

## ABSTRACT OF THE DISCUSSION

**Professor P. M. Booth, F.I.A.** (introducing the paper): There has only been one sessional meeting paper in the property real estate finance area in the last 18 years (Hager & Lord, 1985). There is a similar dearth of treatment of real estate finance in the actuarial literature throughout the rest of the world. So, the purpose of our paper is to lay the foundation stones for the study of real estate performance measurement and modelling, and to move the subject forward, in the hope that others will do further research.

A thorough understanding of real estate indices, their weaknesses and methods of addressing those weaknesses, are necessary if real estate data are going to be used for effective performance measurement and modelling by actuaries. Our paper provides that necessary background. The paper then goes on to look at how information from other markets, for example real estate share markets, can be used to help us understand real estate data better. This is followed by a section on stochastic modelling, in which we find that the Wilkie model structure is reasonably effective for modelling real estate data series.

The paper leaves a number of issues for others to explore further, for example: are there better index construction methods; are there better methods of de-smoothing real estate data; how can we calculate confidence intervals for real estate performance measures; under what circumstances should we use valuation-based data, and under what circumstances should we use data that are adjusted to look more like underlying transaction prices; can we develop better models of real estate data; and so on?

These issues are important for actuaries, as real estate remains an important investment for pension funds and life insurance funds. Actuaries have particular skills that enable them to contribute to looking at these issues for the benefit of everybody. I hope that this paper will open new horizons for actuaries. The real estate finance literature in both the United Kingdom and the United States of America is not that voluminous, and actuaries can easily assimilate it. (Much of it is referenced in the paper.) That literature, combined with this paper, can be a springboard for future greater actuarial contributions to the measurement and modelling of real estate performance.

## REFERENCE

HAGER, D.P. & LORD, D.J. (1985). The property market, property valuations and property performance measurement. *Journal of the Institute of Actuaries*, **112**, 19-60.

**Mr C. Waites, F.I.A.** (opening the discussion): Much has moved on in the real estate finance field, particularly in the U.S.A., and it is helpful to have that progress documented in the paper. The authors have also made some significant strides in developing real estate models for actuaries' use.

The Property Focus Group is sponsored by the profession, which, until recently, was chaired by Professor Booth, and thanks are due to him in that capacity also. The Group consists of actuaries with an interest and involvement in the property field, together with property finance specialists, surveyors and academics. We are always on the look out for new blood.

The property world has changed substantially since 1985, the date of the last sessional paper. The authors of this paper have focused on performance measurement and modelling. There has also been interesting work on the characteristics of property as an asset class, and a better understanding of its underlying debt and equity-like features. There are market developments making the asset class more complex, for example greater risk sharing arrangements between landlord and tenant. The substantial changes in the regulatory framework have led to a rebalancing of institutional portfolios, and this has certainly had a significant effect on the demand for property as an investment. Last, but not least, the explosion in the usage of asset/liability models has led to the need for a better understanding of the asset class. Many of these

developments are touched on in the paper, although its primary themes are indices, data and their deficiencies, and the development of appropriate stochastic models.

Unlike the authors, I am using the terms 'property' and 'real estate' almost interchangeably. However, I do think that they are right to stress 'real estate'.

Section 2 reviews the methods used to construct real estate indices. In today's world there is little dispute about the need for, and primacy of, market-based measures. So, for most purposes, such as performance measurement, asset allocation, indexed funds, and the structuring of derivative products, a market valuation based measure is clearly essential. So, any inherent weakness in the valuation methodology gives real cause for concern. The only exception, noted by the authors, is very-long-term modelling, when transaction, rather than value-based, indices should provide the same answers. The problem is how to assess the short-term steps that have led to the long term outcome.

The heart of the problem in the property world is the use of historic comparables by surveyors, in setting their valuations. This is further compounded by valuation error. In a market value world, these weaknesses have contributed both to a lack of trust in valuations and to the decline in institutional interest in property as an asset class. As the authors note, this is not an entirely black and white issue, and the apparent objectivity offered by equity market indices is only skin deep.

The authors go on to explore this issue further in Section 3. Valuation error will always be with us, and surveyors attempt to minimise its impact by including more comparables. The problem, of course, is that each additional comparable brought into consideration is typically a little less homogeneous than the one before, and/or a little more out of date.

Stickiness in values arises because all comparables are necessarily based on transactions that occurred some time before the valuation date, and various approaches to de-smoothing are discussed in the paper. The approach adopted by the authors backs first order serial correlations. Inevitably some subjective judgement is needed in carrying out the de-smoothing, and that judgement ought to reflect, as far as possible, the underlying valuation process and the weaknesses that lie within it.

One might assume that the problem of stickiness in value, and the need for adjustment, is generally well understood, but I am far from confident that this is the case. I have been reading a recent study by one of the major banking houses, commenting on the attractiveness of property as an asset class. It expresses surprise that property has achieved better long-term returns than gilts, with a lower standard deviation in returns. Various explanations are offered, ranging from non-normal distributions, fat tails and basic mis-pricing, but the problem posed by the underlying valuation methodology is not considered. Clearly, some further missionary work is needed here.

Many of the same techniques used for property valuation may be applicable to other asset classes. Similar issues arise, in particular in private equity, due to the infrequency of transactions and an over-reliance on historic values (although, as a general observation, 'comparables' are even less available than they are in the property world).

Similar issues arise when trying to de-smooth private equity returns, as discussed in ¶3.6.4. In particular, there is a tendency for de-smoothing or imposing additional volatility on the series of returns to lead to an increase in the mean returns, a phenomenon generally referred to as 'drift'. The authors' comment, that significant changes to the mean should be avoided, is fine as far as it goes, but one needs to be conscious of the purpose of what one is doing, and what is really happening to the underlying time series.

Section 4 reviews the various U.K. commercial real estate indices. I want to highlight the important point made in ¶4.3.3, namely that it is vital to be conscious of what you want to use your model for. The best index for one purpose is not necessarily the best for another; and the shortcomings of a particular index may be critical in one application and insignificant in another.

I was particularly interested in Section 5, dealing with residential property indices, even though it is slightly peripheral to the main thrust. It is a very hot topic, not least because of the central position which it seems to occupy in the thinking of the Monetary Policy Committee of

the Bank of England. Only last week, a new house price index, developed by the Office for National Statistics, was published. The hope appears to be that this may alleviate some of the confusion arising from the contradictory information coming out of the existing indices. Time will tell.

I have long felt that this is an area of debate to which actuaries ought to be able to contribute significantly. Maybe there could even be scope for a branded index in this area, with an appropriate provider along the lines of the FTSE-Actuaries indices. This may be an area which, as a profession, we may become drawn to for other reasons, such as an increasing interest in equity release schemes, where one of the key needs is for a robust model of future house prices and the volatility of future price movements.

The attempt made in Section 7 to inform the debate by looking at movements in property share prices is interesting and worthwhile. However, I give a brief note of warning concerning the heroic assumption, in ¶7.1.2, that the management of property companies neither adds nor destroys value. Most property companies persistently trade at a discount on net asset value, apparently because shareholders believe that management is more likely to destroy than to enhance shareholder value. This seems to be contributing to the growing number of property companies reverting to private ownership. All in all, results derived from this approach accordingly need to be interpreted with great care.

Section 8 sets out the key practical applications of the work. Fitness for purpose is stressed again, and rightly so. In conclusion, the work represents a valuable addition to the actuarial tool kit.

**Professor A. Key** (a visitor): Despite a decade of published research on real estate, we still do not have a clear view about the rationale of the smoothing process. Some people think that it is purely an individual behavioural factor used for valuations; others the use of backward looking comparables or the process of index aggregation itself. What thin evidence there is (Brown & Matysiak, 1998) suggests that you do not get smoothing at the individual building level, and therefore what you are looking at is an index aggregation problem rather than purely valuation factors.

To improve our understanding, we need to involve people with access to individual property data, and to persuade them to do more of that analysis. At the top end of the property market, the smoothing issue is one where there is an enormous, and disturbing, gap between academic work and industry practice. The academic work is very extensive, and is tending to spin off into ever more abstruse and esoteric ways of de-smoothing property data. On the other hand, at the practical level, the actuarial and the asset allocation professions, one finds people doing simple things like doubling the standard deviation rather than taking any notice of all the academic discourse.

So, it is incumbent upon the property industry, rather than actuaries, to offer a view, and to say: "What do we think the implications of smoothing are for the analysis of property performance?" If people are going to introduce de-smoothing, or additional deviation, what do we think the right adjustment is?

**Mr N. Mansley** (a visitor): Valuations have changed over time, which has influenced smoothing. In the 1980s to the early 1990s, it was quite common for funds to be fully revalued on only a three-yearly or five-yearly cycle. The data from previous decades are very different from now, where quarterly full external and independent valuations are becoming the norm.

Next, the inferences that you can make from property company shares to the direct property market are very limited, because there are so many other factors that are non-property specific that impact on share prices. Going back to the first quarter of 2000, we saw a period where property company shares were extremely depressed in value, despite a very buoyant property market and very buoyant expectations for the property market. This was a function of the growth versus value story.

My final plea is that, given the importance of understanding the volatility of property and

trying to come up with an important measure, further thoughts are needed about the range of future volatilities that it would be appropriate to use, rather than just doubling historic standard deviations. Maybe, working within a range of what is more appropriate longer term, and trying to make it forward-looking rather than backward looking, appears a sensible approach.

**Dr G. Morrell** (a visitor): I suggest that we ought not place too much emphasis on historic comparables as a primary cause for the need for de-smoothing property indices.

The first sections appear to over emphasise historical comparables for valuations. I am not a valuer, but if you ask a valuer as to what he, or she, does, they certainly do have regard to historic comparable evidence. However, in no way is that a final conclusion to the valuation, as they will impose their own assessment of the current market, which may be very different to the recent, or not so recent, historic evidence.

I concur with Mr Mansley's point concerning historical data and the interpretation of these data. The valuation regime of many investor institutions, certainly going back as far as the authors have done, use data back to the 1920s. Many properties were certainly not valued frequently. It is only since the late 1980s/early 1990s when there have been more regular valuations.

**Mr D. Hunter** (a visitor): The paper supports where the property fund management industry has got to in the past 20 years or so. The development of the Investment Property Databank (IPD) has been a driving force in making property a much more credible asset class. Over the last 20 years there was a choice of indices. A property fund manager could pick the one that suited him best in presenting results to clients. We now have something which is cast in stone and accepted. I was concerned about using other indices, including the perfectly respectable CB Hillier Parker one, which is a real-time index based on today's rents and yields, and has relevance as a leading indicator, but less relevance for performance measurement. We need to keep these indices quite distinct, and urge a strong focus on using the IPD data series in any examination of the figures, including smoothing. I understand the actuarial preference for de-smoothing, but, as a practitioner in the property investment market, I question the need for it. It is something that we live with. The indices which we work with do reflect the market in which we operate. The valuers, much derided by actuaries and by many parts of the property investment industry, do their best. It is often forgotten, but their principal job is to tell an investor what a property will sell for in the market. In preparing their valuations, clearly they have to try to understand how pricing is done. Leading on from that, investors are much more sophisticated than they were even ten years ago. When I look back, pricing was rent capitalised at a given yield based on comparable evidence. Now, all the sophisticated property investors in the U.K. make their decisions based on discounted cash flow (DCF) calculations. There is a target rate of return, and historic evidence is relevant, but it is not the be-all and end-all. Valuers are steadily catching up with that, and reflecting it in their approach.

The point about property companies being of help in the process is misleading. Whether the management adds, or detracts, from value, I will not comment on. One of the big issues which we, as an industry, are pushing for is the push for securitised tax transparent vehicles in the U.K. If we were to have them, and they were to establish themselves as a serious force, as they have in the U.S.A., it is conceivable that we would again have a more real-time measure, with active trading, no taxation to distort the actual pricing, and, perhaps, a better property market that would suit both the industry and as actuaries.

**Mr T. G. Arthur, F.I.A.:** My first point concerns de-gearing, which is a fascinating concept. I wonder whether it could, and should, be applied to equities, so as to get a homogenous result. Equity gearing varies enormously, not only across companies, but also in aggregate over time. Aggregate equity returns are distorted by the rise in gearing, which has been a general feature over the last two generations. That could make a substantial difference.

My second point concerns the inclusion of capital expenditure in the valuation-based

calculations, which is clearly correct, but how accurate is it? For commercial property it would be as accurate as one could expect, but for residential property, even if it is restricted to the commercial rental market, I am not sure. Indeed, I understand that one of the major residential indices makes no allowance for any kind of cost of home improvements, which is a fairly serious error if true.

**Professor R. Verrall, Hon. F.I.A.:** As far as I am aware, apart from a few lines in Wilkie (1995) and also in the work of Huber (1997), there is no substantive reference to real estate data issues in the stochastic modelling literature. This paper points the direction to a range of literature that actuaries can get to grips with and to contribute to. The paper does not represent a complete analysis of real estate data, and it may be that more refinement to real estate data sets are necessary before we should begin to model the data stochastically with confidence. We may then be able to see whether the Wilkie model really is appropriate for modelling appropriately adjusted real estate data. There is valuable research in this paper, but there is also a challenge to actuaries to try to understand real estate data better, then model them with as much confidence as securities market data.

**Mr A. Ross-Goobey, C.B.E., Hon.F.I.A.:** The CB Hillier Parker index appears to give much better returns than the other two indices, as it defines its rent points ex-post. It says in the paper, and it is true, that it is based on the 100% prime location, which, of course, changes over time. They change the point at which they take this rent. Within a town, if the prime position for retail changes, they change the place at which they take the rent, and so it is always the best place to be retailing in any city. Unfortunately, we, as owners of properties, are not able to change our properties in quite the same way, which explains much of the reason why the CB Hillier Parker index is giving an apparently much higher return.

Actuaries already have had an effect on the direct property market, because some of the financial buyers of real estate over recent years have used actuaries to convince property lenders to advance maybe 100%, or more, of the valuation as given by the chartered surveyors. That has changed the way in which property has been bought and sold, and it has been using actuarial DCF, as Mr Hunter was saying. They have been able to convince the banks that a property held with a tenant with a long lease and 100% covenant is actually a good lending proposition, way above what the property valuers have been prepared to put on those properties.

**Dr I. Cullen** (a visitor): This paper is challenging to us, whose business has been index construction in the property sector for over 18 years.

The valuation basis of all the work that we do is a problem, whether we are doing benchmarking analysis or producing market indices, which are not radically different jobs. The question of the valuation basis was brought into sharp focus recently by the formation of the Carsberg Committee by the Royal Institution of Chartered Surveyors, to look at the issue of valuation. It reported with 18 recommendations, the first two of which concerned index-related research, and one of which is now virtually complete, although not yet published. It will be published on November 6 at the RICS valuation conference. It takes the simplest bottom-line test of valuation accuracy, comparing a preceding valuation with subsequent market evidence, several stages further than we have been able to take it before, in part because we have had support from a powerful academic steering committee, on this occasion, to advise about techniques and methods. Although it is not published yet, so that I cannot actually quote specific results, it shows a general trend of improvement, but, of course, it shows extreme results as well.

In attempting to get our heads around those results, we have looked at the role of the fund manager, which can be regarded as that of trying to prove the valuer wrong — by achieving profits in the marketplace or divesting assets that become liabilities — at prices either way above valuation, if profits are to be achieved through changes in circumstances, or way below valuation, if a problem is discovered and a divestment has to be made.

However, the bulk of the evidence shows close correlation of prices with preceding valuations;

suggesting that, if we do have a smoothed index, a by-product of valuations chained one after the other, we may well also have a smooth market. This is not unthinkable, given the different liquidity levels and the different nature of an actively involved marketplace, like property, rather than a more 'purely traded' one, like equities. Such little as we have done to look at the alternative, and we have made some initiatives in attempting to build hedonic models based simply on transaction evidence, suggests that, at least at a superficial level, this conclusion is right. If anything, the transactions-based index is smoother than the valuation-based index. Reflecting on their paradoxical results, we have concluded that, perhaps, it is to do with the fund manager's active involvement in this marketplace, and particularly his or her relatively long-term discretion about how to participate in this marketplace.

So, if you see a recession coming, there are some circumstances in which you can literally just batten down the hatches. The valuers continue tracking the market downwards. "What would I get for this property if I had to sell it tomorrow?" takes it down and down. Three years of negative movement, as we saw in the early 1990s, was a very deep recession. Tracking the transactions shows a much smoother bottoming out of the marketplace, as managers withhold assets from loss-making sales.

I welcome some sort of collaboration with actuaries in examining the way in which we build indices to see if there is scope for improvement. We, perhaps, do not have to jump from a simple valuation-based index to an equally simple transactions-based index, which is incapable of publication, because it tells such an implausible story.

The bread and butter work which we do is about benchmarking — the fair comparison of returns; funds against universes. So, if you are comparing a three-year return on a ten property portfolio, maybe worth in excess of £2 billion, but nonetheless ten assets, with some much bigger benchmark, how you consistently de-smooth those two series, whether it is worth the effort, what different story it would tell, and whether the trustees of the pension fund would ever believe it anyway, is a very large set of open questions. So, benchmarking will probably have to make do with valuation-based indices for the time being. There is certainly nowhere near enough transaction evidence in any one portfolio in any one three-year period to permit a transaction-based comparison.

That leaves us with market indexing, which is the other main purpose to which our indices are put. Market indexing is about describing the shape of the market through the chain linking of consistently available evidence. Our policy has always been that of simply building market samples as big as possible, and using a simple valuation-based methodology to cope with the fact that, with huge samples, while you get all sorts of cancellation of individual asset noise and specific risk, you are coping best with the sheer heterogeneity of the property market in perhaps the most responsible way. The alternative of looking at smaller samples of transaction sequences, or de-smoothed series, has not appealed. If the underlying market is relatively smooth, because of its illiquidity and self-cancelling heterogeneity, then perhaps, for the time being, a sample valuation-based index is appropriate. Bear in mind that we are not just coping with the U.K., but with £120 billion worth of assets, and in the order of 2,000 transactions a year. We are also trying to build consistent services in a series of regions, where the markets are much smaller and much more specialised, and where the challenge of producing a consistently de-smoothed, or consistently transaction-based, set of indices seems to be far greater even than in the U.K.

I would like to see the development of pan-European indices and, maybe, not too long down the line, global indices in the property investment sector. I welcome collaboration with actuaries in the further development of our indices, and their support for our initiative to go global in the index construction business.

**Mr G. Barrie** (a visitor): I am speaking from the financial journalist's perspective. The point about real estate share prices, and cautioning against using that as a marker, cannot be over-emphasised. In 1997 British Land shares were trading at about 800 pence, which was a premium to net asset value. By 2000, in a much stronger market, they were trading at 340 pence, way below net asset value, purely because money had flooded out as a result of the Dotcom boom. At

the moment we have the situation where Canary Wharf, which was trading in the summer at about 137 pence, is now getting on towards £3, purely because it is seen as a takeover play. This is nothing to do with the pure office market. If anything, it has got worse.

Analysts' research is equally to be questioned on this. At the moment Chelsfield, which is a big property company hoping to go private, has analysts' notes vary from saying that it should be taken private at 270-280 pence (HSBC) and 443 pence (JP Morgan). It is likely that it will be at about £3. This is pure sentiment, supply and demand. All sorts of material comes across our desks. We realise the influence of financial public relations, gossip, spin, you name it, on share prices. I would caution strongly against using that as a serious means of calculating your models.

The other interesting factor is the influence of directors on the valuation of companies. You should not underestimate the influence of the property company directors on valuers. There is always a nod and wink in our community about whether they have undue influence, and that is worth bearing in mind before taking the net asset values of property companies as read.

**Mr W. T. Diffey, F.I.A.:** My interest is in property volatilities. At the bottom of Table 3.6.2.1 there are some property volatilities. What we have been trying to do recently is to use Black-Scholes methodology to place a cost on sums assured and reversionary bonus for the cost of basic guarantees on conventional with-profits policies. In the absence of a traded property futures market, we tend to have to try to look at what historic property volatility information is available in order to come up with something sensible to put through a Black-Scholes methodology.

I am interested to hear the views of the authors on the future development of property volatility, whether the result that we have in that table is likely to be reflected going forward. What factors could, in their view, influence property volatility going forward?

**Mr M. N. Urmston, F.I.A.:** I am concerned about the nature of the property underlying some of the work shown in the paper. There is a huge difference between a leasehold property, which is much closer to a corporate bond, and a shop property, which is geared, somewhere in the centre of London. One needs to understand a lot better both the nature of the lease and the risk that the investor is subject to, to have some understanding of the underlying volatility. Particularly as an increasingly large number of transactions are geared, this needs to be fully reflected.

There may be a whole series of different markets to model with different volatilities and a whole range of answers, depending on the nature of the underlying investment.

**Mr P. J. Tuley, F.I.A.:** I come from the same perspective as the last two speakers, namely stochastic modelling on life insurers. I have two questions. Firstly: "If you do have very different strands of property, do you really need different models?" The common approach in the life industry, at the moment, seems to be to actually model a property by a mix of equities and bonds. That could be either stunningly simple or quite subtle, given the comments of Mr Urmston. A derivatives market would normally be the way in which you would validate some sort of property model in the real world. I would be interested to hear whether the authors think that a derivatives market is going to develop in any robust way.

My second question is: "What do managements do?" If one is changing a series of indices to show a far more volatile picture of a property, that implies that managements are currently taking many decisions on the wrong values, day-to-day, year-to-year. That is rather interesting, not just as an owner of a unit-linked property fund policy, but also as a regulator.

**Dr P. McNamara, O.B.E.** (a visitor): With many funds exiting the property market, many here, particularly from the property fund management side, are interested to hear from the authors whether the advent of improved or proper modelling might lead to any changes in the levels of allocation to property for the major life funds and property funds. Might the improved modelling release property from the 'I am not sure what allocation to make, so let us call it 10%'

syndrome? Will market developments also affect that allocation? Mr Hunter has already talked about the efforts that are in train now to develop a securitised market in property. If we could get an index-based property derivatives market off the ground in any deep and liquid form, then this might begin to overcome that greatest of impediments to property investment generally, namely the question of illiquidity.

I have been involved for some time now with a small group of individuals looking to promote the concept of index-based property derivatives. Working with the FSA and, more recently, with the Inland Revenue, it appears that the groundwork for a property derivatives market based on indices could begin to develop in the next few years to a greater extent than was seen in the 1990s. The quality of the index used is clearly essential.

**The Senior Vice-President (Mr P. D. G. Tompkins, F.I.A.):** We have had one or two comments made about benchmarking and the difficulties of that, and the problems about data based on transactions as opposed to value, but, increasingly, people looking at property portfolios and property as an asset class need to have evidence to support the decisions later on, and to look at the benchmarking, and so on. Are there views from practitioners as to the types of benchmarking that are appropriate or not, and how they can justify the transactions and changes to portfolios, about which it might have been difficult to obtain information?

**Mr Hunter:** If you look back a few years, we were all quite happy to take the IPD universe as the conventional benchmark for property performance measurement, in a sense, irrespective of the size of the client portfolio. In many cases that was completely irrelevant. The IPD universe has a very high central London office exposure, and it has a very high shopping centre exposure, neither of which are particularly accessible to smaller investors. Generally, fund managers here will all have been encouraging their clients to go for customised benchmarks, which are very interesting. They can be good news, or bad news, from the point view of the fund manager, in terms of the actual returns that they deliver. The smaller the series, obviously the more danger of a rogue result. However, we are talking about a long-term asset class; we are talking about clients who are prepared to look at it in that way, and who are not distracted by a single year of aberration from the index.

We have been working closely with IPD for all our clients in developing customised benchmarks. That includes, not only the actual performance return, but the breakdown of asset allocation between offices, shops, industrials, and the geographic balance. These are data which we are very happy to look at with the clients and with IPD.

**Dr Cullen:** In the U.K. there are 240 separate funds which are benchmarked. Around 60% of these, in discussion with the measurers, elect an appropriate customised benchmark, which is either a peer group, or a size-matched benchmark, or even a style benchmark for a specialist investment vehicle, for example a retail warehouse portfolio.

**Dr Morrell:** It is crucial in property, more so than in any other asset class, to adopt an approach that recognises the 'investability' of the benchmark, given the particular issues facing a property investor. We support and use bespoke benchmarks derived precisely for that reason.

Three further points are worth noting. The first is that the U.K. is far more advanced than any other country when it comes to commercial property performance indices; in terms of the coverage of the market, the way in which the measures are constructed, the frequency of valuations, and the rigour by which the indices are compiled, largely due to IPD.

The second point is that, increasingly, we are seeing a number of U.K. and non-U.K. investors who prefer an absolute return benchmark.

My final point is one of the interpretation of the performance reports. It is very easy to get carried away with minute differences between the fund return and benchmark return. It is an open question to decide whether these differences are statistically meaningful, given the variation within the samples.



**Professor Key:** When looking at long-term indices, maybe at portfolios that were not valued to modern standards, or valued much more infrequently than in these days, the first order serial correlation is actually much worse in the recent series than it is in the historic series. That is one of the counter-intuities that this sort of analysis throws up.

An example of another one is that, if you start breaking the data down by market, you find that the markets with the highest first order serial correlation are places like central London offices, where you have notionally high transaction volumes and the most transparency. For many counter-intuities, the second order negative serial correlation, which the authors point out, most valuably, is another interesting feature which nobody seems to worry about, going back to the idea that there is something in the process of a generation of smoothing that we fail to understand in the existing literature, which might usefully be served by looking at these sorts of phenomena.

**Mr M. H. D. Kemp, F.I.A.:** There is a strong link between one's assumption concerning volatility and expected transaction costs if one is attempting to hedge derivatives' positions using a stochastic modelling process. Therefore, these two assumptions should be considered in tandem; the cheaper, you assume, it is to transact, the higher should be the volatility assumption that you feed into the stochastic model.

**Dr S. Tsolacos** (a visitor): In relation to Section 7, there is voluminous literature on real estate modelling and forecasting which is very informative for investment decisions. The model in Section 7, which is stochastic, is different from the models that we use in real estate forecasting; for example, extensively we use long-run relationships that link the market and the economy these days.

We have also seen new inputs from physics and mathematics, for instance neural networks. The question which is of interest to property fund managers is the contributions that these models make to existing techniques.

Since there is some history on real estate forecasting, every model should also be judged on how well it improves on the forecasting performance of existing models.

**Mr Ross-Goobey:** The job of the property fund manager is to prove the valuers wrong. This is a circular argument. Dr Cullen will confirm that turnover in the real estate asset portfolios is way below what it is in quoted equities or bonds. That is partly because of the transaction costs, but another of the reasons is that, if you are a manager of a property fund which is going to be valued by a valuer at the end of the year, if you think, because of a DCF approach, like some financial advisers who have been advised by a good actuary, that the property value is actually higher than the valuers say it is, and you make a purchase at above the current quoted price, you are the best buyer, that is all very well, and it may be a perfectly good investment to make. However, at the end of the year that property will be valued down again by the professional valuers, because that is what they think it is worth.

This is a disincentive to try and arbitrage away some of the points that have been made earlier on. That is why it has been left to financial buyers, who often do not have a valuation covenant in their lending.

It is very interesting that we saw, in the late 1990s, the development of lending on property which was not value covenanted — it was only income covenanted. If you are doing that, then you are really saying: "We do not trust the underlying valuations." If the property managers are being incentivised to beat the property valuations, they will cling very closely to those property valuations, and it is left to somebody else entirely, often from outside the traditional property investment market, to come along and try to exploit the arbitrage that is available. It is still a very imperfect market.

**Mr C. G. Lewin, F.I.A.:** Can the authors tell me how the people who run these indexes deal with a situation which occurs sometimes in the property market, where a property is literally

unsaleable, when markets are really depressed and there is nobody around to buy it? Is it the case that the property is then reduced to nil in value, or is it reduced to some notional value?

**Dr Cullen:** Responding to Mr Ross-Goobey, the point about proving the valuer wrong was not so much about making a judgement call and then having to defer to the valuer at the end of the year, but rather that I referred more to the unique difference of property investment, in that you, the manager, are actually involved in it. You can prove the valuer wrong by getting in there and doing something about the property just valued: you can achieve the planning permission, which was not there beforehand; you can negotiate some lease restructuring deal; or you can discover something really sad about the property, like asbestos, and you can take the strategic decision to cut your losses and get out at a loss against valuation. This explains the fat tails and the spreads in the distributions, to a large extent.

As to unsaleable properties, if you have been tracking the U.K. market and have a comprehensive record over more than 20 years through two very deep recessions, you discover everything. The number of development projects which were still attracting capital (probably necessarily) during the early 1990s and which actually attracted negative market values is not trivial. The difficulty of establishing a market price in dire market circumstances has been responded to by valuers in a variety of ways, none of which treats zero as the bottom.

**Mr D. P. Hager, F.I.A.** (closing the discussion): Eighteen years is a long time between Institute sessional meeting papers on property. It is very pleasing to see that the general work on property investments has improved very substantially in that time.

The Institute's timing of this paper is impeccable. We have had three years largely dominated by financial economists telling us about the wonder of bonds. Now, at least, we have had a substantial equity revival. We have had increasing bond prices and a continuing strong set of property returns. Now we have a much more balanced debate between the various types of assets. People in my position, as a pension fund investment consultant, have not done a great job over the past ten years. Here we are with client portfolios with very small exposures to property, and yet property has been, over that ten-year period, the best performing asset class.

Why is that the case? Most large schemes have the benefit of an asset/liability study. Why is it that we have not found a way to get property into these asset/liability studies in a meaningful way? Most of us know some of the problems involved with these studies. We use approximations, such as doubling the volatility, because otherwise the asset/liability model buys 100% property. If we do not do that, then it is common to put some artificial bar on the amount in property, such as 10%, 15% or even 20%. These problems show just how far we need to advance in this particular area, and the paper is a substantial addition to the actuarial work in this area.

Since the paper in 1985 (Hager & Lord, 1985), when we sent a few surveyors to value the same property, spreads between valuers are said to be much lower now. We have heard comments in this discussion that surveyors are using concepts like discounted cash flow to help them in their views of a property valuation. I have had an interesting time in the past year or so, as several valuers have had a go at some properties in the M4 corridor, where there are telecom companies in occupation and plenty of vacancies in the local area. I have not done anything statistical in the same way as I did in 1985, but I am not convinced that the valuation problem has gone away, as the valuation of a property is no easy task. Indeed, I am still of the view, when I look at property returns, that the figure after the decimal point is not a great deal of use, and that before it, on a 12-month period, is not subject to too much accuracy either. I do not have a great deal of confidence in the longer-term figures, but try to focus clients onto the returns for periods of years.

I wanted to pick up a few of the points made in the discussion on indices. Over the past ten to 15 years we have had the excellent IPD series of indices. We can use these in a variety of ways for different types of client. Pension funds really appreciate the different cuts that they can have of the IPD database. It is interesting to see that coverage may be extended to pan-European or global indices.

I put a note of caution out in this particular area, however, that, as we improve the indices, we see the situation which we have seen in the equity market, that investment property managers will reduce their commercial risks and move their asset allocations very close to those of the underlying benchmark. I am already seeing quite a lot of evidence of this in the property market on a sectorial basis.

Another problem that has not been mentioned much is the issue of stamp duty in indices. Clients are quite happy to pick up their own returns, which are calculated with some allowance for the stamp duty costs on the acquisition; but then, of course, they try to compare those with an index which, necessarily, has not featured stamp duty in quite the same way. A number of clients may come to erroneous conclusions.

We have considerable problems with using de-smoothed data. It is fine to use it in matters like asset/liability studies, but I suspect that pension fund trustees will be very sceptical, and quite rightly so, of de-smoothed data. They could argue that they are spending very large amounts on valuation as it is, and they would rather just use these. The cost of valuation is a further issue that we do have to take into account. As people now rush to encourage quarterly valuations, some trustees have pointed out that paying good money to get a property valuation does not necessarily do very much in terms of a cost benefit analysis. I am aware of the counter-argument about it improving the lot of the portfolio to get somebody else to look at it, but we have a concern here about unnecessary costs.

We are not going to find too much mileage in the long term in analysing the property company market alongside the segregated market, although the authors have taken us a good way down that road.

I thank the authors for an excellent paper. This is a great improvement on the contribution of Hager & Lord, 1985, and I look forward to seeing some of the other papers which the authors are also writing on the subject.

**Professor P. M. Booth, F.I.A.** (replying): Professor Key brought up the fundamental issue: "What is the cause of valuation smoothing?" I am not convinced by the Brown and Matysiak hypothesis (Brown & Matysiak, 1998), and, to refer to Mr Morrell's point, the authors do accept that valuers take into account changes in market conditions when they take place. However, you only have to have some reference to comparables in order to anchor a property value to get a smoothing effect. There are more than simply passing references to comparables when most valuations take place, for example, works by Clayton and Geltner (various) seem to show that individual property valuations exhibit auto-correlation between valuations.

The principles discussed in the paper are applicable in other markets, which may be less well developed than the U.K. market. My co-author has much experience of the Italian market. If you ask a valuer in the Italian market what the starting point for a valuation is, it is the last valuation or the last transaction price on a comparable property. I agree that changes in valuation practice may well influence the extent and structure of smoothing over time, and this reinforces the call for the development of smoothing techniques. The different results that we get in different parts of the paper, for example in Table 3.6.2.1, compared with other sections, clearly indicate the need for further work.

I did not really understand the points made by Mr Urmston and Mr Tuley on the validity of an aggregate index. It is true that aggregate indices incorporate a whole range of diverse investments, which is the whole purpose of an aggregate index. It is no less true of equity indices than it is of property indices. As we say in the paper, people often gloss over the problems of equity market indices. People seem to think that, just because they are based on objective transaction prices, there are no issues to be discussed regarding the fundamental composition of equity market indices. Disaggregated indices do exist, and the IPD database can be further interrogated to create more sub-indices. I am sceptical about the limits of using aggregate indices, and on the problems of losing information when we create aggregate indices, but, nevertheless, there is a place for the use of aggregate indices in actuarial work.

When you do de-smooth valuation-based data, you not only increase the volatility, but you

also completely change the correlation structure of real estate returns, not just with other asset classes, but also with liability structures. Correlation structure changes in different ways with different liability structures. To address the point of Dr McNamara, using de-smoothed data does change the results of ALM studies, and changes the results in different ways, depending on the specific assets and liabilities that are being modelled.

The opener was right to say that, whilst residential property is a trivial institutional investment, there might well be many product development uses for residential real estate indices.

It is a pity that, whilst stochastic modelling issues are a crucial area of actuarial work, so many actuaries are quiet in public. Dr Tsolacos did bring up the issue, and to respond to his point, actuarial stochastic models are not really meant to be forecasting models as such; they are models which help us to understand the structure of assets and liabilities and their long-term interaction more effectively. They are not used to forecast the performance of particular asset classes over the short term.

The issue of the use of property company data came in for some comments and constructive criticism. We agree that this is seriously problematic, but the share market might provide some useful information in understanding movements in transaction data. This is particularly so in some markets where there is virtually no information on the performance of direct property holdings. Again, we should not get too rooted in the U.K. context. Mr Barrie, of *Property Week*, goes too far when he says that the price at which shares change hands just reflects sentiment, and so on. Shares changing hands, and the prices at which they change hands, reflect real people taking real decisions with real money. We cannot just dismiss those recorded prices as pure sentiment. If we do that, what is the point of having any index based on prices at all? All prices are subjective, but all of them carry information content.

I end by echoing the comment of Dr Cullen that the form of index that you use should depend on the purpose for which you use it. This is also true in the equity field, and it is an issue that is almost wholly ignored in the equity field.

**The Senior Vice-President (Mr P. D. G. Tompkins, F.I.A.):** Property, traditionally, has been a major asset class for life and pensions business. In recent years, however, its use has declined proportionately, particularly, perhaps, as a result of the way in which equity and bond markets did deliver high returns over the 1980s and 1990s, but not so recently. The role of property as a diversifier is undoubted, and it is receiving increasing interest these days.

One of the challenges for those deciding on a long-term strategy is to understand the way in which the risk and reward balance can be addressed. This paper helps considerably with both a survey of the whole area of property index use and the ways in which some of the price and volatility shortcomings may be overcome. I believe that a paper like this adds considerably to our literature, and I thank the authors for their contribution.