structurally different – and it is the economy that determines the amount and type of space that is demanded and the market clearing rents – so the markets provide diversification in terms of risk and return.

A parallel argument was advanced by some focussing on rents and income trends as well as leasing (and legal) conventions which vary greatly across borders. Again, the insurer is offered choice according to risk appetite in terms of the security of the income stream based on economic and leasing drivers and this offers diversification.

The majority of respondents believe that the Standard Formula takes no account of diversification benefits and this is a fundamentally flawed approach in a regulatory regime which is supposed to be risk-based

4.   **Do you think that the treatment of real estate under Solvency II is pro-cyclical? If yes, are there any measures you believe should be taken to counteract pro-cyclicality in respect of real estate capital charges?**

Over 60% of the respondents to the survey judge the standard formula in QIS 5 to be pro-cyclical. However, there is considerable disagreement as to how – or indeed if – this can be fixed.

The chief concern is that an invariant capital requirement will force insurers to sell relatively illiquid CRE assets in a bear market, thus exacerbating the down trend. Some would like to see this potential vicious cycle circumvented through the use of a 'dampener' similar to that agreed for equities. The justification for this rests on the observation that CRE markets mean revert.

Another suggestion was that both a dampener and a liquidity premium should be employed "to recognise investors with longer term liabilities." The logic behind this is that insurers with long term liabilities have an inherently lesser requirement to liquidate assets than other types of investors and this should be recognised in the standard formula. Still another said that CRE should be allowed a 24 month time horizon (rather than 12 months as specified currently) to adjust solvency capital in order to compensate for the illiquidity of the assets.

In contrast, there were those who agreed that the standard formula is pro-cyclical but felt that it would be impractical to employ a dampener or that the result of employing a dampener could result in perverse outcomes.

5.   Please explain the reasons why you currently choose to have exposure to real estate assets in your funds (e.g. asset liability matching, diversification as per modern portfolio theory, etc. If you have different reasons for holding real estate in different business lines please explain.)

The overwhelming majority of respondents to the survey (over 70%) believe that property offers very considerable diversification benefits to a portfolio of assets (hence the disenchantment with the correlation matrix in the standard formula). In addition, the asset liability matching capabilities of property were emphasised by many as a higher return (albeit less liquid) alternative to fixed income with potential to create alpha. The perception of property as a partial inflation hedge was cited by nearly 30% as a further reason to have exposure.

6.   Has Solvency II already had an impact on your real estate allocations? Please describe any impact to date.

For a small but important number of respondents, Solvency II has already frozen all acquisition activity in real estate pending a clearer view of the final regulatory framework. For others, Solvency II has had no impact to date but many are concerned that the high capital charges relative to returns will force them downsize portfolios or move out of core investments.

7.   Do you believe Solvency II will have an impact on your real estate weightings in the future? Please describe any expected impact and the reason(s).

Almost all Euro-zone respondents are depending on obtaining permission to use internal models and thus avoid what they feel will be punitive capital requirements on low risk assets. If they are forced to use something similar to the standard formula, nearly 40% believe they will have to reduce their exposure to what they consider to be 'core' assets – the assets with low risk-return characteristics. There is particular concern attached to residential holdings. Some fear that core real estate exposures may have to be wholly liquidated if standard formula treatment is insisted upon. Some Euro zone respondents believe that QIS 5 Solvency II treatment incentivises the pursuit of higher risk-return strategies.

Outside the Euro zone, the response was more mixed. Numerous respondents pointed out that it is the position of CRE relative to other asset classes that matters, not just the treatment of property on a stand-alone basis. Many feel that other assets, particularly corporate bonds, are so harshly dealt with that it may shift allocations toward property.

8. **Do you believe Solvency II will have an impact on your direct versus indirect real estate weightings in the future? Please describe any impact and the reason(s).**

There is profound confusion regarding the treatment of indirect real estate under the standard formula – apparently due to obscure drafting in QIS 5. Some respondents think that a 'look through approach' means they can treat the real estate holdings in an unlisted vehicle in the same way as they treat direct real estate. Others think the vehicle immediately attracts a 49% capital charge. Urgent clarification and refinement is needed in this regard.

If all indirect vehicles with leverage are treated as non-EEA equity under the standard formula, a typical respondent noted that "there will be a perverse incentive to invest only in those that are highly geared. Since capital requirement is charged against NAV, the higher the debt relative to GAV, the lower the NAV and consequent capital charge." This could provide a significant disincentive to invest in low leverage unlisted funds for users of the standard model.

There is also concern that if indirect exposures are not treated with more sophistication in the standard formula many investors will reduce their geographic diversification along with their overall demand for unlisted indirect funds. "…indirect property is the dominant means of getting exposure to non-domestic markets and given the capital charge for overseas investing will likely be higher due to an overlay of currency shocks, insurers may retreat to domestic markets which might result in a lower allocation to indirect overall."

9. **Do you believe Solvency II will influence your allocation between leveraged and unleveraged real estate investments in the future? Please describe any impact and the reason(s).**

Nearly half of respondents said there would be no impact on their leverage position, but many of these do not use leverage at present or only do so minimally. Over 40% of respondents indicated that they are likely to reduce leverage in favour of unleveraged direct holdings.

10. **Is listed real estate currently treated as part of your real estate allocation in your funds?**

One third of respondents treat listed real estate as part of their allocation. The remainder do not invest in listed funds primarily because it is part of the equities allocation.

11. **Do you believe that Solvency II will influence your allocation between listed and unlisted real estate vehicles in the future? Please describe any impact and the reason(s).**

Some respondents said that they might look more favourably on listed relative to unlisted funds as equities will attract a 39% charge while unlisted indirect will attract a 49% charge. The listed funds with gearing would thus attract a lower capital charge than the unlisted for any level of gearing. Others thought they might have to reconsider retaining any exposure to listed real estate given the high capital charge relative to direct holdings.

12.   Do you believe that Solvency II will influence your allocation between conventional real estate assets/vehicles and alternative 'real estate related' exposures (e.g. real estate loans, real estate debt, other 'real estate related' structured products)? Please describe any impact and the reason(s).

There is likely to be far more insurance company involvement in mortgage lending under Solvency II. There appear to be capital saving incentives in the current Solvency II framework to obtain exposure to real estate through mortgage lending in preference to conventional investing. Given that lending involves a somewhat different skill set on the part of real estate fund managers, this could pose some unanticipated challenges.

Some noted that the search to generate return and minimize capital may result in new structured products. One respondent observed "If Solvency II turns out to have a detrimental impact on the insurers' willingness to hold real estate through conventional means, alternative more capital efficient holding structures will likely be developed. A split of the debt and equity components of a real estate cash flow is one possible outcome."

While sensible instruments could potentially be devised to minimise capital, if the net result is less transparency and the creation of new types of risk which are less well understood, this could generate a variety of unintended consequences.

13.   Is your firm currently engaged in developing internal models in preparation for Solvency II? Yes/No

Nearly all of the respondents (94%) are planning to use internal models. The capital saving incentives to do so were reiterated throughout the survey.

14.   Please indicate the data sources you are using to populate the real estate elements of these models. (e.g. internal, external, data frequency, length of time series)

When asked what data they are using (or planning to use) for internal modelling nearly 40% are using IPD data, a third are using internal data as well as external data while 28% have not chosen data yet as they have not started modelling. The data is generally annual or quarterly depending on market.

15.   Are there any important gaps in real estate data availability that you have identified? Please list these (e.g. data frequency, length of time series, absence of historical data for certain markets or asset types)

All of the respondents bemoaned the lack of adequate data. Even UK investors who have the longest external data set with the greatest frequency find it is inadequate for modelling to the 0.5 percentile. "No data we have identified is close to being adequate to give robust results." Respondents also find using property data in a statistical context that was originally formulated for daily market data intellectually discomfiting. "A generic issue with property data is… these are not being assessed by daily market transactions but by infrequent valuations and even less frequent transactions."

The problems are most intractable for modelling non-UK markets. The limited data frequency - often only annual - and the absence of long time series data in many markets renders estimating the 0.5 percentile an exercise in spurious accuracy. The problems get worse as portfolio exposures become more global. Modelling Emerging European markets, Asian markets and Latin American exposures is posing insurers with an intractable problem.

16. **If your firm has already started to develop Solvency II internal models, please broadly outline the approach you are taking, your methodology and any indicative results.**

Nearly 30% of those intending to use an internal model have not commenced work yet or are still in the earliest stages of development. Many groups prioritised modelling their fixed income and equity exposures ahead of real estate.

Most respondents gave only a brief description of the modelling approach they are adopting and no dominant methodology is discernable. Several reported that they are outsourcing the modelling process to external providers.

17. **Please detail any other Solvency II issues related to real estate investment that you believe to be important and have not been covered in the above questions.**

Most groups hope to obtain regulatory approval for their internal models, but unease was expressed as to whether the regulators had enough staff to evaluate all of the models before Solvency II comes into force.

Scepticism was expressed about the concept of basing capital charges on quantitative methods that require data that either does not exist or has insufficient data points to reliably determine tail risk.

Several respondents expressed the concern that Solvency II was actually giving far too much weight to the capital value of real estate assets and not enough weight to the income streams and the attributes of leases which are one of the primary reasons that these assets are acquired by insurers.

Scepticism was expressed regarding the formulation of models based on total returns that give undue weight to capital values and the dependence on their output for determining regulatory capital. The Standard Formula takes no account of the fact that a portfolio of leases exhibits different risk characteristics than the capital values of the property assets.

Improving the information base for Solvency Modelling

IPD's overview of the property capital requirements proposed by EIOPA and survey of initial industry responses (above) remains incomplete, at least in the sense that a constructive and comprehensive response would, wherever possible, offer a broader, longer, more "market-sensitive" and more frequently refreshed information base of European real estate investment returns and values.

IPD's 25 year role has essentially been that of improving the transparency of real estate investment markets by developing the highest standard of property portfolio measurement and benchmarking from which headline market indices can thereafter be published. So far it has proved possible to prepare and produce market indices for 24 national economies worldwide (of which 15 are in Europe) and composite indices for the whole of Europe, the Nordic region, the Euro-zone and a full global mix.

This work has, however, necessarily been driven by the valuation and measurement regimes that have prevailed in each of the mature investment markets worldwide. Thus in Europe, it has proved possible to produce only one monthly index (in the UK), three quarterly indices (adding the Netherlands and Ireland markets to that of the UK), two bi-annual indices (France and Italy), and eleven annual indices (all other European markets, including Germany, Sweden and Spain). Outside Europe a higher proportion of IPD's indices are refreshed quarterly (US, Australia, Canada and New Zealand) but some are still restricted either to a bi-annual (South Africa) or an annual frequency (Japan and Korea).

In the following sections we describe the initial work done to extend our coverage, primarily at this stage in Europe, in ways which should lead to the sort of investment information resource that will get closer to meeting the full needs of regulators. It is important to emphasise at this stage that everything described is work in progress. Whilst it is potentially useful to draw indicative conclusions from intermediate results, none of this work has yet been subject to IPD's standard (and time consuming) testing regimes which precede formal new Index release and publication.

A pan-European quarterly property index

The central challenges of the information enhancement stages to this Solvency II research programme are therefore to:

1.   Extract maximum value from the underlying IPD performance databases (initially just for the mature European markets).

2.   Develop a consistent set of higher frequency, quarterly, performance indices for this group of European markets.

Development progress

This work has been restricted initially and deliberately to utilising the open market valuation and cash flow datasets that underpin IPD's currently published indices. This is so that a careful comparison can be made between the market performance published for each national economy and a quarterly re-estimation of that performance, maximising the use of all the available underlying valuation and related financial information.

In most cases valuation interpolation has been required because, with the exception of the UK, Netherlands and Ireland markets, full quarterly open market regimes do not exist. However, IPD's database and data capture frameworks record everything within a monthly data structure. So the timing of capital and revenue flows in addition to a small proportion of non synchronised valuation data has permitted a somewhat more sensitive approach to quarterly index construction. In addition the France and Italy markets over the most recent periods have been able to exploit half-yearly valuations for sub-samples of funds and assets as noted above.

The development of quarterly performance estimation procedures on the back of this database has so far enabled us to produce consistent histories for total returns, together with income and capital components, for all 15 IPD covered European markets. These histories already go back at least 10 years for major markets with the exceptions of Italy (9 years when updated to December 2010) and Spain (10 years when updated to December 2010). The fully consistent series at present available runs through only to December 2009.

Indicative results: volatility

This quarterly index development work has already begun to provide us with a more sharply focussed record of European market performance over the last 10 years. The measured volatility of returns across the whole of IPD's pan-European Index stood at 4.5% as at the end of December 2009. The new index development work provides us with rolling 12 month returns from 2001 through 2009 which exhibit a volatility of 4.8% - still based exclusively on valuation records but utilising all available evidence and adjusting for the time specific incidence of cash flows.

For the Euro-zone the reported volatility from the published annual index series was lower – at 3.0%. Based upon rolling 12 month figures drawn from the new quarterly index work the standard deviation remains at 3.0%. This probably reflects the fact that the Euro-zone as a whole benefits much less from genuine additional quarterly valuation information.

Indicative results: correlations

Much lower volatility within the Euro-zone suggests that it is worth exploring the similarities and dissimilarities in the return profiles of the component markets in addressing the issue of an appropriate risk benchmark for European real estate portfolios. For this exercise the new 10 year quarterly index series – expressed as rolling 12 month returns from 2001 through 2009 – was subjected to a full series correlation analysis.

It is unfortunate that no more than 10 years can be explored, so that tail correlations cannot be produced, but in a sense this limitation imposes the toughest test of the existence of market independence. The boom/bubble in prices during the middle years of the decade and the extreme volatility since 2007/8 were both driven by major global pressures and so we should expect the highest degree of performance synchronisation in these circumstances.

	Denmark	France	Germany	Ireland	Italy	NL	Norway	Portugal	Spain	Sweden	Switzerland
Denmark	1.0000										
France	0.8725	1.0000									
Germany	-0.3070	-0.1830	1.0000								
Ireland	0.8222	0.8955	-0.1450	1.0000							
Italy	0.5630	0.7342	-0.2032	0.8387	1.0000						
Netherlands	0.6847	0.8348	0.2620	0.8607	0.6726	1.0000					
Norway	0.8513	0.9504	-0.1849	0.8870	0.7028	0.7559	1.0000				
Portugal	0.6432	0.7477	0.1757	0.8160	0.8063	0.8181	0.7101	1.0000			
Spain	0.8655	0.9243	-0.2980	0.9174	0.8722	0.7753	0.8744	0.8419	1.0000		
Sweden	0.7660	0.8691	-0.0460	0.7824	0.4369	0.7816	0.8684	0.4962	0.6813	1.0000	
Switzerland	-0.0746	0.2096	0.4318	-0.1431	-0.1350	0.2154	0.1340	-0.0244	-0.0667	0.2611	1.0000
UK	0.7242	0.7002	-0.3819	0.8748	0.7755	0.5698	0.7477	0.7147	0.8219	0.5194	-0.4837

Table 6: 12 month rolling return correlations, Q1 2000 to Q4 2009

In practice the correlation analysis detailed in the above table does show the expected high levels of matching between European markets – with several pairs of markets exhibiting correlation coefficients, over close to a 10 year period, at a level at which 75% of the variance in one can be accounted for by that of the other. However, there are in addition a significant number of negative correlations, suggesting that there was not a uniform singular response to accelerating demand followed by a financial crisis and global recession across the whole of Europe.

The matrix reports the pair-wise correlations of the rolling annual returns, using the newly derived quarterly data, but only for the 12 European markets with long enough histories to include in the analysis.

Indicative results: market clusters

To test these demonstrated patterns of similarity further, the correlation matrix was clustered by successively combining the markets with the highest correlations, at each stage re-computing the composite returns of clustered markets or groups, and reconstructing the reduced correlation matrix in a stepwise fashion.

This analysis produced three major clusters of markets. In the first few stages a large cluster around the France pattern of returns emerged, linking in first Norway, then Spain, Ireland, Denmark, Sweden and finally the Netherlands (in that order of similarity).

A second cluster, initially linking the market pattern of Italy with that of Portugal, then emerged as relatively independent of the first France-led group. To this cluster the UK market was joined at the next stage, prior to the fusion of these two large France and Italy led groups into a single "dominant European" cyclical shape.

Finally a small but clearly very distinct group, comprising just Switzerland and Germany, was formed. The Austrian market did not support a long enough history for inclusion in this analysis, but the return history that is documented suggests that it too would have been clustered in this group. Interestingly the group still exhibited a negative correlation with the whole of the rest of Europe, even after the two larger groupings (the France and Italy composites) were forged into a single dominant European return profile. The chart below shows the composite rolling 12 month returns of each of the three main market groups as clustered on the basis of their correlation scores.

Graph 2: Composite market groups, clustering steps and correlations
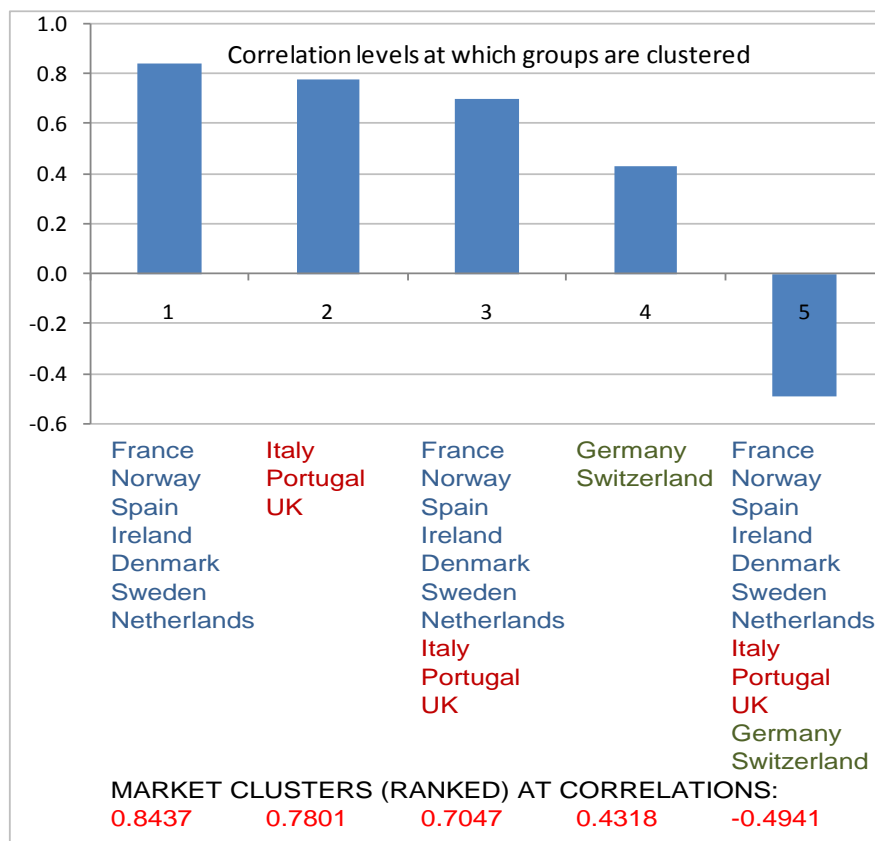
Graph 3: Composite market groups, 12 month rolling returns
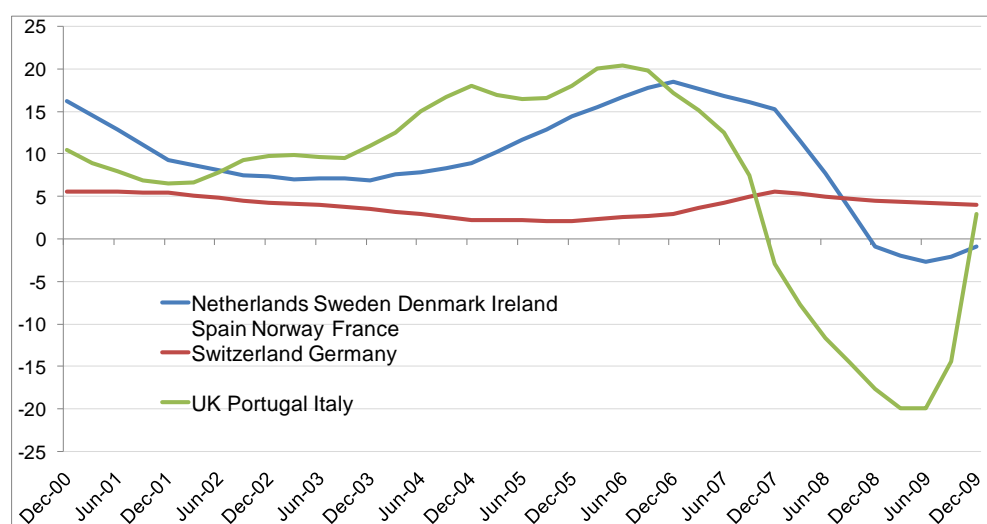
Of course none of this analysis identifies major departures from the overall cyclical pattern of the decade. What it does demonstrate is the significantly varying scale and pace of the initial 6-7 year process of yield compression, from that of the UK and Ireland at one end of the spectrum, to that of Germany and Switzerland at the other. In the latter two markets no price bubble emerged and so a major correction, of the sort documented in the UK and Ireland, was not required and did not happen. If differential responses of these magnitudes are observed even in the most extreme of economic circumstances, it would seem sensible to reflect these differences in the risk benchmarks that are deployed for determining capital requirements.

The residential sector in European portfolio diversification

The currently preferred CEIOPS approach to a Solvency II capital charge regime is to utilise the UK Monthly Index as a base line standard for all European markets. Whilst this approach is questionable for the technical reasons articulated in the first sections of this report, one aspect of the IPD index development side of the project has explored the re-generation of a UK all property index series by adding a non-minimal residential component. This will help investigate the potential diversification benefits of a "European style" exposure to the residential sector.

The 70 funds that contribute to the UK Monthly Index have virtually no exposure to the residential sector. Even the UK quarterly and annual indices reflect weights of no more than 1-2% in the sector.

The mainland European average market weightings are however closer to 20%. If therefore a UK index is to be deployed more widely across Europe for risk assessment purposes, it would seem reasonable at the very least that a residential component should be added, and broadly in accordance with a typical European weighting rather than the uniquely low weighting at present prevailing within the UK.

Development progress

The methodology used for this exercise takes interpolated residential returns and values from the IPD UK Residential Investment Index (and the UK Annual Index prior to 2001) to create a fourth sector at a quarterly frequency. A quarterly moving European residential weight is calculated from the 15 European IPD databanks and this weight is applied to the UK returns at the expense of the full weightings of other sectors, whilst preserving the UK shapes of those commercial sectors – retail, office and industrial – relative to each other.

Indicative results

Over a 10 year period to December 2009, when these European residential weights are applied to UK residential returns, the recombined market pattern exhibits a noticeably reduced standard deviation. The quarterly level drops by almost 20% from 4.2% to 3.4% and the measured volatility of the rolling 12 month returns drops from 13.6% to 11.6% (a drop of about 15%).

The corresponding 0.5% tail values at risk are reported in the table below. Over the full monthly/quarterly measurement period available to us – back to December 1986, an unadjusted VAR of -26% drops to -20% with the injection of a UK residential return but at a typical European weight. Over the 10 year period of the greatest shock (and the only period over which fully comparable cross-Europe data are available), the corresponding figures barely change, still offering a 20% benefit with the inclusion of residentials.

UK Monthly and Quarterly Indices at 3 month intervals					
Rolling 12 month returns					
		Standard Deviation		.5% Value at Risk	
To December 2009	From:	Dec-86	Dec-99	Dec-86	Dec-99
UK only					
UK weights unadjusted		11.98	13.56	-25.55	-25.56
All weights as Pan-Europe		11.49	12.59	-23.21	-23.38
UK weights + Europe residential		10.97	11.64	-20.39	-20.48
	Max reductions:	1.01	1.92	-5.16	-5.07

Table 7: Implied UK VARs with Residential Sector adjustment, to Dec 09

These are all superficially surprising results in that a far higher fraction of the residential total return is due to capital value movement – normally by far the most volatile component of the total return – than is the case for any of the main commercial sectors. Other things being equal therefore it would be reasonable to expect higher volatility in residential investment performance. In practice, however, a multitude of factors dampen volatility in this sector and diversify results away from commercial sector trends.

The research coupled this synthetic reshaping of the UK index series with a parallel reconstruction of mainland European performance data. Utilising the newly created quarterly series over the past 10 years for the major European markets, and recombining these into full pan European composites, enabled us to compare the volatility of the whole European market (including its exposure to the residential sector of around 20%) with a synthetic series excluding residential performance from all markets.

Pan-European Quarterly Indices at 3 month intervals			
Rolling 12 month returns			
		Standard Deviation	.5% Value at Risk
To December 2009	From:	Dec-99	Dec-99
Market weighted Europe			
Europe weights unadjusted		4.80	-4.78
Europe - ex residential		4.90	-5.08
	Increase:	0.10	-0.30

Table 8: Implied European VARs with Residential Sector adjustment, to Dec 09

The results were far less dramatic in this instance. The rolling 12 month returns for the pan European markets to December 2009 exhibited a standard deviation of 4.8%. When the residential sector was removed, the volatility did increase, but only by 10 basis points to 4.9%, though the implied 0.5% VAR rose over 30 basis points to -5.1%.

This suggests that the diversification benefits of mixing national markets into a pan European composite swamp the more local benefits of blending residential with commercial investments.

However, in the major national markets in which there is significant investment in residential property – France, Germany, Netherlands, Sweden and Switzerland – national market volatility has been reduced over the last 10 years by the inclusion of residential returns in all but one case. The notable and interesting exception is the Netherlands where the 10 year standard deviation is marginally increased.

Risk adjusting European indices using transactions evidence

All of the index development work described above has, to this point, been restricted to the extraction of maximum utility from the baseline asset valuation record of national and European markets. This is because the universally accepted standard for producing and publishing investment property market indices is one which is restricted to the use of asset data which has a continuous open-market valuation record. Asset purchases, sales, major refurbishments and developments are excluded from the record because the movements associated with these major examples of active management can be driven by non-market factors which thereby risk distorting the overall market record.

IPD has however always insisted on recording every aspect of each asset held in an investment portfolio. This is because the aim is not just to produce a headline market index, but also to provide a full and fair benchmarking service which compares the bottom line performance of each contributing portfolio (including all active management) with the equivalent for a relevant peer group or the whole market universe.

The major limitation of a headline market index which is restricted to the aggregation of professional valuation judgements is that it is likely to produce a smoothed record of the full market picture, driven as it is by occasional transactions which will commonly introduce spiky evidence into the historical record.

The review of the CEIOPS proposals above has already utilised some of the conventional ways of de-smoothing valuation index series. The main problem with such methods is that they are not based upon solid market evidence as to the volatility associated with trading activity in real estate investment markets. A transactions based approach to property index building would seem therefore to be a sensible addition to the toolkit.

Development progress: UK

There are various ways of attacking this task (all of which have been pursued at IPD at some stage over the last few years), but the latest round of investigations has been limited to the assessed value approach (most recently tried with some success on US data). This is essentially a hybrid method in that it uses the valuation as a combined assessment of the various "hedonic" or quality aspects of the asset and then adjusts for the precise market movement reflected in sale prices. The result is thus best thought of as a transaction linked index (TLI). The approach is detailed in the Appendices to this report.

In the UK it has not proved possible to build TLI's prior to the beginning of 2002, and so the volatility measurement initially only covered the short eight year period to mid 2010. Since that initial development the model has been tested and extended to December 2010. However, this extension has required some simplification to the typologies used in the sample evaluation stage, demonstrating the heavy dependence upon sample sizes which are critical to this modelling approach.

Indicative results: UK

It is apparent from the latest results that this new UK TLI exhibits noticeably more volatility, with stronger rises and falls in price levels, than pure valuation-based comparators over the period Q2 2002 to Q4 2010. These findings were expected in the context of received wisdom upon valuation-based indices as being smoothed representations of real estate market performance. The standard deviation – or average volatility – of the quarterly valuation based series since 2002 rises markedly when adjusted on the basis of the full transaction evidence.

The new Index series also show that, with respect to turning points, and specifically the rapid changes in the UK real estate market since mid-2007, there was either no difference or at most a one quarter lag in the dates indicated by the transaction series from those shown by the valuation series. This finding is also probably not surprising, given the severity of the cycle and the high degree of valuer synchronisation recorded in the UK over the last three years – all apparently reading that cycle in the same way and reflecting trading evidence punctually.

The UK TLI appears therefore to complement the market standard valuation-based indices rather than replacing them. Nonetheless, as a high level risk indicator it should be of considerable use as an authoritative and evidence based source of data on the volatility of the overall commercial real estate market, possibly eliminating the need to use the assumption driven de-smoothing methods often applied to real estate data. It therefore has an obvious potential role within the Solvency ll debate.

Development progress: Europe

The huge challenge of extending this work to address the issues of valuation smoothing and (potentially) lagging across the whole of Europe has constituted a major focus of the IPD Solvency ll research programme, but not a focus which has had the benefit of an appropriately long investment of research time.

It has so far taken close to three years to develop the sophisticated UK TLI to the level reported above. The team are barely three months into this wider European challenge. It necessarily requires slow and painstaking research work, and immediate and definitive answers cannot be expected

In one sense the whole infrastructure and practice of real estate valuation for investment purposes is a direct response to market illiquidity. It is likely therefore that wherever valuation is most difficult (the least liquid markets) transaction linked modelling will also be intrinsically difficult.

Not surprisingly, therefore, thin sample sizes, even in some of the largest mainland European markets, have bedevilled this research. Even in the UK the extension of the earlier published work through from Q2 2010 to cover the last two calendar year quarters has proved a major challenge requiring significant model recalibration (as noted above).

Despite intensive research efforts, the most sophisticated form of the model, applied successfully in the UK and involving full sale sample evaluation and rebalancing; regression of that sales sample on valuations; and then mass appraisal of all assets, proved too data demanding to work in mainland Europe. The problem of small transaction samples was most painfully felt at the first sample evaluation stage and so eventually this had to be abandoned, at least for the time being.

The simpler alternative - of least squares regression modelling without sample correction, plus mass appraisal - was adopted as the European failsafe. For the sake of consistency with these European composite models, the UK work was also redone utilising this simpler technology.

As with the UK, it did not prove possible to build TLIs prior to the beginning of 2002 and so the volatility measurement can again only cover the shorter eight year period at present (nine years now in the case of the UK).

Indicative results: Europe

The results of this work have nonetheless enabled us to build relatively robust pan European and Euro-zone transaction linked index models, as well as generating acceptable national market carve outs for France and the Netherlands (as well as for the UK)

The first stage indicative results broadly confirm the utility of this approach in addressing the limitations of valuation based indices through providing a complementary evidence base for the additional market volatility associated with transaction illiquidity. The volatility of the rolling annual returns on a pure valuation basis for the Euro-zone, at 3.2%, rises to 7.9% when derived from the transaction linked series. This suggests a Euro-zone 0.5% tail VAR of -10.4% (based on the CEIOPS criteria).

For a broader European composite, which adds the large UK market into the mix, the rolling 12 month volatility rises from 5.8% to 9.0% and the implied tail VAR rises to -13.3%. The augmented volatility scores, coupled with inferred tail risk values, are drawn together in the table towards the end of this section.

Graph 4: Pan-European Transaction Linked Price Indices, to Dec 09
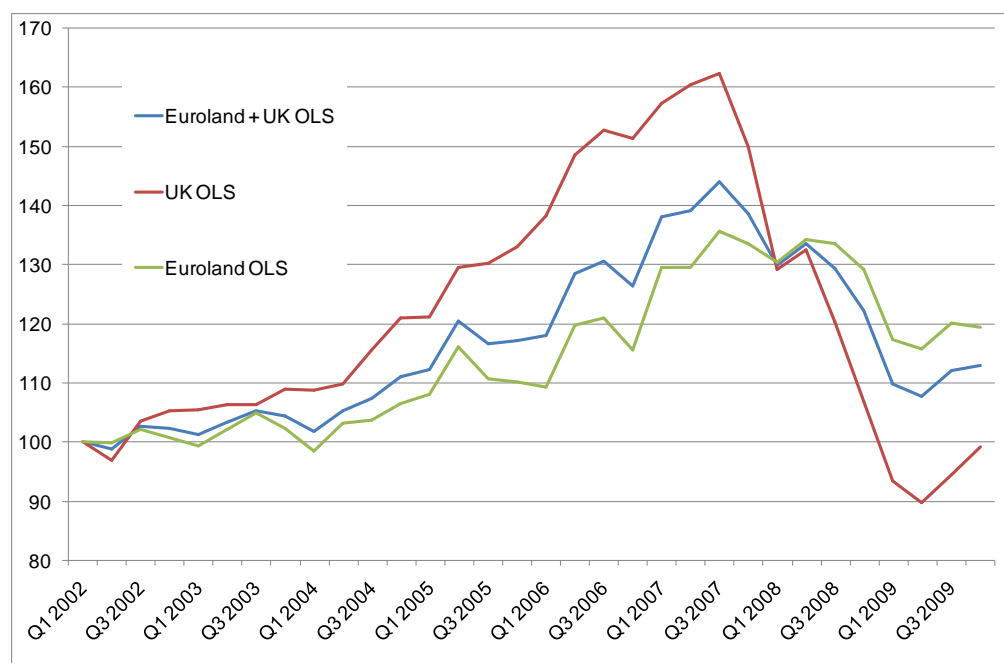
The modelling approach which delivers this result is also capable of disaggregation to report statistically significant France and Netherlands results. Unfortunately, however, no other markets, including Germany, are at present capable of robust single market reporting.

Of the two markets which can be separately reported at this point, the France valuation based rolling 12 month volatility score rises through transaction linking from 6.9% to 9.7%, implying a tail VAR of -9.0%; and the Netherlands valuation standard deviation score (of only 4.1%) rises to 7.7% delivering a VAR uplift to just over 8%.

Graph 5: Euro-zone Transaction Linked Price Indices, to Dec 09
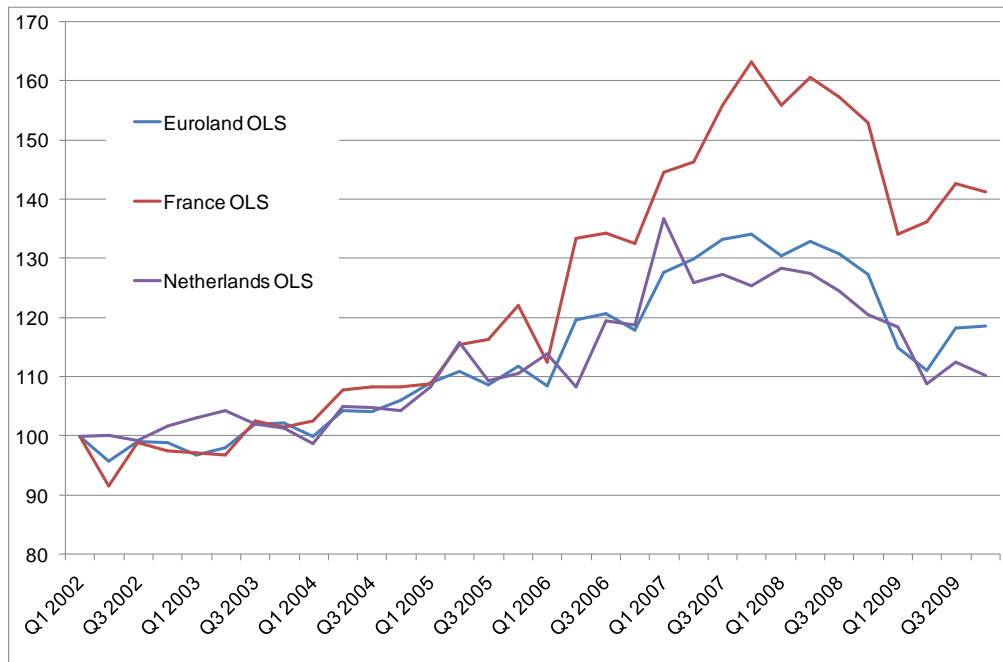
These figures compare with the much higher (close to -25%) tail VAR for the UK since 2002, but these results are based upon the much more sophisticated modelling procedure which has proved too demanding of the data volumes in mainland Europe.

Using the simpler pure OLS modelling technology, but calibrated now through to December 2010, the UK standard deviation (of 14.2%) for the valuation based rolling 12 month returns rises only to 14.3% through transaction linking, yielding a VAR of -23%. The spread across the main sectors of the market is also very small, spanning only 70 basis points.

It is worth noting that the VARs vary by no more than basis points if calculated over the shorter measurement period – to December 2009 – all that is available at present for mainland European analyses.

Graph 6: UK Sector Transaction Linked Price Indices, to Dec 10
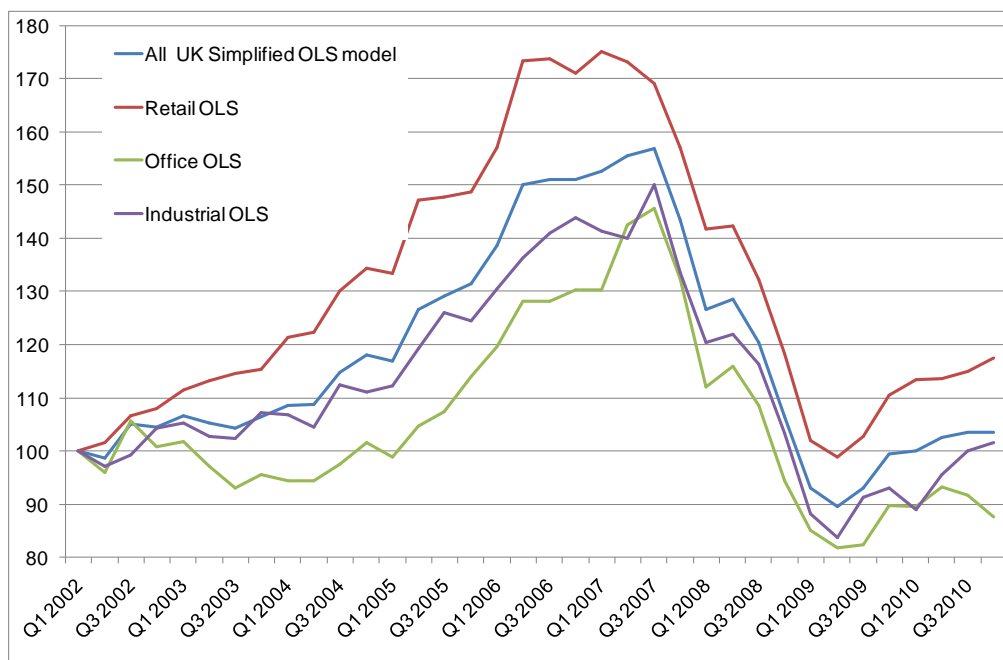
So, though this work is nowhere near completion, these early indicative results suggest that underlying transaction volatility is not fully captured in valuation based indices and therefore a modest risk adjustment must be made in establishing capital adequacy requirements.

However, this evidence also suggests that the extent to which volatility is captured in pure valuation based indices does vary significantly from market to market, and therefore the required value at risk can move from little more than marginal tweaking of a valuation based answer (up or down, as in the UK for instance) to a factor approaching two in much more smoothly valued markets, such as the Euro-zone as a whole (see table summary below).

There is still no evidence of any major leads or lags in valuation practice as a result of this research. It is therefore appropriate to focus upon the required levels of evidence based de-smoothing in each market or group of markets. Moreover, the transaction linked research does nothing to gainsay the variation between markets demonstrated using the quarterly valuation data and does confirm that absolute volatility levels still vary significantly from market to market (from less than 8% in the Netherlands to more than 15% in the UK).

	Valuation Based Index		Transaction Linked Index	
Rolling 12 month returns	Standard Deviation	.5% VAR	Standard Deviation	.5% VAR
To December 2009				
Euro-zone only				
France	6.93	-2.25	9.70	-8.89
Netherlands	4.06	-2.47	7.69	-8.08
Rest of Euro-zone	1.48	-1.14	7.92	-13.09
All Euro-zone	3.10	-0.06	7.81	-10.40
To December 2010				
UK only				
Retail	15.20	-24.04	15.15	-23.75
Office	14.51	-23.98	14.60	-23.09
Industrial	12.81	-20.90	13.33	-23.46
All Assets	14.17	-23.34	14.27	-23.17
To December 2009				
Pan-European				
UK + Euro-zone	5.78	-7.09	8.99	-13.25

Table 9: Implied VARs across Europe from VBIs and TLIs, Dec 02 to Dec 09

The above table summarises the position we have reached so far in drawing down transaction data to inform the overall process of providing real estate volatility estimates that are grounded in properly documented market trading evidence. On this basis, the Euro-zone's required 0.5% tail VAR, at -10.4%, sits comfortably in line with figures for the only two Euro denominated national markets for which separate calculations can at present be made – France and the Netherlands.

The UK, in contrast, generates a transaction linked tail VAR which is almost identical to that computed from the equivalent valuation index. Despite slightly higher transaction linked standard deviations overall - particularly when computed from the pure quarterly movements as opposed to the rolling 12 month rates reported above - the sharpest single quarterly spike which impacts most upon the negative tail (and thus VAR) of the rolling 12 month series, flows from the pure valuation rather than transaction linked results.

If these much richer information streams are to be used to refine future real estate solvency targets, it may be prudent, given the early stage of the research and the significant data difficulties of producing national market models across mainland Europe, to require the use of Euro-zone level volatility scores in the determination of capital adequacy requirements where robust national results cannot yet be reliably derived. For the exceptional markets for which well-behaved least squares transaction linked models have so far been successfully built (France and Netherlands) there would appear no reason not to utilise these market specific numbers.

At the broadest level of European aggregation, however, the combined UK plus Euro-zone TLI model calibrated quarterly back to December 2002 shifts the pure valuation-based rolling 12 month return volatility out from 5.8% to 9.0%. The corresponding 0.5% tail VAR rises from -11.5% to
-13.3%.

Conclusions

There were never going to be any eureka moments in this research. Risk based regulation depends upon batteries of information which are complete and flow with high frequency from long and regularly updated histories.

Despite the best endeavours of IPD and many others, property investment still falls far short of this target. And it is far too simple to conclude that property investors are somehow sluggishly obtuse, unwilling to embrace the full transparency standards achieved from other asset classes. They struggle to document their market performance because it is deeply embedded in the many businesses (or assets) that they run (or hold). Reporting the bottom line return performance of a real estate portfolio is a bit like doing a mini company audit on each asset at every measurement point.

The sheer complexity and deeply embedded nature of property return delivery thus goes a long way to explain the problems of risk documentation, and thus of risk based regulation, described and discussed above. However, industry successes in the face of these difficulties should not blind us to the genuine and major differences between real estate assets, portfolios and markets.

Our survey of insurance businesses has demonstrated a widely shared belief in the risk containing power of property diversification across assets, sectors and territories, and in the unique importance for risk containment of secure income delivery. Almost all believe that the specifics of their exposure warrant bespoke internal modelling rather than standardisation. And a close look at the utmost that can be extracted from the IPD databases is strongly indicative of the importance of market differences and thus of cross-border diversification.

A direct and close overview of the EIOPA proposals as they stand shows that they have gone a long way to bring a meticulous and novel risk perspective to bear upon a more prudent approach to capital adequacy. However, adopting the longest and most frequent return history available (that of the IPD UK Monthly Index) as the baseline for all European portfolios, no matter what their mix of market and sector exposures, appears to be an intermediate position, and one which can be developed and refined without sacrificing or even diluting the prudential aims that underpin the regulatory starting point.

A great deal of evidence for this view has been adduced by simply taking the already published IPD Index numbers plus underlying databases, and attempting to extract maximum value from them. Creating a full quarterly structure – which utilises all available valuation data – over a full 10 year period, has enabled correlation and cluster analysis which shows how, in the deepest and most closely synchronised of global economic upheavals, European markets have demonstrated at least three distinct patterns of property investment response. One key market cluster persists in exhibiting a negative correlation with the rest of Europe over the full decade.

Adjusting the valuation based indices one step further, to allow for the transaction driven volatility intrinsic to lumpy and illiquid real estate markets, reveals patterns of extra volatility, and thus values at risk over and above the valuation determined levels, which again vary noticeably by market and region.

IPD's recommendation on the basis of all this work is therefore to add force to the principles which underpin Solvency II by refining the detail of the regulation in a way which is sensitive to the documented and complex diversity of property investment practice and performance across Europe.

If, for the sake of simplicity however, the broadest available pan-European property shock factor was requested of IPD, to be based on the best evidence of tail values at risk currently available, this would be no higher than 15%, but preferably allowing modest company level and internal modelling flexibility around this figure.

Appendix A:
IPD Quarterly Dataset Methods and Data

Preparation of data for Solvency II models

Context

To create a dataset which can be used for Solvency II modelling, IPD has created a quarterly dataset for all 15 European countries where an index is released. This gives an increased number of data points fulfilling a requirement for modelling purposes.

National indices

In the majority of countries this is done purely by taking straight line interpolated values between the annual data points which are reported, though in some countries the increased frequency of the valuation regime gives a more accurate picture of quarterly movements. To date, a full quarterly index is available in only three markets – Ireland, the Netherlands and the UK, and even in these markets the time series is not as long as the annual time series. IPD stores data on a monthly basis including reporting capital expenditure in the month it occurred. Data is then compounded on a monthly time weighted basis so that even the pure interpolated series will take into account any trends related to the time of year capital expenditure occurs. This is relevant because return measures are calculated on a capital employed basis.

For the UK some analysis has also been done using reweighted sectors by applying the average European weight of the residential holdings and reducing the size of the other sectors yet keeping their relative weightings to each other. This enables users to see how the UK volatility may change if applied to a more diversified European market.

Initially, this work has been done for the main performance metrics of total return, income return and capital value growth for all property and the five main sectors of the market: retail, office, industrial, residential and other.

Pan-European quarterly index

In addition, IPD have created an aggregated pan-European quarterly time series. This has been done by weighting each national market by the estimated size of the professionally managed real estate investment market. IPD market size estimates are arrived at using a "bottom up" approach where market research is conducted to identify the size of all individual funds to include alongside the funds IPD already measures. Due to the secrecy of some funds, not all necessary information is in the public domain so some assumptions are inherent in these estimates. Market size estimates are only completed at an all property level however, not a sector level. Weightings for sectors are always taken from the IPD databank for each country as it is assumed that IPD holds a sample which is representative of the market as a whole.

As the residential sector is not considered an investment sector in a number of European countries, and exhibits performance often driven by economic factors different to that of the main commercial sectors, IPD has also created national time series from aggregating only the three main commercial sectors: retail, office and industrial. A pan-European quarterly time series has also been created on this basis, thus allowing analysis to be done both including and excluding residential exposure.

National index methodologies

Austria	Annual Index 2003-2009. Annual data interpolated to give four quarters.
Belgium	Annual Index 2004-2009. Annual data interpolated to give four quarters.
Denmark	Annual Index 1999-2009. Annual data interpolated to give four quarters.
France	Annual Index 1999-2009. Annual data interpolated to give four quarters.
Germany	Annual Index 1999-2009. Annual Data interpolated to give four quarters. Interpolated data then smoothed to remove effects of held down valuations and unsynchronised valuation regime.
Ireland	Quarterly Index 1999-2009
Italy	Annual Index 2002-2009. Annual data interpolated to give four quarters.
Netherlands	Annual Index 1999. Annual data interpolated to give four quarters.
	Annual Index / Quarterly Indicator 2000-2007. Annual Index de-smoothed using the Quarterly Indicator shape. The Quarterly sample ranges from 20% to 70% of the Annual sample
	Quarterly Index 2008-2009. Pure Quarterly Index data.
Norway	Annual Index 1999-2009. Annual data interpolated to give four quarters.
Poland	Annual Index 2004-2009. Annual data interpolated to give four quarters.
Portugal	Annual Index 1999-2009. Annual data interpolated to give four quarters.
Spain	Annual Index 2000-2009. Annual data interpolated to give four quarters.
Sweden	Annual Index 1999-2009. Annual data interpolated to give four quarters.
Switzerland	Annual Index 2002-2009. Annual data interpolated to give four quarters.
UK	Monthly Index 1998-2000. Monthly data compounded to give Quarterly data. The Monthly sample ranges from 35 to 50% of the Quarterly sample.
	Quarterly Index 2001-2009. Pure Quarterly Index data
	The exception is Residential:
	Annual Index 1999-2000. Annual data interpolated to give four quarters.
	Annual Residential Investment Index 2001-2009. Annual data interpolated to give four quarters.

European cluster analyses: valuation based indices

European cluster analyses: valuation based indices			
12 month rolling returns (weighted by IPD coverage)			
	CLUSTER 1	CLUSTER 2	CLUSTER 3
	Netherlands, Sweden, Denmark, Ireland, Spain, Norway, France	UK, Portugal, Italy	Switzerland, Germany
Q4 2000	16.2	10.4	5.6
Q1 2001	14.5	8.9	5.6
Q2 2001	12.8	8.0	5.5
Q3 2001	11.1	6.9	5.5
Q4 2001	9.3	6.6	5.5
Q1 2002	8.6	6.6	5.2
Q2 2002	8.0	7.8	4.8
Q3 2002	7.4	9.3	4.5
Q4 2002	7.4	9.8	4.3
Q1 2003	7.0	9.9	4.2
Q2 2003	7.1	9.7	4.0
Q3 2003	7.0	9.6	3.8
Q4 2003	6.8	10.9	3.6
Q1 2004	7.6	12.6	3.2
Q2 2004	7.8	15.0	2.9
Q3 2004	8.3	16.7	2.6
Q4 2004	8.9	18.0	2.2
Q1 2005	10.2	17.0	2.2
Q2 2005	11.6	16.5	2.1
Q3 2005	12.8	16.6	2.1
Q4 2005	14.4	18.0	2.1
Q1 2006	15.5	20.1	2.3
Q2 2006	16.7	20.4	2.5
Q3 2006	17.7	19.9	2.7
Q4 2006	18.5	17.2	2.9
Q1 2007	17.6	15.2	3.7
Q2 2007	16.8	12.5	4.3
Q3 2007	16.0	7.5	5.0
Q4 2007	15.3	-3.0	5.6
Q1 2008	11.6	-7.7	5.3
Q2 2008	7.7	-11.7	5.0
Q3 2008	3.5	-14.6	4.7
Q4 2008	-0.9	-17.7	4.5
Q1 2009	-2.0	-20.0	4.4
Q2 2009	-2.7	-19.9	4.2
Q3 2009	-2.2	-14.5	4.1
Q4 2009	-0.9	2.9	4.0

European cluster analyses: valuation based indices

Appendix B:
## Transaction Linked Index – Estimation and Index Construction

The transaction linked indices presented in this report arise out of ongoing development work by IPD in this area. Essentially, they are based on a series of regressions where sale prices for properties that have sold in each quarter are regressed on to preceding valuations and a set of dummy variables that indicate the location of the property concerned and the sector of the market to which it belongs. The results from such regressions reflect the extent to which sale prices, on aggregate, differ from valuations in that quarter. The dummy variables then allow for variation in these differences between selected areas and sectors.

The regressions can be estimated using established Ordinary Least Squares (OLS) techniques. However, OLS based results may give a biased picture of market movements if sales do not constitute a random sample of the entire population of properties[1]. Thus, an alternative two-stage approach has been proposed. In the first stage, a probit model tests whether sales are a random sample by comparing their characteristics (e.g. in terms of sector, value and past performance) to those of assets that did not sell in that period. From this comparison, a variable is generated that estimates the errors an uncorrected regression of prices on to valuations would find. The second stage then adds this variable to the standard price-valuation model. This then helps to correct regression results for any bias arising from non-random selling patterns.

This two stage procedure has been tested by IPD using data for the UK real estate market[2]. However, whilst it is theoretically preferable, further empirical testing on both UK and European data indicates that it is extremely sensitive to the number of transactions in the underlying segments and that small sale samples can cause estimates from the two-stage procedure to be unreliable. For this reason, OLS regressions appear a more practical option for exploring the volatility of European real estate markets in particular.

Once regressions have been estimated for each quarter, the coefficients from the regression involving sale prices are used to conduct a mass appraisal of all unsold assets in the IPD database each period. Two predictions of sale price are generated for each property; one that uses the previous quarter's coefficients and one that uses the current quarter's coefficients. These sets of predictions can then be summed to give an aggregate price estimate for all properties in a sector, a country or across Europe as a whole. The change between the first and second estimate then provides a transaction linked and value weighted estimate of capital growth in that quarter, which can be chain linked with those for other quarters to produce the transaction linked indices featured in this report.

The different stages involved in producing the transaction linked indices are summarised in the following diagram. All six stages occur when the two stage method is adopted, but the sample selection test is omitted in the generation of OLS based results.

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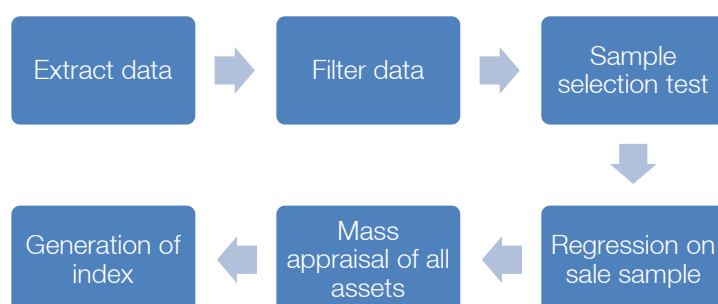
[1] See Fisher et al. (2003) for a discussion of this problem
[2] See Devaney & Martinez Diaz (2010)

Two more aspects of the index construction exercise should be noted. First, a number of filters are used to exclude non-representative assets. For example, properties have been excluded from the analysis in the following cases: where there is missing data in a field required by the models, where holding period is less than one year, where price or valuation is less than €10,000, where sales relate to development projects, and a very small number of sales where mark-up on previous valuation was lower than -50% or greater than 100%.

Second, valuations used in the modelling are not the immediately preceding valuations in each case since these can be contaminated by knowledge of the sale price. Instead, valuations made two quarters prior to the quarter under consideration are used. So, for instance, if sales during Q1 2009 were being studied, valuations as at the end of Q3 2008 would be used to calibrate the model. This treatment is similar to that adopted in annual studies of valuation accuracy in Europe undertaken by IPD for the RICS where sale prices and previous valuations are compared.

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Fisher, J., Gatzlaff, D., Geltner, D. & Haurin, D. (2003), 'Controlling for the impact of variable liquidity in commercial real estate price indices', Real Estate Economics, 31: 269-303.

European transaction linked analysis – UK only

| | UK only models | | | UK only models | | | |
| | Valuation based growth indices | | | Least squares transaction linked growth indices | | | |
	All Property	Retail	Office	Industrial	All Property	Retail	Office	Industrial
Q1 2002	100	100	100	100	100	100	100	100
Q2 2002	101.1	102.2	100.1	100.6	98.7	101.6	95.9	97.2
Q3 2002	102.1	104.4	99.6	101.4	105.2	106.6	105.7	99.2
Q4 2002	102.6	106.7	97.3	102.2	104.6	108.0	100.8	104.2
Q1 2003	102.7	108.1	95.4	102.7	106.7	111.6	101.8	105.4
Q2 2003	103.6	110.5	94.4	103.5	105.4	113.3	97.2	102.8
Q3 2003	104.6	112.6	93.8	104.3	104.4	114.6	93.1	102.4
Q4 2003	106.5	116.4	93.3	105.5	106.4	115.4	95.5	107.2
Q1 2004	108.4	119.4	94.0	106.9	108.7	121.3	94.4	106.9
Q2 2004	112.0	124.6	96.0	109.9	108.9	122.5	94.5	104.5
Q3 2004	115.0	128.9	97.7	112.1	114.9	130.1	97.6	112.6
Q4 2004	118.8	133.9	100.1	115.0	118.1	134.5	101.5	111.1
Q1 2005	120.1	135.5	101.3	116.0	116.9	133.5	98.8	112.3
Q2 2005	123.7	139.6	104.2	119.7	126.7	147.2	104.8	119.4
Q3 2005	127.3	143.9	107.1	122.9	129.1	147.8	107.5	126.0
Q4 2005	133.4	151.2	112.4	127.4	131.6	148.8	114.0	124.4
Q1 2006	137.5	155.7	117.0	130.5	138.6	157.2	119.7	130.5
Q2 2006	142.4	160.5	122.3	134.8	150.2	173.5	128.1	136.3
Q3 2006	146.1	163.9	126.4	138.6	151.2	173.9	128.1	141.0
Q4 2006	149.8	166.6	131.4	141.6	151.2	171.1	130.3	143.9
Q1 2007	151.7	167.7	134.5	142.8	152.6	175.3	130.3	141.4
Q2 2007	153.2	168.0	137.8	143.8	155.6	173.2	142.5	140.0
Q3 2007	149.8	163.1	136.0	139.9	157.0	169.2	145.7	150.1
Q4 2007	136.8	148.2	123.6	129.6	143.5	157.1	132.4	133.6
Q1 2008	130.6	141.1	118.3	123.2	126.7	141.9	112.2	120.5
Q2 2008	125.3	135.6	113.0	118.9	128.6	142.3	115.9	121.9
Q3 2008	117.6	127.5	105.7	111.6	120.4	132.3	108.7	116.4
Q4 2008	100.7	108.4	90.8	96.4	106.5	118.4	94.4	103.4
Q1 2009	92.0	98.6	82.6	89.1	93.0	102.0	85.0	88.2
Q2 2009	88.3	94.7	79.0	85.6	89.6	98.8	81.7	83.7
Q3 2009	89.7	96.7	79.5	86.9	93.0	102.8	82.4	91.3
Q4 2009	96.9	106.1	84.6	92.7	99.4	110.5	89.8	93.1
Q1 2010	101.1	111.0	88.8	94.8	100.0	113.4	89.5	89.1
Q2 2010	102.9	113.1	90.6	95.7	102.6	113.7	93.2	95.6
Q3 2010	103.7	114.1	91.4	95.7	103.5	115.1	91.8	100.0
Q4 2010	105.0	116.0	92.4	95.9	103.6	117.5	87.6	101.6

European transaction linked analysis – Pan-European

	Pan-European models			Pan-European models		
	Valuation based growth indices			Least squares transaction linked growth indices		
	UK + Euro-zone	Euro-zone	UK only	UK + Euro-zone	Euro-zone	UK only
Q1 2002	100	100	100	100	100	100
Q2 2002	100.4	100.1	101.1	98.8	99.8	96.9
Q3 2002	100.7	100.1	102.1	102.6	102.1	103.6
Q4 2002	100.9	100.3	102.6	102.2	100.7	105.3
Q1 2003	101.0	100.3	102.7	101.3	99.3	105.5
Q2 2003	101.3	100.4	103.6	103.4	102.0	106.3
Q3 2003	101.6	100.5	104.6	105.3	104.9	106.3
Q4 2003	102.1	100.5	106.5	104.4	102.3	108.9
Q1 2004	102.6	100.6	108.4	101.7	98.5	108.8
Q2 2004	103.5	100.5	112.0	105.3	103.2	109.7
Q3 2004	104.3	100.6	115.0	107.4	103.7	115.6
Q4 2004	105.3	100.6	118.8	110.9	106.4	121.0
Q1 2005	106.0	101.1	120.1	112.2	108.0	121.2
Q2 2005	107.2	101.6	123.7	120.4	116.1	129.6
Q3 2005	108.5	102.0	127.3	116.6	110.6	130.2
Q4 2005	110.4	102.6	133.4	117.1	110.2	133.0
Q1 2006	112.4	103.8	137.5	118.1	109.3	138.2
Q2 2006	114.5	105.0	142.4	128.4	119.7	148.5
Q3 2006	116.4	106.3	146.1	130.6	121.0	152.7
Q4 2006	118.2	107.6	149.8	126.4	115.5	151.4
Q1 2007	119.7	108.9	151.7	138.0	129.4	157.3
Q2 2007	121.2	110.3	153.2	139.1	129.6	160.5
Q3 2007	121.4	111.7	149.8	143.9	135.7	162.4
Q4 2007	119.5	113.0	136.8	138.6	133.5	150.0
Q1 2008	117.5	112.4	130.6	130.0	130.5	129.3
Q2 2008	115.7	111.6	125.3	133.6	134.3	132.5
Q3 2008	112.9	110.4	117.6	129.3	133.6	120.3
Q4 2008	107.8	108.8	100.7	122.2	129.2	106.9
Q1 2009	104.5	107.2	92.0	109.8	117.3	93.4
Q2 2009	102.3	105.5	88.3	107.6	115.8	89.6
Q3 2009	101.8	104.3	89.7	112.1	120.2	94.4
Q4 2009	102.9	103.1	96.9	112.9	119.4	99.2

European transaction linked analysis – Euro-zone

| | Euro-zone models | | | | Euro-zone models | | | |
| | Valuation based growth indices | | | | Least squares transaction linked growth indices | | | |
	Euro-zone only	France	Netherlands	EZ ex Fr+NL	Euro-zone only	France	Netherlands	EZ ex Fr+NL
Q1 2002	100	100	100	100	100	100	100	100
Q2 2002	100.1	100.5	100.3	99.8	95.4	91.5	101.2	94.4
Q3 2002	100.1	101.0	100.5	99.7	98.5	99.0	100.2	96.9
Q4 2002	100.3	101.6	101.4	99.5	98.2	98.0	103.1	95.1
Q1 2003	100.3	102.0	101.5	99.4	97.5	98.6	103.4	92.5
Q2 2003	100.4	102.4	102.3	99.3	98.9	98.0	106.0	94.8
Q3 2003	100.5	102.8	102.7	99.2	102.6	104.3	103.9	100.2
Q4 2003	100.5	103.2	102.5	99.2	102.4	102.5	103.1	101.5
Q1 2004	100.6	104.1	103.1	98.8	100.1	103.1	99.7	97.6
Q2 2004	100.5	105.0	103.3	98.4	103.6	107.8	106.6	98.2
Q3 2004	100.6	105.9	104.0	98.1	103.2	108.3	105.9	97.4
Q4 2004	100.6	106.8	104.2	97.7	105.9	109.5	106.5	102.4
Q1 2005	101.1	109.2	105.1	97.6	108.8	108.3	109.4	108.0
Q2 2005	101.6	111.5	106.0	97.4	112.2	113.5	116.2	108.5
Q3 2005	102.0	113.8	107.0	97.1	108.5	115.8	110.4	101.9
Q4 2005	102.6	116.2	108.6	97.0	110.2	121.1	111.3	101.6
Q1 2006	103.8	120.7	110.2	97.1	107.1	112.3	114.8	99.8
Q2 2006	105.0	125.1	111.8	97.2	118.1	131.2	108.7	112.2
Q3 2006	106.3	129.6	113.9	97.2	120.5	133.7	120.5	110.6
Q4 2006	107.6	134.1	115.7	97.3	116.3	132.6	120.3	102.8
Q1 2007	108.9	138.1	117.2	97.8	129.4	144.4	138.4	114.9
Q2 2007	110.3	142.0	119.1	98.3	127.2	143.4	126.3	116.1
Q3 2007	111.7	146.0	121.2	98.7	133.9	155.6	128.7	120.7
Q4 2007	113.0	150.0	122.6	99.1	135.0	162.9	126.6	118.4
Q1 2008	112.4	148.3	123.7	98.6	130.7	155.8	129.8	113.0
Q2 2008	111.6	146.7	124.6	97.9	134.0	159.4	127.4	118.5
Q3 2008	110.4	144.0	124.7	97.0	130.9	156.7	125.7	114.5
Q4 2008	108.8	141.2	120.2	96.2	127.9	152.6	121.9	112.6
Q1 2009	107.2	138.0	118.4	95.1	115.4	134.0	120.3	100.5
Q2 2009	105.5	134.8	115.9	94.0	112.0	136.0	110.0	95.3
Q3 2009	104.3	133.0	115.1	93.0	118.2	142.0	113.1	103.0
Q4 2009	103.1	131.1	113.4	92.1	117.5	140.4	110.9	103.8

Appendix C:
IPD Solvency II Real Estate Investment Impact Survey Format

This is a confidential survey being conducted by IPD as part of an urgent study to examine the calibration of real estate risk under the current Solvency II proposal and its potential impacts. Our research is supported by a consortium of European real estate and insurance associations, coordinated by INREV. The objective is to provide informed representations at the regulatory level. Responses will be aggregated to produce survey evidence and no quotes or responses will be attributed to any person or institution.

Each respondent will receive a copy of the final survey report.

Please return your completed survey by Monday 21st February to kate.gimblett@ipd.com.

If you have any questions, please call Kate Gimblett on +44 (0)7976 717 388.

Participant Name:

_____

Financial Institution:

_____

Participant's Full Job Title:

_____

Brief Description of Role (including whether Group, entity or other functional level):

_____

Direct Line or Mobile:

_____

Email:

_____

Business Address:

_____

I.   Questions on Standard Formula treatment of real estate

1.   Do you consider the current capital charge applied to real estate according to the Standard Formula (25%) to be appropriate? Please explain why you consider it appropriate or inappropriate.

2.   Do you consider that the current correlation matrix applied to real estate according to the Standard Formula is appropriate? Please explain why you consider it appropriate or inappropriate.

3.   Do you think that a geographically diversified real estate portfolio provides higher diversification benefits (not currently recognised under the Standard Formula)?

4.   Do you think that the treatment of real estate under Solvency II is pro-cyclical? If yes, are there any measures you believe should be taken to counteract pro-cyclicality in respect of real estate capital charges?

5.   Please explain the reasons why you currently choose to have exposure to real estate assets in your funds (e.g. asset liability matching, diversification as per modern portfolio theory, etc. If you have different reasons for holding real estate in different business lines please explain.)

II.   Questions regarding the impact of Solvency II proposals on real estate allocations

Please answer the questions below assuming Solvency II remains as currently framed under the QIS 5.

6.   Has Solvency II already had an impact on your real estate allocations? Please describe any impact to date.

7.   Do you believe Solvency II will have an impact on your real estate weightings in the future? Please describe any expected impact and the reason(s).

8.   Do you believe Solvency II will have an impact on your direct versus indirect real estate weightings in the future? Please describe any impact and the reason(s).

9.   Do you believe Solvency II will influence your allocation between leveraged and unleveraged real estate investments in the future? Please describe any impact and the reason(s).

10.   Is listed real estate currently treated as part of your real estate allocation in your funds?

11.   Do you believe that Solvency II will influence your allocation between listed and unlisted real estate vehicles in the future? Please describe any impact and the reason(s).

12.   Do you believe that Solvency II will influence your allocation between conventional real estate assets/vehicles and alternative 'real estate related' exposures (e.g. real estate loans, real estate debt, other 'real estate related' structured products)? Please describe any impact and the reason(s).

III.   Solvency II internal real estate models

13.   Is your firm currently engaged in developing internal models in preparation for Solvency II? Yes/No

14.   Please indicate the data sources you are using to populate the real estate elements of these models. (e.g. internal, external, data frequency, length of time series)

Data description	Internal or external source	Data frequency (monthly, quarterly, annual)	Length of time series

15.   Are there any important gaps in real estate data availability that you have identified? Please list these (e.g. data frequency, length of time series, absence of historical data for certain markets or asset types)

16.   If your firm has already started to develop Solvency II internal models, please broadly outline the approach you are taking, your methodology and any indicative results.

(All answers will be treated with the utmost confidentiality. Our objective is to produce an overview of industry modelling approaches.)

IV.   Additional observations

17.   Please detail any other Solvency II issues related to real estate investment that you believe to be important and have not been covered in the above questions.

V.   Supplementary data on your current exposure to real estate

18.   Please add any information you may have available related to your company's current real estate investment exposures (e.g. percent held in real estate relative to other asset classes, percent held by business line and/or fund where appropriate, countries and sectors to which you have exposure).

(All answers will be treated with the utmost confidentiality. Our objective is to produce evidence that this survey has obtained a representative sample.)

Thank you very much for taking the time to contribute to this study. Your input is deeply appreciated. You will receive a copy of the final report on its completion.

Please return your questionnaire to kate.gimblett@ipd.com by Monday 21st February 2011.

Kate Gimblett
Consultant to IPD
M: +44 (0)7976 717 388

Appendix D:
IPD Solvency II Real Estate Investment Impact Survey Results

Headline Responses

The overwhelming majority of Euro-zone domiciled insurers who responded to the survey consider the current capital charge for property under the Standard Formula to be too high.

The majority of respondents think that the correlation matrix used in the Standard Formula substantially underestimates the diversification benefits of real estate.

The overwhelming majority think that geographic diversification of real estate portfolios yields benefits which the Standard Formula does not recognise.

Over half of respondents think the current Standard Formula framework is pro-cyclical.

Over 70% invest in real estate because of its diversification benefits which they believe to be substantial.

Solvency II has not yet had an impact on the real estate weightings of the majority, but an important minority have put all new investments on hold.

Nearly 40% believe their real estate weightings would be reduced by use of the Standard Formula given the size of capital charges relative to the level of expected returns in low risk markets. This view is more prevalent in the Euro-zone than elsewhere.

There are contradictory views held among respondents about the meaning of the current drafting on treatment of indirect exposures. This needs urgent clarification and refinement.

A significant minority believe the Standard Formula will precipitate a move to unleveraged direct holdings and could trigger a retreat from geographical diversification using unlisted real estate vehicles.

Half believe that the Standard Formula as currently framed will shift exposures to more capital efficient vehicles for gaining exposure to property.

Half expect to increase their real estate mortgage exposure because lending to real estate receives more favourable treatment under the current Solvency II framework than direct investment.

There could be a shift to structured real estate products that are specially devised to save capital. Such a shift has the potential to reduce transparency and expose insurers to risks which are less well understood.

Nearly all of the respondents to the survey intend to use internal models rather than the Standard Formula.

Lack of data is a huge roadblock to producing reliable models that deliver robust results. There is no external real estate data series for any country that is adequate for modelling to the 0.5 percentile. Some firms are using internal as well as external data.

Most of the firms surveyed are in the early stages of modelling and the approaches used depend on the composition of each real estate portfolio and the available data.

Many survey respondents view the Standard Formula framework as somewhat arbitrary. Most are depending on obtaining regulatory approval for their internal models but concerned as to whether the regulators will have enough staff to evaluate all models before Solvency II comes into force.

Questions on Standard Formula Treatment of Real Estate

1. **Do you consider the current capital charge applied to real estate according to the Standard Formula (25%) to be appropriate? Please explain why you consider it appropriate or inappropriate.**

    - 56% of respondents considered the capital charge under the Standard Formula to be <u>inappropriate</u>
    - Almost all of the respondents who considered the capital charge to be <u>inappropriate</u> were based in the Euro-zone
    - 44% of respondents considered the capital charge under the Standard Formula to be appropriate or 'acceptable'
    - Almost all of the respondents that considered the capital charge to be appropriate or 'acceptable' were based in the UK
    - The majority of Euro-zone respondents believe that their main investment markets are less volatile than the UK and the capital charge should be more precisely calibrated to the risk-return characteristics of their exposures which are primarily outside the UK.

The response to this question was nearly unanimous on the part of insurers based in the Euro-zone. They considered the 25% capital charge to be too high for their exposures to core, unleveraged assets with long leases that are let to tenants with strong credit ratings in regions with a history of low volatility in capital values, income and total returns. Most claimed this describes the type of exposure that constitutes the majority of their investments in the asset class.

A typical response pointed out that the 25% capital charge was derived from data on the UK market which is far more volatile statistically than the main European markets where these insurers hold the bulk of their exposures. One respondent noted that 85% of the company's exposure was in a market that had not experienced negative total returns in the past 20 years.

Further dismay was expressed regarding the absence of sensitivity to diversification gained through investing across sectors, particularly residential (residential is only a tiny sector in the UK IPD data base but has a considerably greater weighting in many Euro-zone markets). Likewise, it was felt that the diversification benefits gained through investing cross-border were ignored (see question 3 results for further detail).

Dismay at the entire approach of the Standard Formula was also expressed due to the use of total return data in a manner that results in implicit over-emphasis on capital values. It was observed that the income element of real estate returns is considerably less volatile than capital values – even in markets such as the UK - and the Standard Formula takes no account of this. Where real estate is used to derive income to pay long term obligations such as annuities, it is this "stability of income return derived from a portfolio of leases" which is deemed to be a risk mitigating factor.

In general, Euro-zone respondents believe that the Standard Formula capital charge is based an overstatement of the risks attached to holding the types of property exposures that these insurers focus on. Capital charges of 10%-15% were reported as the results of internal analyses quoted by those Euro-zone respondents who offered this information.

In contrast, most UK (and some respondents with domiciles outside the Euro-zone) were comfortable with the Standard Formula treatment and found it not dissimilar to their own analysis for the preponderance of their exposures. Some noted that it was "slightly less onerous that the current UK ICA stress" and "broadly comparable to the experience of 1974". Even those with more cross-border exposure professed sympathy with the regulators' decision to base the capital charge on UK data "given the paucity of data outside the UK". Several noted that the capital charge is not out of line if viewed in the context of the treatment proposed for other asset classes.

2. **Do you consider that the current correlation matrix applied to real estate according to the Standard Formula is appropriate? Please explain why you consider it appropriate or inappropriate.**

- 61% of respondents consider the current correlation matrix to be inappropriate
- 17% considered the current correlation matrix to be acceptable
- 22% were not sure if it was appropriate or inappropriate as they had not yet thoroughly researched this area
- The majority of respondents believe that the correlation matrix understates the diversification benefit of holding real estate.
- The majority particularly take issue with the equity and fixed income correlations and state that the statistical evidence indicates much lower figures should be used, even when accounting for the rise in correlation in the tail of the distribution

The majority of respondents to this question - regardless of firm domicile - believe the correlations used in the QIS 5 matrix to be considerably higher than justifiable. Those who offered the results of their in-house analyses reported equity correlations of between 0.39 and 0.5. The fixed income correlations ranged into the negative, i.e. even the sign was different to the correlation used in QIS 5.

The majority of respondents described the correlation matrix as "unjustified by the data", "too high, even allowing for the need to use dependencies which allow for tail events rather than normal conditions correlations" and "arbitrary".

3. **Do you think that a geographically diversified real estate portfolio provides higher diversification benefits (not currently recognised under the Standard Formula)?**

- 94% of respondents believe that a geographically diverse portfolio does provide higher diversification benefits than a portfolio based in one market.
- 11% modified their belief in geographical diversification by adding they meant globally diversified – not just spread around Europe.
- Most respondents think that geographic diversification benefits should be reflected in the Standard Formula if it is possible to do so without adding undue complexity

There is wide agreement among the respondents that a CRE portfolio benefits from geographic diversification. Most believe that the size of this benefit has declined somewhat in recent years – particularly within certain regions of Europe - as markets become more globalised and synchronised. Nevertheless 94% of respondents believe that the benefits are material, particularly across countries and regions that are less economically synchronised.

Others have a slightly different view of diversification and emphasise that markets have varying risk-return characteristics and expectations (e.g. the London market exhibits markedly different characteristics from the Munich market). The insurer chooses markets on the basis of the group's risk appetite and should be able to reflect this risk appetite in its solvency capital requirement.

In a similar vein, some argue that since economies are structurally different – and it is the economy that determines the amount and type of space that is demanded and the market clearing rents – so the markets provide diversification in terms of risk and return.

A parallel argument was advanced by some focussing on rents and income trends as well as leasing (and legal) conventions which vary greatly across borders. Again, the insurer is offered choice according to risk appetite in terms of the security of the income stream based on economic and leasing drivers and this offers diversification.

A couple of respondents stated that they thought diversification might be implicitly assumed in the Standard Formula. However, the majority believe it takes no account of diversification benefits and this is a fundamentally flawed approach in a regulatory regime which is supposed to be risk-based.

4. **Do you think that the treatment of real estate under Solvency II is pro-cyclical? If yes, are there any measures you believe should be taken to counteract pro-cyclicality in respect of real estate capital charges?**

- 61% of respondents think that Solvency II is pro-cyclical as currently framed
- Some of the above are incorporating mean reversion into their internal models
- A number expressed concern that the invariant capital charge would force companies to sell assets in a bear market, even though the liabilities are long term (e.g. life)
- 33% do not perceive Solvency II as pro-cyclical

More than half of the respondents to this survey judge the Standard Formula in QIS 5 to be pro-cyclical. However, there is considerable disagreement as how – or indeed if - this can be fixed.

The chief concern is that an invariant capital requirement will force insurers to sell relatively illiquid CRE assets in a bear market, thus exacerbating the down trend. "This could contribute to a vicious circle of selling, price falls, shrinking margins of assets to liabilities and further selling."

Some would like to see this potential vicious cycle circumvented through the use of a 'dampener' similar to that agreed for equities in QIS 5. The justification for this rests on the observation that CRE markets mean revert in the long term.

One respondent put the case thus:

> *"The empirical data to draw on is admittedly thin. But, a review of the IPD annual index capital growth statistics which commence in 1971 show three phases of significant <u>inflation-adjusted</u> capital value falls – the mid 1970's, early 1990's and 2007-9. In the first two cases, an initial market shock was followed by further declines in value, <u>but these were significantly smaller in magnitude</u>. We would argue that this provides support to the case for the extension of the symmetric adjustment from equities to real estate."*

Another respondent suggested that both a dampener and a liquidity premium should be employed "to recognise investors with longer term liabilities." The logic behind this is that insurers with long term liabilities have an inherently lesser requirement to liquidate assets than other types of investors and this should be recognised in the Standard Formula. Still another said that CRE should be allowed a 24 month time horizon (rather than 12 months as specified currently) to adjust solvency capital in order to compensate for the illiquidity of the assets.

In contrast, there were those who agreed that the Standard Formula is pro-cyclical but felt that it would be impractical to employ a dampener or that the result of employing one could result in perverse outcomes.

5. **Please explain the reasons why you currently choose to have exposure to real estate assets in your funds (e.g. asset liability matching, diversification as per modern portfolio theory, etc. If you have different reasons for holding real estate in different business lines please explain.)**

- 72% cited diversification as a primary reason for investing in property
- 28% cited ALM as a reason for investing in property
- 28% cited inflation hedging as a reason for holding property

It is clear that the overwhelming majority of respondents to the survey (over 70%) believe that property offers very considerable diversification benefits to a portfolio of assets (hence the disenchantment with the correlation matrix in the Standard Formula).

In addition, the asset liability matching capabilities of property were emphasised by many as a higher return (albeit less liquid) alternative to fixed income with potential opportunities to create alpha. The perception of property as a partial inflation hedge was cited by nearly a third as a further reason to have exposure. Many Euro-zone insurers perceive core assets to be very low risk and emphasised this.

Questions Regarding the Impact of Solvency II Proposals on Real Estate Allocations

The questions below assume Solvency II remains as currently framed under the QIS 5.

6.   Has Solvency II <u>already</u> had an impact on your real estate allocations? Please describe any impact to date.

- 78% say that Solvency II has not yet had an impact on their real estate allocations
- 11% state that there has been an impact - all new real estate allocations have been put on hold until there is more clarity about Solvency II

For a small but important number of respondents, Solvency II has already frozen all acquisition activity in real estate pending a clearer view of the final regulatory framework.

For others, business is carrying on, but it is not quite 'business as usual' – Solvency II is now hovering in the background and entering into discussions. Many are concerned that the high capital charges relative to returns will force them downsize portfolios or move out of core investments.

7.   Do you believe Solvency II will have an impact on your real estate weightings in the future? Please describe any expected impact and the reason(s).

- 39% believe that if they were forced to use the Standard Formula their real estate weightings would be reduced because of the capital charges relative to expected returns in low risk markets
- 22% believe that there will be no impact on weightings
- 11% believe there could be increased allocations for diversification purposes or due to the capital charges proposed for corporate bond exposures
- 28% were unsure

Many found this question difficult to answer given the level of uncertainty regarding the final form of Solvency II. As numerous respondents pointed out, it is the position of CRE relative to other asset classes that matters, not just the treatment of the property on a stand-alone basis. However, the domicile of the insurer had an important impact on the nature of the response.

Many are counting on being able to use internal models and thus avoid what they feel will be punitive capital requirements on low risk assets. If they are forced to use something similar to the Standard Formula, 39% believe they will have to reduce their exposure to what they consider to be 'core' assets – the assets with low risk-return characteristics. There is particular concern attached to residential holdings. Most of these respondents are domiciled in the Euro-zone and have very considerable exposures to core real estate that might have to be wholly liquidated if Standard Formula treatment is insisted upon. Some Euro-zone respondents believe that the Standard Formula in QIS 5 incentivises the pursuit of higher risk-return strategies.

Outside the Euro-zone, the response was more mixed. Many feel that other assets, particularly corporate bonds, are so harshly dealt with that it may shift allocations toward property.

8.   Do you believe Solvency II will have an impact on your direct versus indirect real estate weightings in the future? Please describe any impact and the reason(s).

- 44% think there will be no impact on direct versus indirect allocations
- 39% think that they will be forced switch into more direct holdings, largely because of the 49% capital charge which some – but not all – respondents believe will apply to these exposures
- There is much concern among some UK respondents about the current drafting on treatment of indirect exposures which indicates there will be perverse incentives to use indirect real estate for highly leveraged exposures

There is profound confusion regarding the treatment of indirect real estate under the Standard Formula – possibly due to obscure drafting in QIS 5. Some respondents think that a 'look through approach' means they can treat the real estate holdings in an unlisted vehicle in the same way as they treat direct real estate. Others think the vehicle immediately attracts a 49% capital charge. Clarification is needed in this regard.

If all indirect vehicles with leverage are treated as non-EEA equity under the Standard Formula, a typical respondent noted that "there will be a perverse incentive to invest only in those that are highly geared. Since capital requirement is charged against NAV, the higher the debt relative to GAV, the lower the NAV and consequent capital charge. In our view, for users of the standard model, this could provide a significant disincentive to invest in [low leverage] unlisted funds. There is a strong argument that even in the standard model there should be a more sophisticated view of unlisted real estate".

There is also concern that if indirect exposures are not treated with more sophistication in the Standard Formula many investors will reduce their geographic diversification and the overall demand for unlisted indirect funds. "To the extent that indirect property is the dominant means of getting exposure to non-domestic markets and given the capital charge for overseas investing will likely be higher due to an overlay of currency shocks, insurers may retreat to domestic markets which might result in a lower allocation to indirect overall."

Most respondents that invest in indirect vehicles are assuming that they will be able to employ a look-through approach using internal models that will ameliorate any perverse treatment in the Standard Formula. As a result, the usual considerations such as liquidity will dominate their investment decisions. One response also suggested that indirect vehicles, even with a 49% capital charge, could be an efficient means of taking development exposure.

9.   Do you believe Solvency II will influence your allocation between leveraged and unleveraged real estate investments in the future? Please describe any impact and the reason(s).

- 44% think that capital charges will push them to increase their unleveraged direct holdings.
- 39% believe that there will be no impact on their allocation between leveraged and unleveraged holdings as they are planning to use internal models to make these determinations

Over 40% of respondents indicated that they are likely to reduce leverage in favour of unleveraged direct holdings and believe that Solvency II will push others in this direction. Conversely, nearly half of the respondents said there would be no impact, but many of these do not use leverage at present or only do so minimally.

The confusion surrounding the treatment of indirect vehicles with leverage continued in responses to this question. One respondent said "as things currently stand, there is a potentially perverse outcome for anyone involved in leveraged vehicles in that 'one may as well be hanged for a sheep as a lamb' – if you are going to be 'punished' for leveraged instruments but the level of gearing is not deemed relevant to that calculation, one could be tempted to gear highly rather than lowly."

A few responses noted that returns would have to be very substantial to use leverage under Solvency II as currently framed.

10. Is listed real estate currently treated as part of your real estate allocation in your funds?

- One third include listed real estate as part of the real estate allocation
- 44% treat listed real estate as equities
- 22% do not hold any listed real estate

On third of respondents included listed real estate in their allocation. The remaining respondents to the survey either did not treat listed funds as 'real estate' because it was part of the equities allocation or did not invest listed real estate.

11. Do you believe that Solvency II will influence your allocation between listed and unlisted real estate vehicles in the future? Please describe any impact and the reason(s).

- 39% thought there would be no change in the way funds are allocated
- 44% deemed this question irrelevant because it is an asset allocation question when listed CRE is deemed as equities

One third of the respondents include listed real estate in their allocations so there were not many responses to this question.

Some said that they might look more favourably on listed relative to unlisted funds as equities will attract a 39% charge while unlisted indirect will attract a 49% charge. The listed funds with gearing would thus attract a lower capital charge than the unlisted for any level of gearing.

Others thought they might have to reconsider having any listed real estate at all given the high capital charge relative to direct holdings and the look-through approach to indirect (this assumes the vehicle will not attract a 49% charge).

One respondent noted that with internal hedges in place there should be no need for change.

12. Do you believe that Solvency II will influence your allocation between conventional real estate assets/vehicles and alternative 'real estate related' exposures (e.g. real estate loans, real estate debt, other 'real estate related' structured products)? Please describe any impact and the reason(s).

- 50% believe that Solvency II as currently framed will shift exposures to more capital efficient vehicles for gaining exposure to property
- 44% expect to increase their real estate mortgage exposure
- Many mentioned that lending to real estate received more favourable treatment than direct investment
- A few mentioned a potential shift to structured products specially devised to save capital
- This is the most worrisome result in the survey as it indicates exposures may become less transparent and may expose insurers to risks which are less well understood

Regulatory changes often have unintended consequences and it appears that the Solvency II treatment of real estate could engender some interesting developments in this regard.

First, there is likely to be far more insurance company involvement in mortgage lending. This is already occurring in the EEA and has long been a feature of the North American market. However, there appear to be particular incentives in the current Solvency II framework to obtain exposure to real estate through mortgage lending in preference to conventional investing. Many responses echoed the sentiment that "getting exposure through mortgages…is from a risk-return perspective in the current Solvency II framework much more interesting than investing into real estate directly." Given that lending involves a somewhat different skill set on the part of real estate fund managers, this could pose some unanticipated challenges. However, undo concern is mitigated by the fact that it is low LTV lending that the Solvency II framework rewards.

An area of greater concern is the possibility that the search to generate return and minimize capital could result in new structured products. One respondent noted "If Solvency II turns out to have a detrimental impact on the insurers' willingness to hold real estate through conventional means, alternative more capital efficient holding structures will likely be developed. A split of the debt and equity components of a real estate cash flow is one possible outcome."

While sensible instruments could be potentially be devised to minimise capital, if the net result is less transparency and the creation of new types of risk which are less well understood, this could trigger a range of unintended consequences.

Solvency II Internal Real Estate Models

13.   Is your firm currently engaged in developing internal models in preparation for Solvency II? Yes/No

- 94% of those surveyed are developing internal models

Nearly all of the respondents are planning to apply to use internal models. The capital saving incentives to do so were re-iterated throughout the survey.

14.   Please indicate the data sources you are using to populate the real estate elements of these models. (e.g. internal, external, data frequency, length of time series)

- 39% are using IPD data
- 33% are using internal data as well as external data
- 28% have not chosen data yet as they have not started modelling
- Data is generally annual or quarterly depending on market

Other sources of data mentioned were INREV, NECRIEF, Bloomberg, data from Chambers of Commerce, Land Registry data, Nationwide and Halifax house price indices and house price forward contract prices.

15.   Are there any important gaps in real estate data availability that you have identified? Please list these (e.g. data frequency, length of time series, absence of historical data for certain markets or asset types)

- 83% complained about the lack of long time series
- 78% complained about inadequate frequency of data
- 39% complained about the lack of data for certain countries
- 22% complained about the absence of data by asset type
- 22% complained about the absence of data by vehicle type

All of the responses to this question bemoaned the lack of adequate data. Even UK investors (who have the longest external data set with the greatest frequency) find it is inadequate for modelling to the 0.5 percentile. "No data we have identified is close to being adequate to give robust results."

Respondents also find using property data in a statistical context that was originally formulated for daily market data intellectually discomfiting. "A generic issue with property data is the implicit smoothing of prices as these are not being assessed by daily market transactions but by infrequent valuations and even less frequent transactions."

The problems are even more intractable for modelling non-UK markets. The limited data frequency - often only annual - and the absence of long time series data in many markets renders estimating the 0.5 percentile an exercise in spurious accuracy. Additionally, "many of the underlying indices represent a highly aggregated view of large diverse property markets and asset types such that conclusions derived from those indices are only partly meaningful for any actual portfolio".

The problems get worse as portfolio exposures become more global. Modelling Emerging European markets, Asian markets and Latin American exposures is posing insurers with an intractable problem.

16.   If your firm has already started to develop Solvency II internal models, please broadly outline the approach you are taking, your methodology and any indicative results.

- Nearly 30% of those intending to use an internal model have not commenced work yet or are still in the early stages of development.
- The remaining respondents are still developing or refining their models and the majority were unable to report their results.
- Where results were reported, they tended to be considerably below the estimates calculated using the Standard Formula.

Developing internal models is proving to be a challenge for all survey participants. This is due to the aforementioned paucity of data relative to the task of measuring solvency capital required at the 0.5 percentile, i.e. in the tail of the distribution where we have the least data.

Nearly 30% of those intending to use an internal model have not commenced work yet or are still in the earliest stages of development. Many groups prioritised modelling their fixed income and equity exposures ahead of real estate which explains why work is only now starting to commence in earnest.

Most respondents gave only a brief description of the approach they are taking. There is no dominant approach to modelling that is discernable. Several reported that they are outsourcing the modelling process to external providers.

For those that have commenced work, 20% are using an externally sourced economic scenario generator or a risk scenario generator in a Monte-Carlo framework as a component of the process. Others are basing their approach on techniques that incorporate cyclical adjustment based on deviation from long-term trend. An ALM approach was also mentioned based on total return volatilities.

Some are using de-smoothed appraisal-based indices for exposure types based on geographical location and asset types. For others, the data being used to calibrate models is disaggregated based on location and risk category to estimate the impact of each shock. Still others describe using expert judgment to estimate volatility or choose the most appropriate distribution.

In summation, there appear to be a myriad of approaches to internal modelling for real estate exposures. In most cases the modelling approach is driven by the nature of the exposures held, their geographic locations and the data available.

Additional Observations

17.   Please detail any other Solvency II issues related to real estate investment that you believe to be important and have not been covered in the above questions.

The additional observations supplied by respondents indicate that there is unease regarding the implications of Solvency II as currently formulated.

Scepticism was expressed about the concept of basing capital charges on quantitative methods that require data that either does not exist or has insufficient data points to reliably determine tail risk. One respondent labelled the Standard Formula for real estate as "without logic".

Many respondents were of the opinion that Solvency II capital charges heavily weight the asset allocation decisions of insurers toward government bonds. The treatment of EU bonds relative to real estate and other risk assets leads some to be quite sceptical of the current framework. One Euro-zone respondent wryly articulated a sentiment shared by many: "While we understand the necessity of capital charges…we would hate to be reduced to 'coupon clippers', even though most EU member states could use the support that Solvency II will provide for their bond issues."

UK respondents were generally somewhat more comfortable with the asset allocation implications of Solvency II than their Euro-zone counterparts, due in no small part to the fact that the Standard Formula is based on UK data. While most believe that further refinement is needed, they see less to argue with as regards their UK exposures. As one put it:

> *"Clearly, it is not insurers' interests to invest in risk free assets only. Ultimately, some insurers will need to hold more capital under Solvency II than is currently the case if they are to continue to sell policies that are attractive to consumers. Insurers in countries that do not currently mark assets and liabilities to market and where risk based approaches to solvency calculation are not used will be most impacted by Solvency II in its current form."*

Several respondents expressed concern about the sheer cost of Solvency II. They observed that the increase in administrative costs going forward is likely to have adverse implications for pricing and consumer returns while the benefits of Solvency II are uncertain.

The underlying unease that often pervaded our survey responses seemed to stem primarily from the judgment that much of the Standard Formula framework seemed somewhat arbitrary. Most are depending on regulatory approval for their internal models, but unease was expressed as to whether the regulators had enough staff to evaluate all of the models before Solvency II comes into force.

Several respondents expressed the concern that Solvency II was actually giving far too much weight to the capital value of real estate assets and not enough weight to the income streams and the attributes of leases which are one of the primary reasons that these assets are acquired by insurers. Scepticism was expressed regarding both the formulation of models based on total returns that give undue weight to capital values and the dependence on their output for determining regulatory capital. The Standard Formula takes no account of the fact that a portfolio of leases exhibits different risk characteristics than the capital values of the property assets.

Finally, one respondent observed that economic and financial models had a poor track record and expressed scepticism about reliance on the methodologies underlying Solvency II.

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