

ABSTRACT OF THE DISCUSSION  
HELD BY THE INSTITUTE OF ACTUARIES

**Mr D. P. Corry, F.I.A.** (introducing the paper): This is the second in a series of papers on the variable annuity topic to be presented to the Actuarial Profession.

At a conference specifically on the topic of variable annuities, in September 2007, they were referred to as the 'next big thing'. I suppose that there was a question mark: "Is it or is it not the 'next big thing'?" I hope that it will turn out to be that.

The idea is that these variable annuity products will bridge the gap left by the decline of with profits and defined benefit pension schemes. We have seen extraordinary growth in other countries; for example, sales in the United States of America in 2007 were about \$180 billion of variable annuity products. Over the past couple of years we have seen a number of launches throughout the United Kingdom and Europe. We are beginning to see increasing interest. So, the question mark is still there: "Will these be the next big thing in this part of the world?"

In terms of our paper, we started off with a sample product design. It is impossible to cover everything as part of a paper like this, so we picked a guaranteed minimum withdrawal benefit, because that product probably represents, most closely, the existing products which have been launched in the U.K. Clearly, there is a range of other structures which could be offered.

We looked at a fairly standard product: 5% per annum guaranteed income from age 65 for the rest of life. We built in a feature where there would be a step up once a year if the fund value was greater than the original premium, subject to a maximum of 15%. That step up would happen up to age 75. We looked at some projections using a 60% equity backing ratio. Obviously, in the actual market, in terms of what you would launch, you would have a range of different equity backing ratios; but this seemed appropriate as a suitable equity backing ratio for this example. We assumed a charge for the guarantee of 75 basis points per annum. We fixed that as a charge in all cases, but, clearly, you could have different charges.

We moved on, in Section 6, to look at customer outcomes. What we are doing here is projecting how the fund would work. We compared a drawdown product without any guarantees with a variable annuity with some guarantees. We looked at two different examples initially, the tenth percentile and the 90th percentile examples. Figure 6.2.4a shows the tenth percentile, the tenth worst in terms of fund performance. You can see that the fund value effectively reduces to nothing between ages 80 and 85. The slightly lighter line is the drawdown version, because, in the variable annuity version, there is an additional 75 basis points charge. However, in either case, the fund value will expire eventually.

In the variable annuity the dotted line across the top gives the guaranteed benefit basis, of which 5% can be drawn down every year. So, in the variable annuity example, you will be able to continue to draw down your 5% for life, assuming that you live beyond age 85. In this example, clearly there is a particular value to the guarantee.

In the second example (Figure 6.2.4b), which is at the other end of the scale, the 90th percentile, you can see that the dotted line does increase a little at the start as the fund value rises. However, in this case the fund continues to increase most of the time. Obviously, the drawdown gives a higher fund because of the lower charges.

Those are two particular examples. We moved on then to show some figures which cover all of the simulations. We have a range of different simulations. In Figure 6.3.3b you can see the amount of income which would have been drawn down in the various different examples. This is the drawdown version, so that there is no guarantee, and the customer draws down 5% of the original premium each year, and we build in the sort of increases at which we are going to look in the variable annuity, for comparison. You will see that, depending on which percentile you are at, eventually the income reduces to zero somewhere, starting at about age 82 for the worst examples, and, for a lot of the examples thereafter, at different ages.

Obviously, on the upside, if you get very good performances, then you can see that the fund value does very well.

When you compare a similar figure of customer outcomes for the variable annuity (Figure 6.3.3a), you can see that there is lower volatility. The top clearly is lower than in the drawdown example because the good scenarios are not so good. However, clearly, in the bad scenarios you are doing substantially better, and you have your minimum guarantee applying right across the board. So, what you are really doing is reducing volatility and giving some potential for better returns to the client in bad scenarios, as a result.

Section 7 looks at pricing. There are a number of market risks which are going to apply, and we shall look at some of these:

- *Asset movements*. Clearly, falling equity markets are bad from the insurance company's point of view. The same applies to bond assets, if the bond values fall in your portfolio.
- *Changes in interest rates* also affect the value of the guarantee. Low interest rates will increase the value of the guarantee.
- *Equity market volatility* makes the guarantee more valuable, as does *interest rate volatility*.
- *Correlation* can go in either direction, but any correlation between interest rates and equity markets will affect the value of the guarantee.

Typically, these products are invested in a selection of funds available in the market. To the extent that you are hedging or managing your costs on these products, you will be using market traded indices. So, if the actual fund performs differently from the index, you are going to have an additional risk, which is referred to, typically, as basis risk.

A further risk, which could be referred to as either a market risk or a non-market risk, arises because the charge to the customer is fixed for a period of time through changing market conditions. For example, in our sample product, I said that the price was 75 basis points. The price of 75 basis points could remain unchanged for a matter of months or more. It would be changed only infrequently. Market conditions change daily. Interest rates and volatilities will change daily. So, the profit margin is moving all the time as the underlying cost of the guarantee changes.

The non-market risks which need to be managed are:

- *Lapse behaviour*. Here clients either lapse or have the option of switching off the guarantee and of stopping paying for the guarantee. Typically, these products are priced with what we call dynamic lapse experience, where we assume there to be a higher level of lapses in very good scenarios. We assumed that, when the client's option is out of the money, more clients will lapse. Similarly, we assume lower lapses when the option is in the money. That is certainly the way in which we have priced the sample product in this particular paper. It is an area which needs to be monitored very closely.
- *Mortality and longevity risk*. This type of product is a life annuity, and improving mortality increases the risk for the insurance company.
- *The individual funds*. These are chosen by the policyholder, and will have different equity backing ratios. They will have different volatility levels. The company does not know what the fund mix will be in advance.
- *Withdrawals*. When will the customers start these? If they have the option to start immediately, will they start immediately or will they defer for some time? Similarly, will they always take the maximum amount allowed by the guarantee?
- *Business mix*. There tends to be quite a wide pricing of these particular products. The 75 basis points charge might apply to everybody aged between 65 and 70, for example, and for both males and females, and clearly the actual mix of ages, genders, and so on, will have an impact on margins.

We started this paper in the autumn of 2007. We priced it with the market position as at 30 June 2007. The price for the guarantee was described as 49 basis points. That was the economic cost in terms of the market price, given the assumptions which we made about lapses, about mortality, and so on, and given the market conditions at that time.

To illustrate the sensitivity of the price to the risks which are mentioned above, Table 7.5.1 shows that there is a very substantial increase in price if there is a fall in interest rates, an increase in equity volatility, or if longevity assumptions improve.

Section 10 looks at some of the capital implications, and Table 10.8.4a shows how much the value of the liability would change for various stresses. If you look at the unhedged column, this shows the change in the liability, given the market movements which are in the first four columns to the left of the table. In line (1), if equities fall by 5%, you will see that the unhedged liability increases by 253. So, you make a loss of 253 if you have not hedged. The two columns to the right of the table show the impact of hedging. The first example shows the impact of a delta-rho hedge, i.e. hedging equity market movements, bond market movements and also interest rate movements. The column on the right shows the situation where volatility is also hedged. You can see that a hedging strategy can substantially reduce the level of volatility of your result in a range of scenarios. Line (6) shows the impact of quite a dramatic market change: a 25% fall in equities, a 1% change in interest rates, and increases in volatility.

We moved on, in Section 10, to project the profits and losses for a range of different scenarios. Figure 10.9.5a shows quarterly profits and losses projected over the life of a policy. This is, again, on an unhedged basis. You can see the very volatile profitability. Good scenarios clearly will lead to good profits, and vice versa. Figure 10.9.5c shows the impact on these results of implementing a delta-rho-vega hedging strategy. You can see that the volatility of profit and loss (P&L) results is substantially reduced. The P&L is much tighter in this scenario, which makes the profit more predictable.

What does all of this mean in terms of economic capital at risk? We have examined two different approaches here. Table 10.9.12 summarises the results. The left column shows the capital loss if you take the immediate stress approach. The capital loss of 5.8% on an unhedged basis reflects the dramatic scenario outlined above (a 25% fall in equities, a 1% change in interest rates and increases in volatility). If we had used a cash flow projection and put a present value on all these profits and losses at the extreme end, we would be looking at a capital need of about 12.9%. We are not apologising for having a range of different approaches. Approaches are going to develop for these products. You can see that the levels of capital need to be quite high on an unhedged basis, but, clearly, the levels of capital can reduce quite substantially if you look at the hedged approach.

Finally, Section 11 looks at some regulatory constraints. Probably the most significant regulatory barrier is the HM Revenue and Customs (HMRC) rules on drawdown in retirement, and the Government Actuary's Department (GAD) limits which apply. You get a situation where the GAD maximum can fall below the guaranteed income, so that you can get a situation where the product is saying: "We guarantee you £5,000 per annum, but the GAD limit is saying that the entitlement is only £4,000 per annum." Clearly, that is a constraint on product design, and is an undesirable feature.

You can have the opposite happening where you have the GAD minimum applying, and the GAD minimum says that you must take an income of £5,000, but your guarantors are only guaranteeing you £4,500. If you then go ahead and take the £5,000, you will be reducing your future guarantees. Either way, these are undesirable features. There was some hope that there would be changes, but the pre-Budget report in 2007 effectively killed off any prospect, for now, of having some change. It is something which we would hope to see. Maybe it is an area where the Actuarial Profession could have some involvement.

It is also useful to look at the impact of the changes in market conditions since we priced the example in the paper. I remind you that the example was priced, based on conditions in June 2007. We have recalculated the cost using conditions on 7 March 2008. The economic cost of the guarantee would have almost doubled from 49 basis points in June 2007 to 96 basis points on 7 March 2008. It is interesting that almost half of the increase is due to a drop in interest rates, and the other half of the increase is driven by an increase in equity volatility. There have been substantial movements in both of these, which means that the price of the same product in March 2008 will be substantially more expensive.

To start the discussion, there are a number of topics which we thought might be interesting.

First, in our opinion we are optimistic about this type of product, or these styles of products. Is that justified? Do people feel that there is a real market? Is there real customer benefit here? Do people believe that they are offering something different, that there is consumer benefit being offered, or is it just an additional charge for very little benefit?

The initial companies setting up in this market are basically companies which have been successful in this market in the U.S.A. Will domestic companies succeed, or will it be dominated by people who have been successful in the U.S.A.? Many of those companies also brought that success to Japan. Will those type of companies come in, or will we see the major U.K. providers getting involved?

Will hedging techniques perform as intended? We showed you projections, and, of course, projections are easy, models are easy, but, in extreme market conditions, if things go wrong, are we missing a 'black swan' type of event, which means that it just kills off the whole thing?

Would changes to legislation be better? That is going back to the point which I was making about the HMRC rules. Is there a way of designing something which is acceptable to HMRC, and, also, is acceptable to insurance companies?

Finally, are actuaries well equipped to develop and to market these products? They would seem to suit actuarial skills. They are a mix of investment risks, mortality, persistency, and so on. They are the type of things with which we are familiar and are dealing, but are they suited to actuaries, or are they more for people who have stronger market skills, perhaps?

**Mr D. J. McLean, F.I.A.** (opening the discussion): This is an investment paper about, largely, pensions within an insurance context. Inevitably, the authors have focused on a stylised product and a simplified product. In particular, I think that the product has, inevitably, as has been highlighted, a lack of a link between what the guarantee actually costs and what you can charge for it, and the way in which that charge can be changed through time. While the paper sets out how you would derive the cost, there are some fairly practical implications of how you would then translate that into a product which is actually being sold.

In setting out the variations of possible product designs, I was tempted to think that we might let the marketing people loose on that, including the marketing actuaries, and we would end up with some horrendously complicated products because we can manufacture them, particularly where they link into some of the regulatory framework. Suddenly, we have these wonderful tools to have sophisticated products. The temptation might be that people head off into that complexity without necessarily adding particular value.

A second area where we might well get some comments is Section 10. It is also a helpful reminder that there is nothing new under the sun, given the nature of some of these guarantees. I wonder whether, for example, we might have offices which are in a position to hedge out their correlation risk because some of the historic unit-linked guaranteed annuity options (GAOs) are exposed to correlation in the reverse way.

A traditional unit-linked GAO has more longevity risk at higher equity market levels, whereas a new-style variable annuity may have more exposure at lower equity levels. I am not sure that people's product design is quite healthy enough to make sure that it hedges out their correlation in that way.

There is also some scope for some further depth, in terms of the way in which the hedging is treated. At its most simple, ¶10.8.4 describes four risks hedged with three variables. Clearly, we could add a second volatility variable to hedge more effectively. However, I also think that there is an extent to which, inevitably, there are far more variables which, in reality, we would want to hedge, because we not only want to hedge along the yield curve, but also along the volatility curve.

I think that there is an opportunity for a number of different approaches to that, and different ways in which we can spell out combinations with different instruments. We might also want to consider linear instruments in the derivatives, such as variance swaps, which could be used for these hedges, rather than implicitly, as within the paper, where you put on an option which contributes volatility and delta, needing you to adjust the delta position elsewhere.

An investment bank would, inevitably, hedge more of the types of risks which I have

described, and more of the correlation risks which are shown here, but would probably still end up, I suspect, with rather more residual risks than the paper implies.

We might get some feedback, given recent events in the investment markets, where some of the derivatives are less liquid than they were, but, for that matter, a great deal of the underlying instruments, themselves, are hugely less liquid than they were six months ago. That might give some interesting characteristics for trying to put on hedges.

In terms of treating customers fairly and implicitly — is this a good product or not? — I am very happy with the conclusion of ¶6.5.9, which says that this is a product which is attractive to consumers. However, it is based on an equity risk premium, in ¶6.1.1, of 4%. That is fine, and I think that many would argue that it is a pretty reasonable number. Now if, in ten years' time, we have had a not very healthy return from the equity market, and at that stage we are, with hindsight, judging treating customers fairly, I wonder whether it might be argued that you should have used a smaller number. To some extent, using a smaller number there is fine, because, provided that you also reduce the volatility number and say that risk and returns are associated with each other, which seems pretty reasonable, the product may still stack up. The hurdle which the 4% has to overcome, primarily, is not volatility and the reduction of the ¾% charge, but it is the ½% charge which is implicit within the product. So, you have to capture enough risk premium to overcome our potentially inefficient industry's costs of distributing the product in the first place.

The comment on the ½% cost and trying to produce products with guarantees in that world is particularly appropriate, given the references to Japan, where the authors refer to the 1.5% yields available in Japan, not too many paragraphs apart from the point at which the authors referred to 1.5% as an annual management charge. In my view, if you start with a yield of ½%, deduct ½% in charges, there is not a lot left.

It will be disappointing if we do not get some comments on the regulatory environment, and, given the Profession's desire to develop its focus on delivering needs for customers, I particularly appreciated the comments, in ¶11.2.4 and following, about the way in which the current regulations give us a situation, essentially, where a product of this sort meets the intended purpose of the regulation, but it does not deliver what the regulation actually obliges the product to do. We ought to have some feedback on how we can deliver that to meet customer needs best.

The problem which I see with that argument is that, if we do suggest regulatory changes, do we not think that pensions regulation is already horrendously complicated? I suspect that, as actuaries arguing for greater complexity of pensions regulation, we would, perhaps, not have too much credibility. It may be that somebody can marry these two obstacles and come up with something which gives us a sensible solution. There seems to be something of a puzzle here.

**Mr A. Silverman, F.I.A.:** Section 4.2 deals with the experience in the U.S.A., and, in particular, the reasons for the success of the product there. I should like to add to the list in ¶4.2.8 what I think is one of the most important factors historically, and which is relevant to Figure 4.2.2. This is the tax treatment of U.S. mutual funds, which are a competing product, and, historically, the most important one. Many people here would find that the tax treatment is most peculiar. In the U.S.A., mutual fund investors become personally liable for capital gains tax when a mutual fund realises profits on individual holdings. This will be the case, even if they, themselves, are under water and losing money on their mutual fund holding.

Switching between funds is a chargeable event. This can all get sorted out later on, when mutual fund holdings themselves are sold, but, in the meantime, it is a cash outgo for the investor. So the so-called tax deferred status, which is how people in the U.S.A. would refer to it, of annuities is a very meaningful thing there.

It is a quid pro quo at a public policy level for the longer-term nature of the product compared to mutual funds. It is relevant to say that it also provides some contrast with the current U.K. position, where insurance products are now at a tax disadvantage outside of the pensions arena.

The tax qualified arena, that is the pensions arena, has become more important for variable

annuities. In recent years, in the U.S.A., longevity protection has, of course, been far more a factor in their growth. U.S. citizens still have little or no requirements to buy longevity protection with 401K funds. It is only more recently that longevity has become an issue for members of defined contribution pensions. It is simply a demand for annuities, of course, in conjunction with the guarantees, but it is very much a traditional demand for annuities in that part of the market.

Competition in the U.K. in this segment will include with-profits annuities, and the impact may not be quite as minimal as suggested. For one of the leading U.K. pensions offices, just taking reported figures at face value, 40% of pensions sales were with profits in 2007, which I think would surprise many people.

In some European territories, structured products sold by banks in the retail market are in competition, particularly in Germany and in Scandinavia. If *Money Management* magazine is to be believed, they will have an increasing impact in the U.K.

In Section 8.5 there is some reference to financial reporting of profitability. This is probably one of the areas into which people could delve, but, as a user of accounts in my role as an equity analyst following the insurance sector, I should like to make a plea that some consideration be given to making reported profits simply an up-to-date estimate of the per annum profitability over the term of the contract. We are, after all, talking about 12 months, or annual, accounts. It would be possible to argue that U.S. GAAP tries to do something similar to this, and certainly earnings' multiples and the returns on equities would then be meaningful. While this might sound simple enough, I am afraid that it is not the case with the current forms of reporting.

I agree with ¶10.4.1, where it is stated that there should be cost advantages to manufacturing your own guarantees. This, ultimately, may become a pivotal area if, or when, it comes to competitive comparisons with structured products sold by banks. In this connection, I do wonder what the real economic sense is in running an investment fund which might be long of equities and a dynamic hedging programme which might normally be short of equities and long of bonds. If you aggregated the two, might it, dare one say, look something like a with-profits fund?

**Mr M. A. Pomery, F.I.A.:** The paper seems to me to be underplaying the importance of the U.K. market context. The decline in defined benefit (DB) pension schemes in recent years has been so great that there are now said to be fewer than one million active members left in private sector schemes. The switch from DB to defined contribution (DC) pension provision has been extensive, and it has been disproportionately concentrated at the younger ages, because of the widespread approach of closing DB schemes to new entrants. Therefore, I think that we are facing, in ten or 20 years from now, a tidal wave of people reaching retirement with DC savings. Mostly, those savings will be of inadequate amounts.

There has been a widespread lack of attention paid to the issues surrounding the conversion of pensions savings into retirement income, what is called 'decumulation'. Even the excellent report from Lord Turner's Pensions Commission contains very little on this subject. The Government's response has been equally lightweight in this area. I partially exempt our own professional body from this criticism, because we have made efforts to raise the profile of this issue from time to time, notably by the competition organised two years ago by the Finance, Investment & Risk Management Board and its chairman at the time, Sally Bridgeland.

The traditional annuity is an extremely unpopular product with the general public. As suggested in ¶3.1.3, it is not necessarily suitable for someone retiring with a life expectancy of around 30 years. I am not offering a ready-made solution to the decumulation challenge, but it seems to me that the direction of travel which we should be taking is clear, and can be summarised in three parts.

First, the traditional annuity still has an important role to play, but people should be encouraged to defer buying one until they have reached an age where their life expectancy is around, say, 15 years. That, to me, seems to be going back to where annuities first started.

Secondly, the financial services industry needs to develop innovative investment, protection and decumulation products to cover the period between retirement and annuity purchase, which might last around, say, 15 years for many people. This would be a huge market, and represents a

great opportunity for the industry. Moreover, successful innovation in this area would be doing a great service to our society.

Thirdly, if the intricacies of the tax system stand in the way of sensible innovation, we should be prepared to lobby the Government to remove those barriers.

**Ms T. J. Abbey, F.I.A.:** I should like to make a couple of comments on what might have helped the sales of variable annuities in other countries. I discovered, at a seminar in February 2008, that commission rates of 15% of single premiums probably helped sales in the U.S.A. when these products started. It focused brokers' minds on whether they would like to sell them to people.

In Japan there is a huge desire for protection. We have heard earlier that there is the 1½% charge compared to the risk-free rate of 1½%. I have seen, in Japan, a charge of 3%, so they have 3% deduction against a risk-free rate of 1½%. I am not quite sure why they are buying them at all, compared to putting their money into a deposit account or into a bond, but they are, and in huge quantities. So, there is a huge desire for that downside protection with upside potential which, possibly, we will not see here, as charges are much more explicit.

Turning to value for money, I think that we have an issue compared to some of the conventional annuities which are around. Numbers quoted in March 2008 were for a level annuity at 7.2% and an RPI-linked annuity at 5.3%. It is quite difficult to sell a 5% guarantee if you can already get a guarantee of more than that from a conventional annuity. It is quite difficult to justify the extra charges. Part of that may be around deciding what the illustrations look like. That was an issue referred to in the paper, and I absolutely agree.

We need to consider, in the illustrations, how we explain the benefits of these products and how they add value to the consumer; for example: considering how often you may be likely to get more than 5%; or how often you are being protected against the minimum. It is going to be quite hard working that out, so that both the brokers and the consumers are happy and understand what we have done. Explaining it within the Actuarial Profession has been enough of a challenge. When we take it out more broadly, that is obviously going to be an interesting thing to do.

We also need to think about to whom we are selling. Conventional annuities will always have a part to play for some of the smaller pots of pension money, which is the greatest proportion, and, in these cases, conventional annuities are probably the way to go.

One thing which I think might be interesting, possibly, is having some kind of bancassurance option, where there are far fewer fund choices, maybe very simple high, medium and low risk combined funds, and then they can be done with much cheaper advice to people with smaller pots of money and can still be done economically. An independent financial adviser (IFA) option is there if you want fund advice.

Something to think of, though, is the guarantee charge. We have previously heard that you have the 1½% already deducted before the guarantee charge is considered. That is not true for all index-linked funds. You can get index-linked trackers with, maybe, only a 50 basis points charge, not, obviously, with the cost of an IFA's advice, but straightforward simple ones which can be bought directly. It may be possible to add some of this protection to a simple FTSE 100 tracker. Then you are adding 50 to 75 basis points, even the 96 basis points which you have come up with now, onto something with only 50 basis points. That may feel like more value for money to the consumer. These are all things which may help us to broaden this market.

Considering capital, the credit crunch has obviously made things rather interesting, with banks trying to raise capital at the moment. The paper touches on the availability of the assets which you require for your dynamic hedging model, which does need to be thought about in any individual capital assessments (ICA) which you are doing, and in the capital requirements which you are setting up. Will the constant rebalancing be possible in the future, or will you need to allow for a mis-match while it is uneconomic to do so, or when those assets are simply not available?

Non-linearity is a big risk to be considered for variable annuities. Often you can consider risks together, which are larger than they are individually. One example is equity volatility and lapse rates. You could easily argue that, in times of very high volatility, consumers would be

more concerned about where the markets could be going, and, therefore, would be less likely to lapse. So, you could end up under hedged at exactly the time when the options are far more expensive to buy in the market.

**Professor A. D. Wilkie, C.B.E., F.F.A., F.I.A.:** I have a number of points. The charges have already been mentioned. They seem fairly high; 1½% or possibly 2¼%. An option available to people, particularly the younger people about whom Mr Pomery was talking, is to do the savings themselves, and not to worry about pension plans at all. It is, of course, very difficult to make regular savings, personally, on a contractual sort of basis, but it should be something at which we can look as an alternative.

It may well be that the tax relief which is obtainable is bigger than the charges, so it is still worthwhile, but, if the charges get big enough, then my suspicion is that the charges are taking up more than the tax relief, and it would be better value for somebody simply to save up for retirement themselves, invest their money in some way, and to live on the income.

For the examples in Simulation 38 and in Simulation 81 (see ¶6.2.1), one would need to know what the numbers are. They are on a log scale, so they are not easy to read off. One would need to allow for the fact that the income is taxable, but that any capital is not taxable except for capital gains. It would be an interesting exercise to see how it works. We then have a three-dimensional problem, as, to some extent, there is with this. How long does the person live? What are the chances of running out of capital entirely on these particular savings? It might not be the only income. What are the chances of it running out before they die? If they do not run out, what is then the capital value of their assets on death? These are three interesting things to plot in some three-dimensional way.

There is reference in ¶7.2.3 to Guidance Note 47, the calibration of economic scenario generators. Unless GN47 has been revised and I have not noticed, it is not of any help at all if you are doing hedging. Almost entirely the point about hedging is getting the variants big enough. GN47, which was produced some time ago, was dealing entirely with minimum values, in that you have to have high enough minimum values, which you could get easily through the high mean and low standard deviation, which would be totally wrong for hedging. You could also get well below the minimum values by a low mean and a high standard deviation, which would be just what you wanted for hedging. So, GN47 should be looked at as well.

**Mr P. C. Shallis, F.I.A.:** I have three comments on what I believe is a very comprehensive and definitive paper. First, I am slightly surprised that the authors have not taken the opportunity to introduce into this discussion some more U.K.-centric terminology, instead of using the U.S. label of 'variable annuity', defined in a particular way to satisfy and to accommodate products which we have seen in the U.K.

Ultimately, in my view, this is a concept or a technique; it is not a product. I would argue that it is neither the variability nor the annuitisation aspect which defines this type of business, but, rather, it is the guarantees, and it is the way in which those guarantees are provided which is the key to defining this type of business. It is also important to appreciate the differences between those guarantees and the traditional guarantees which we are used to seeing in the U.K. Guarantees, whether they are on with-profits products, or on other products, are generally delivered through very simple investment management techniques, through providers investing in fixed-interest assets sufficient to meet the guarantees when they become due, and then to invest any remainder in equities.

What we have here is a concept, by which, if the investor wishes to invest a certain proportion of their assets in equities, then that is what they get, and, in return for that, they pay an explicit charge in order to obtain the guarantee.

Secondly, it will be interesting to see whether the U.K. and the European markets actually do follow the U.S. and Japanese experience as far as the adoption of these products is concerned. There are already signs that they may not. Broadly, the evolution of products in the U.S.A. and Japan has been one whereby a provider will develop a new guarantee. That guarantee will be copied by other providers, and, for a period of time, that guarantee will dominate sales in the



market, until such time as another provider invents another guarantee. That will then be copied and sold in volume. We have already seen, with the experience in the U.K. so far, products sold in two very distinct markets, and, out of the first six products sold in the U.K., no two products actually carry the same guarantee.

Another sign of the difference between the U.S.A. and the U.K. is given in ¶4.2.8, where there is a reference to earlier research looking at success factors in the U.S. market, one of them being 'transparency and flexibility'. It is the transparency of cost, while widely regarded as a good thing in the U.K., which has provided a barrier to sales in some situations, where the explicit cost of guarantees exceeds the consumers' and the advisers' perceived value of that guarantee.

Then, Section 6 gives some very interesting and detailed analyses of the sample product from the consumers' perspective. The concern which I have, though, is that, if we need stochastic models to understand how products such as this might operate across the range of likely scenarios, then what does that say about consumers' and advisers' abilities to understand fully the detailed operation of these products? It is probably no wonder that stochastic model-based illustration and advice tools have been developed for some of these products already. That is an area where careful consideration will be needed.

**Mr P. J. Sweeting, F.I.A.:** It seems to me that the value for money which any individual investor will get from a guaranteed minimum withdrawal bond variable annuity would depend hugely on when they bought that product. Your eventual value for money is going to depend on the returns which you get in the first few years. All that you need are poor returns in the first couple of years, and that might preclude any future increases in your guaranteed payments. Different investors in these products could have very different results over time.

If an investor wanted to keep the same asset allocation, there are a couple of ways in which this could be addressed. One would be to have some sort of smoothing of your assets: intergenerational transfers, with profits, and such other opacities. The alternative approach, rather than to smooth your assets, is to try to unsmooth your income. At the extreme, basically, that means taking the same percentage of your fund every year and allowing your income to go up and down. However, you could have some middle ground, where the minimum level of income is not necessarily the income drawn at the outset. You could have a guarantee level which is set at, say, 80% or 90% of your initial income. That might give you enough flexibility that, when the market falls, by the time when it has rebounded, you have not taken so much of your assets in income that you never get any of the benefit of the subsequent increase in the market.

**Ms C. E. Henshall, F.I.A.:** From a practical point of view, some companies are finding computing issues as one of their biggest challenges. That is an area where, as actuaries, we can be involved, in particular on the testing side, and also for actuaries who are monitoring variable annuity programmes to be aware of what is going on in IT.

In terms of marketing, we talk a lot about marketing being a challenge with this product. I would deduce that there is an opportunity there for us, as actuaries and as a Profession, to be proactive in this area, and to use some of our communication skills to try to present this product well to the public.

On hedging, much of the paper covers companies doing the hedging themselves. In practice, we are working with companies which are setting up their own contracts with investment banks. Basically, they are taking all of the market risk off the books by setting up their own contracts. That is another option for insurance companies as well.

**Mr T. W. Hewitson, F.F.A.:** I was interested to look at some of the figures in Section 10, particularly in ¶10.8.1 and 10.8.4. I see that it shows, for example in ¶10.8.1, the figure of -£1,816. There is a difference, as stated there, between the value of future charges and the value of future claims. It would be quite interesting to know what are the two gross amounts. In other words, what is the actual economic value of the liability for the option before allowing for the charges.

Turning to the capital strain and the capital position, I am closely involved in some of the

Solvency II work for insurers. Under that regime, at the moment, it looks as if the way in which it will come out will say that, in assessing provisions, these are to be calculated on a market-consistent basis, where dynamic hedging can be taken into account. I presume that this is going to be equivalent to the gross figure in ¶10.8.1, but, when looking at the capital requirement under the current proposals for Solvency II, this will be assessed by looking at an instantaneous fall, for example in the value of equities, currently suggested in QIS4 as 32%. No allowance could then be made for dynamic hedging during that fall. The provision could be reassessed following that fall, allowing for potential hedging thereafter. There is also no allowance at the moment, under the current proposals in QIS4, for any change in the implied volatility. I do not know quite how that will come out in terms of some of the figures in the paper.

I should add as well, of course, that, where a firm was writing a large amount of this type of business with complex options, then, under the Solvency II proposals, there would also be the facility for the Regulator to require the firm to adopt an appropriate internal model. That model then, of course, would be expected to look into the intricacies of options, including the changes in the volatility. I hope that this helps to show where we are at the moment.

**The President (Mr N. J. Dumbreck, F.I.A.):** A number of people have referred to the fact that the cost of the guarantee has more or less doubled from ½% to 1% in current market conditions. Is there any evidence of how companies writing this kind of business around the world have responded to this change? Have they put up their charges for new business?

**Mr Corry:** The first thing to say is that most of the countries around the world are not writing in sterling. Interest rate movements have been more dramatic in the U.K. market. Obviously, in the U.S.A. we have seen changes in interest rates as we have in Japan — less so in the euro zone, so that it has been less of an issue there.

In volatilities, people generally do not price with implied volatilities in the market. We generally find that people are pricing with some sort of a conservative volatility assumption. I do not think that anybody would have priced it at 49 basis points, going back to the end of June 2007. That is my experience. They would have used some kind of prudent volatility assumption, which might be closer to where we are now.

In terms of interest rates, this is the same as in any market; it is driven by competition. How competitive has the market been? Have you been required by competition to reduce your price? Have you been allowed by competition to increase your price or not? You tend to find variations in terms of either that the guarantee has changed or that the price has changed. Instead of 5% for life, it might become 4.5% for life, and that reduces the price substantially, or it might be that you make some other tweaks to the products, or some other changes, for example: less volatile funds, lower equity backing ratios, and so on, and you find a mix, really, of all of these.

**Mr G. S. Finkelstein, F.I.A.:** There has been a bit of repricing of late. It depends where and which guarantee benefits are involved. However, it is also the case that, whereas the hedging programme tends to be marked-to-market as much as possible, the retail pricing has margins included, in order to get a return on the residual capital at risk after hedging, as well as to avoid having to re-price every other week when market conditions change. The size of those margins varies by company and by market.

**The President (Mr N. J. Dumbreck, F.I.A.):** I found Section 10, on the hedging process, particularly interesting and useful as an introduction to how hedging works. I assume that similar techniques are capable of being applied to with-profits business as well.

My suspicion is that the way in which dynamic hedging is applied to with-profits business, in practice, is typically less sophisticated than that for variable annuities. Is that a fair assessment?

**Mr Finkelstein:** Clearly, the variable annuity product is going to compete with other products offering guarantees, such as with profits or constant proportion portfolio insurance (CPPI). There is always going to be a demand for products which provide upside and guarantees.

However, what variable annuity manufacturers are doing is bringing in modern financial risk management techniques and hedging technology which build on the science which started with Black & Scholes (1973), which was some 20 years after Frank Redington's paper on terminal bonus and immunisation (Redington, 1952). That said, there is a very important distinction between traditional guaranteed products, like with-profits products or even CPPI products, where an important lever of risk management is the ability to sell equities in a falling or a volatile market, to a product where you are offering guarantees on an external managed fund and you have no control over the underlying assets. In that case, since you have fewer levers of risk management, the main lever of risk management available to you is hedging (assuming, of course, that you have not reinsured). Therefore, for the same quantum of capital at risk, you will find it likely that you will need to be more active than you would have been if you could adopt other measures, like changing your underlying asset mix, to reduce the cost of guarantees or pooling or smoothing the capital resources of the fund which is providing the guarantees.

**The President (Mr N. J. Dumbreck, F.I.A.):** Returning to Mr Hewitson's question, if Solvency II requires you to assume an instantaneous 32% fall in equities, and you cannot assume that you can shift your dynamic hedge during that fall, does that lead to enormous capital requirements for this type of product?

**Mr Finkelstein:** That is exactly what has happened in Section 10.8. The capital measure which you are seeing is the amount of capital at risk, which addresses one of the frequently asked questions: "What happens if your hedging technology is telling you to sell, and, when you pick up the 'phone to trade, the 'phone lines are jammed or there are simply no buyers out there?"

Essentially, when you have worked through the calculations in these immediate balance sheet shocks, the amount of capital risk shown is the amount which results if the next opportunity which you get to rebalance your hedge occurs when the market is already down by 30% or  $X\%$ , or whatever the stress was. We are not rebalancing the hedge during those immediate balance sheet shocks in section 10.8. We do rebalance the hedge (in weekly time steps) in the nested stochastic cash flow projections in section 10.9, but not through the immediate balance sheet shocks in section 10.8.

**Mr Corry:** For other purposes, I have performed Solvency II specific shocks, applying a 32% equity fall, and so on, and the sort of figures about which Mr Finkelstein has been talking. Effectively, you get that lack of dynamic element which is what comes through, and that, effectively, becomes your capital. For a one-off shock of 32%, you get some benefit because you are hedged, but, obviously, you are not perfectly hedged.

**Mr Finkelstein:** If, as is usually the case, your stochastic valuation model has a dynamic lapse behavioural component included within it, then the impact of the shock will be to put the guarantees more deeply into the money, which is normally the trigger for increasing the dynamic lapse rate, and for further increasing the value guarantee. Thus, the impact of the shock and the consequential impact of the dynamic lapse behaviour is, indeed, reflected in the liability valuation movements on the balance sheet.

Also, it is worth considering briefly what would happen if it were the case that you were able to rebalance the hedge. Let us say that the market fell by 30% over the course of a day, and you were able to rebalance the hedge, say halfway through the day, by the time you had validated the trade recommendations. Then, in this case, you can take the capital adverse figures in section 10.8 and multiply them by roughly a half.

There is a big difference by having a short position in the underlying asset and not rebalancing during the course of that, and not having had the short position at the start of the day in the first place.

**Ms K. J. Byrne, F.I.A.:** One of the things which would make the product a success is if IFAs take it on board and sell it.

One thing which I have noticed, when talking to IFAs and working with them over the past ten or 20 years, is that it takes them quite a while to get up to speed with new concepts and new products. If you take structured products, for example, which appeared in the early 1990s, it was not until, perhaps, the late 1990s when they were sold in any volume, and then many problems came out of that, ultimately, when there were market crashes. It was only then that the IFAs really started to understand how those products worked and what was behind them.

I think that we will see similar things with variable annuities or unit-linked products with guarantees, because it will take IFAs quite a while to get to grips with what this new concept is. I ask IFAs about whether they use any of these new-style products and what they think of them. One of the first things which I come across is: "Oh, yes, this is the unit-linked bond from an American life company." They did not really understand that it was actually a guarantee.

Since the products have been around a lot longer, one or two IFAs are starting to take them up. I would be quite interested to know if there is anybody here from any of the companies which are actually providing them, who can provide some insight into what IFAs think of them and how they use them. There are one or two IFAs who are great fans and sell them, particularly on the pensions side.

Talking to some IFAs more recently about their clients, what they advise and how they actually manage their portfolios, the comments which I now receive show that they understand how these types of products work, and are of the form: "We take a balanced and holistic view to financial planning with our customers, and we invest for them in a portfolio. So, we have cash-based products with guarantees; we have corporate bonds; we have equities; and we might even have some commercial property. Therefore, because we have a balanced portfolio view, we do not actually need to pay 50 basis points for a guarantee, because there are parts of the portfolio which are always going to perform and provide some sort of level of minimum benefit, even if it is just from the cash and the bond proportions."

So, the IFAs at the top end are doing proper financial planning, and they do not think that they need guarantees, and the IFAs at the bottom end, with smaller amounts to invest, probably do not know about the product. It is probably going to come down to how the IFAs understand the products, and how they take them up, as to whether or not they will be successful, as well as other aspects, such as tax benefits.

**Mr Corry:** In other markets in Europe which I have seen, and in the U.K., a little, as well, IFAs have been slower to take up these products than have other distribution channels. It is typical, maybe, of new styles of products. I echo some of what Mr Challis said earlier. There is sometimes a danger of saying: "Here is a product, in the U.S.A., which is a guaranteed minimum withdrawal benefit (GMWB) product for life. Let us have one in the U.K."

Some of the most successful take-ups of these products have been in Germany, where they said: "Here is a tool kit. We have a problem in Germany. Old guaranteed products are not going to work any more and we want to sell something new. We have a tool kit from the U.S.A. Let us use this tool kit to design some products which suit our own particular market." The products sold under variable-annuity-type headings in Germany are very different from anything sold in the U.S.A. They are effectively regular premium pension plans, but they have been sold in enormous volumes to a mass market. It is because they have designed something which genuinely fits their market.

The U.K. is still struggling a little to find something which fits genuinely, for some of the reasons which we have been discussing. There is a little bit of: "Take what works in the U.S.A. and make it work here." IFAs, I think, will ultimately sell some of these products when the benefit to U.K. customers can be shown.

What Ms Byrne did not mention was longevity risk. The sophisticated IFA is putting something together, but longevity risk is the one piece which is missing.

What people are trying to do with pension pots is to manage income, but, maybe, also to pass on some capital to their families. These types of products can be useful tools to balance those types of competing desires of: "I want to get some income, but I want to make sure that I can also pass on some capital to my family, and I want to be able to manage both at the same

time.” It could be a mixture of the GMWB for life type of product and of others about which we are talking. We are going to need to see that sort of change before we get a really serious take-up from IFAs.

**Mr Finkelstein:** We obviously cannot give individual company volumes, but there is no question that the variable annuity product concept is gaining momentum. Looking at the volumes which are in the public domain, more and more distributors, including institutional distributors like banks and the major IFA firms, are taking on the concept, and there are clear signs that it is filtering down, as would be expected for a new concept. I do not like calling it ‘educating’ the distributors; but ‘selling’ it to the distributors, through explaining the proposition and the sales message, is going to take time. If more and more institutions with deeper distribution channels will take on the challenge, then this increasing effort into promoting the product concept will increase the likelihood that the product will really take off.

There were comments about trying to manufacture these guarantees yourself. Also, if we invest in a diversified fund, is the customer safe enough? It is tough enough for a financial institution with an army of actuaries to manufacture these guarantees with hedging techniques — to expect someone, like my mother, who is 65 and is retiring, to try and to synthesise these guarantees, is a step too far.

Diversified managed funds are fine, and that is what we are also doing to bring the cost of the hedging down. We offer managed funds instead of 100% equity funds, as a choice of funds on which you can have guarantees. However, at the end of the day, if you are earning from drawdown without guarantee and the equity markets fall by 25% in a year, if you were 100% in equities your lifetime savings are down by a quarter. If you are only 50% in equities, your lifetime savings are down by 12½%. Either way, an insurance company is going to write to you and to tell you to start drawing down less. That is going to put an enormous stress on maintaining your living standard in retirement.

The traditional annuity which does not give you any upside inflation exposure is not going to do wonders for those who are going to live for a long time (nor for those who do not live very long, as the annuity payments will cease after a short period of time). If you go into an index-linked annuity, the starting annuity amount is just too low.

**Mr A. J. Ritchie, F.F.A.:** That last point is one of the crucial points which has come out of both this discussion and also when we presented the paper to the Faculty. Price is a key issue in the U.K. We live in a very price-focused market. This is a value for money product. It is not a low priced product, it is a value product. To echo the point made by Ms Byrne, the key to how well these sorts of products will succeed in the U.K. depends very much on how well actuaries can communicate the benefits.

If you look just at price, you will not choose this product. However, the more that we, the authors, investigated this product, the more we felt that it met a customer need which is not always being met at the moment. We think that, but how successful can we, as actuaries, be in communicating that to advisers and to customers? At the end of the day, it is these people whom we need to convince if the product is going to sell.

One such example which came up when we discussed this at the Faculty was about why we would pay this higher charge. If the guarantee affords you to invest more in equities, then you have more potential upside, yet you still have the protection from the downside. So, although you are paying this higher charge, if you can try to achieve more of that equity risk premium while still having some form of protection, then this may more than offset the charge which you are paying on the median scenarios. You have the real benefit in the up scenarios of being more invested in equities, and, in the down scenarios, if equities do not do very well, you still have that protection from the guarantee.

These are the sorts of things which we are going to have to explain to advisers and to customers if this product is to take off, and, in five years’ time, if we are saying: “Look at the success of these guarantees”, I think that that will be largely down to actuaries. If, in five years’ time, we are talking about something else, then, perhaps, we did not communicate it very well.

**Mr M. A. Hills, F.I.A.:** I now follow up from Mr Ritchie's point regarding price, because I think that it is down to how much value there is in the price from the perception of the customer.

I work for one of the current providers in the U.K., and our guarantee is more of a 'floor'. The income which you hope to be able to take from the policy is greater than the guarantee. If the guarantee bites, it actually means that the equity markets, in the main, have performed badly. You do not really want the equity markets to perform badly so that the guarantee bites, but you have protection if they do. It is just as if you take out buildings and contents insurance; you do not want your house to burn down, but you have insurance in case it does. It is very much a matter of how much value customers, in their own circumstances, with advice from their advisers, put on that. Some will value that guarantee; some will not. I now refer to Section 11, and to legislation. This section just talks about drawdown and legislation. However, these products also work in the annuities space. I do not mean conventional annuities, but the modern, what we call flexible, annuities or unit-linked flexible annuities, where you do also have GAD limits or HMRC limits, although they work in a different way to those for drawdown and ASP. You do not have the same restrictions with annuities — the post age 75 issue with GAD limits is only relevant to structured products, not to annuities. There is also a comment about some of the issues with GAD limits. You can work within current legislation to overcome these, and, if anyone wants to know how, they can look at our relevant literature.

I agree with a previous speaker that we need a better name. None of the existing names are any good. 'Variable annuity' is not a good name, as these products are not necessarily variable, nor annuities. Similarly, 'guaranteed drawdown' is not a good name, as they are not necessarily drawdown products. 'Mid-market' and 'third way', also, are not very good names. If anyone can come up with a better name, then they are a better person than I am. Many other people have talked about this, and, at the first meeting of an ABI Variable Annuities Working Party, which was set up recently, we tried to find a better name, and we could not do so!

Concerning lobbying, I do not know whether it is within the remit of the Institute or the Faculty to lobby on behalf of consumers or the industry for changes in legislation. However, I suspect that the current providers, and the market as a whole, would support the Profession if it is within its remit to do such a thing.

**Mr P. G. Brett, F.I.A.:** I found the paper very useful, because I have just entered the variable annuity market. It was quite good to find out how the things work.

Definitely the name has to change. Until I entered the market, I had no idea what a variable annuity was. The name did not explain to me what it was. Someone mentioned unit linked with guarantees. That seems to me a simple name which gets the message across.

I also agree with the point made by a previous speaker about looking at the value of the guarantees. We have somehow got to have the policyholder's utility function in there. They probably value downside more than they value upside. I do not know how you allow for that. There should be some way.

One point on pricing, which I still have not got my mind around, is where we are doing dynamic hedging and using lapse rates changing with the market situation, where we are saying that, in the U.S.A. people are not acting rationally, so we make some allowance for that. I wonder whether that can apply to this market, where you have IFAs who are, perhaps, a bit more rational than the normal man in the street.

Also, I think that the charges are very high. Anything which the Institute can do to look at whether the charges make sense, whether these products do make sense to people, would be welcome. One of the obvious questions is: "Is paying 1½%, or whatever, for a guarantee worthwhile?" Obviously, at my company we believe that it is. It would be a comfort to me if I could see that other actuaries also agree with us.

**Mr I. A. Farr, F.F.A.:** I am within two months of the end of my time as Chairman of the Association of Consulting Actuaries, and, in that context, it is unusual for me to speak to an audience which probably contains mainly life office actuaries.

I want to make a comment to follow on from what Mr Pomery was saying about the way forward. As I see it, the way forward for occupational schemes for medium to large employers is to provide a pension which, once in payment, is conditionally indexed. Quite simply, that means that increases each year are in line with whatever index is chosen, but, during severely adverse conditions, there is the option not to pay the next year's increase. The pension cannot be reduced from the level which it has reached, but it can be frozen, and then later continue to increase. When conditions improve materially the increases which have been missed can be reinstated. The Association of Consulting Actuaries has been in serious discussion with the Government about changing the law to allow employers in the private sector to establish new conditionally indexed pension schemes.

Why is it that conditionally indexed pensions could not be offered to individuals with their own pension arrangements? That would appeal to the average individual. We need that sort of product. Clearly, the purchase price would have to secure an initial level of pension materially better than you would get from an index-linked annuity based on British Government bond yields. The intention would be for the pension to increase in line with a pre-selected index each year. So, what gives, because clearly something has to give, is, potentially, next year's increase, either because life expectancy is moving materially further ahead than allowed for in the costing, or because investment markets are adverse.

This is the sort of product design which the average individual will understand, easily explainable by IFAs. If that product can be designed and be made available in the marketplace, then, in my view, it would appeal to many individuals with their own arrangements or who participate in money purchase arrangements provided by small employers.

**The President (Mr N. J. Dumbreck, F.I.A.):** Just to be clear, in the conditional indexation situation, who decides whether the going has got tough? Is that determined by specific triggers which are set in advance, or is discretion involved?

**Mr Farr:** In a conditionally indexed occupational scheme, as proposed by the Association of Consulting Actuaries, if the funding level, allowing for pre-funded future increases, drops below 100%, the employer has the option to say to the trustees: "Do not pay next year's pension increase." So, the risk is shared between the scheme member and the employer. In an individual arrangement, clearly the risk would have to be shared between the individual and the shareholders of the life office. The life office can take this into account in the charges being made within the product design.

So, why not? That is what is needed, in my view, to help individuals with their own pension arrangements. It would be a simple concept to explain to individuals. People want a pension to increase in line with retail price inflation, or whatever. If conditions become adverse, the pension could not go down, but it would just flatten off for a year or two, and then carry on increasing. The increases would be conditional. That is how I see the future.

**Mr Finkelstein:** It sounds very similar to a variable annuity ratchet. Essentially, a ratchet occurs when some variable (like a unit-linked account value) exceeds some threshold trigger point, causing the guarantee benefit to be irrevocably increased. If I understood Mr Farr correctly, in this case it sounds like the trigger, instead of it being a funding level, is whether the guarantee is in or out of the money. Of course, every ratchet has its price, and the cost of this ratchet would have to be assessed. However, the concept should be clear, which is to have the freedom to design and to price products which we think have a very strong customer need for a commercially attractive price.

**Mr D. C. E. Wilson, F.I.A.:** I shall give a slightly different answer to that given by Mr Farr, which is that I think that this product does exist, and I think that it is the with-profits annuity. I think that the with-profits annuity is a very good product. The only problem with it is the title — the words 'with-profits', which people hate, and 'annuity', which people hate.

The with-profits annuity is very slightly different to what has been described. In a typical

instance, you will accept that, in the bad times, the income can, in fact, fall by a pre-specified maximum amount each year. It may be that which is what puts people off buying these products at present. Essentially, that product does exist. There are sales out there, but it is not very easy. That partly comes down to the issue about IFAs and what they understand, and so on.

That was the other point which I wanted to make, around the role of IFAs, answering some of the questions which had been raised earlier. We have heard a lot about how IFAs need to understand stochastic advice effectively in order to be able to explain these products to people. I guess that my puzzlement here is around how they can sell existing products, like, for example, structured products and guaranteed equity bonds, without understanding uncertainty in exactly the same sort of way in which we need to be able to explain the variable annuity product.

Similarly, I have heard people say: "Well, people will offer different sorts of guarantees on these products, so it is very difficult for IFAs to compare them with each other." With-profits bonds have been sold for years, and the nature of with-profits bonds, as we all know, varies significantly between different companies, and the implicit guarantees in those have all been very different. So, again, this is not really a new problem for them, it is something which has existed so far. Where I see the role of the IFAs is that they really have the best opportunity to understand what a customer's needs are, and what sort of guarantees are appropriate for that person. Perhaps, to answer something which Ms Byrne said earlier, it is not clear to me that IFAs are best placed to manage a portfolio of products to provide that guarantee on behalf of the individual.

It may well be that an insurance company, once it knows what guarantees people want, is in a better place to manage the underlying financial risks which provide that guarantee, or we could go one stage further, which is by way of the hedging which we talked about in these products, where much of the underlying risk ends up being managed by the financial markets. Perhaps an investment bank takes on the market risk and does that. Managing guarantees is very much their expertise. I suppose that, for me, it is a bit odd that an IFA would look to be managing the guarantees and be competing with investment banks in providing that sort of service.

**Mr A. D. Smith:** We have been talking about guaranteed products, and it is clear why policyholders might like the idea of a product which gives them the better of two things: it gives a guaranteed amount if the markets go down; and it gives a variable amount if the markets go up. It is particularly clear why they would want that if they did not have to pay for it. However, of course, they do have to pay for it, so somebody must be on the other side. There must be some other group of investors, somewhere, who would prefer to take the money and, potentially, get hit if the markets go up or down, but stay okay if the market does more or less what was expected. That person might be somebody who is advised by IFAs who do not understand stochastic models.

There seems to be a bit of a gap in explaining who is going to want to take the other side of that risk. Perhaps we are being a little unsophisticated in how we are considering the demand for these products.

**Mr J. A. Maher, F.F.A.:** This is partly related to what Mr Smith said in terms of who is taking the risk. At a certain scale, a company can run its business to manufacture the guarantee and to take a trading view to make a profit on that. There is, however, a barrier to entry and a hurdle of scale for that. Once addressed, the question becomes, not the guarantee, but the product and the selling of the product. There are, however, smaller organisations which cannot have the scale to make that barrier to entry (dynamically to trade to derive profits from the guarantee). What happens in that middle space? Are we left with a whole raft of companies locked out of the market, and how can they operate in that space?

**Mr D. B. Pye, F.F.A.:** I want to show my support for quite a few people who have said that, rather than just picking up the name 'variable annuities', perhaps we should come up with something, ourselves, which is relevant for the U.K. market.

I also want to give some insight into some of the challenges which are actually faced by the



IFA. IFAs, as we know, do not like complicated products. When you look at these variable annuities, initially, what you are looking to offer does seem very simple, a guaranteed income for life, but, as soon as you get into the details underlying it, there is, lo and behold, a little bit of complexity. I think that IFAs are scared of these. I have even heard of certain networks which have to have extra due diligence in order to sell a guarantee type product.

There are these barriers to entry. Variable annuities are very new in this market. As people, over time, get used to them, and as IFAs get more comfortable with the concepts, and as they get more comfortable with the insurance companies which offer the guarantees, that is when they will take off.

**Mr R. A. J. Waddingham, F.I.A.:** We have been talking about 'drawdown' arrangements, which are very flexible, and 'guaranteed annuities', and have been trying to capture the benefits of both. It would seem seductive.

However, I cannot help wondering, after having listened to the discussion, that we best capture the advantages of both by actually providing each product alongside the other. The great majority of people, the people about whom Mr Pomery spoke, who will be emerging from DC plans in the coming years, could not entertain the risk of variable annuities, and, furthermore, could not afford the additional cost of the products which we are discussing. Arguably, people with less than six-figure sums in their pensions pot at retirement would best be directed into the traditional guaranteed products.

I suspect that the paper underestimates the existing attraction of drawdown arrangements; I suspect that the figures capture only ABI drawdown products and I reckon that there might be up to £30 billion in flexible SASSs and SIPPS outside the insurance industry.

The drawdown arrangements which we have already are flexible. They carry risks, but for people who are able to bear those risks, they can fit their circumstances. I wonder whether we will not find ourselves, in practice, providing the traditional guaranteed annuity to the great majority, numerically, of those who retire, and then build on the existing flexibilities of drawdown, and covering the various risks of the latter, by setting the investment strategy of the drawdown product appropriately.

**Mr J. M. Nurse, F.I.A. (closing the discussion):** This paper and the discussion have brought out many of the detailed issues which need to be considered when looking at the design, pricing, implementation and ongoing management of products such as variable annuities. The authors, and the many contributors to this discussion, are to be congratulated on setting this out so clearly for us.

At the heart of this discussion, I think, lie two main issues, the first of which has been widely commented on in the discussion, while the second has received fewer comments, possibly because the paper covers these areas so thoroughly.

First, there is the consumer need for the so-called third way products, and, particularly, what is, and how best to communicate, the underlying customer proposition; and, second, the need for firms to design and to price the products correctly, and then to manage the risks arising from the business while it remains in force, in such a way that the providers of the capital used to support these products obtain the return which they expect.

Essentially, the design of the product, described and analysed in Sections 5 and 6, appears to address an identifiable need in providing a guaranteed minimum level of income during retirement which also has the potential to rise over time, because the customer can stay, at least partially, invested in equities during retirement.

Section 11, though, highlights the practical restrictions which current U.K. pensions legislation seems to impose on these products in meeting this need. The modelling done in Section 6 leads me to conclude that the requirement, effectively, to convert to a fixed annuity by age 75, seriously limits the likely attractiveness of this product design, and points to a strong need to have this legislative, but artificial, restriction removed, in order to meet a very real customer need and to deliver a more compelling proposition.

It seems evident, from those few products which have been launched into this market so far,

that these concerns are inhibiting firms from delivering an effective customer proposition. I suggest that it is open to these firms, and to their advisers, to work constructively with the Treasury and HMRC to overcome these difficulties. I look forward to seeing further initiatives in this area.

I believe that the prize is worth pursuing, though. Some private research has been undertaken in this area, and, while I cannot share the full details, it is worth noting that the absolute quantum of, and the growth in, the amount of funds seeking at-retirement solutions over the next ten to 15 years in the U.K. will be substantial.

Ms Byrne also highlighted the top end IFA perspective — and I paraphrase here — that we know about investments; we can provide absolute returns over the medium or long term, so why should our customers have to pay for guarantees? My comments on this are two-fold. First, there is Japan! Secondly, if the returns are not positive in the long term, are those IFAs prepared to dip into their own pockets to reimburse their customers for the losses which they have suffered? I suspect that they may quibble at that last point.

Another topic highlighted by the authors in Section 6.5, and by Mr Shallis in the discussion, is the need to provide accessible and understandable information to the customers and to their advisers. While stochastic illustration tools can portray graphical representations of percentile distributions, which even many of us here have to think about carefully when seeing these for the first time, how likely do we think that it is that even well-briefed advisers will communicate clearly the risks and the rewards of competing products without overwhelming their customers? Yet this is what must happen if the market is to develop properly, without storing up yet more accusations of mis-selling and obfuscation. We face several challenges, however, in this endeavour.

The first of these challenges, alluded to often in the discussion, is terminology. I consider that it is quite regrettable that the U.K. industry, and, indeed, even the authors to this paper, seem to have adopted the U.S. terminology without modification. As the definitions in Section 2 show, the term 'variable annuity' is very specific in the U.S. context, and its generic use in the U.K. as a proxy for any type of unit-linked policy which contains investment guarantees is unfortunate.

Research among IFAs shows that over 40% of them would never consider recommending variable annuities to any of their clients, while over 90% would certainly consider some form of investment-linked product with guarantees to be of interest! Now, I can do that maths!

Also, some comparisons with structured products and indexed annuities by market analysts and by some media commentators have led to some confusion in the market for variable annuities. The solution, unfortunately, will not lie in 'GMxBs' or 'living benefits', convenient though some of this shorthand may be to those of us working in this day to day, but the authors, at least, give a clear exposition, in ¶2.9, of what we think we should be describing in the U.K. context. Now we just need to agree a common terminology. In the quest for customer marketability, and to meet the challenge which Mr Hills laid down for us, may I suggest 'Packaged Investments with Guarantee Options' — PINGO!

This brings us to another challenge, and one which has resonance, given the present uncertainties in the world's financial markets, arguably caused by the secondary packaging of over-lending by banks on overvalued assets into the wider financial market. Confidence between banks has evaporated, as some over-indebted borrowers sneeze, and no one admits to catching a cold. So, the U.S. Federal Bank (Fed) cuts rates, injects massive amounts of liquidity, and acts as deal maker in the latest round of bank rescues, and for what purpose? It is to ensure that confidence is maintained in the markets, or at least the pretence of confidence. The Fed provides the guarantee, so the market breathes a collective sigh. However, here in PINGoland we are not asking the Fed to provide a guarantee; we are asking private insurance companies to do so. So, how valuable are the guarantees on these products? How safe are these institutions? How effective are their hedging programmes, not just this year or next, but for the next 40 years or so? Also, under what circumstances will the stresses test the very survival of the firms providing these guarantees?

The authors commendably start to address this in Section 10.8, but it seems to me that much more detailed consideration needs to be given to this aspect for any firms considering entering

this market, as many of these guarantees and customers will be in force, if not in the money, for many years to come. Also, how well placed are advisers in the market to evaluate the strength of the guarantees and the institutions which provide them?

This should lead me to consider, in detail, the proposed hedging platforms and programmes, and their ongoing effect in this to help manage and to mitigate the financial and other risks being taken on when writing these product types. However, I feel that the authors have made an impressive contribution in Section 10 in introducing many more actuaries to this complex and myriad topic, so I will limit myself to a couple of points.

First, rigorously applied hedging programmes should help, of course, materially to mitigate the financial risks being undertaken. However, these programmes, particularly the processing power used in the stochastic projections of assets and liabilities, are, typically, very expensive to establish and to maintain, and current solutions appear to rely on the brute force computing approach, which seems to put cost barriers in place, both for new entrants and for design innovations. I would suggest that the future should see the development of more sophisticated approaches to the evaluation of hedging strategies and of regular trading requirements, and I look forward to this next generation of solutions.

Furthermore, these hedging programmes are not designed to mitigate those unexpected non-financial risks, such as adverse policyholder behaviour, unexpected trends in longevity, and poor management of operational risks. Some structured thinking on product design, through policyholder motivations and the packaging of benefits, can help mitigate some of these risks. For instance, as alluded, periodic ratchets can help mitigate some early lapse and withdrawal risks. While Section 5.3 mentions this particular point, some further depth, I felt, in Section 9, would have been most welcome on this and on other risk management aspects. Given the world of ICAs and Solvency II, I am certain that this will be a major focus for the industry and for the Profession over the coming months and years.

Mr Corry, in his opening presentation, asked a number of questions. I think that the paper and the discussion have helped to provide some useful insights, and maybe even some answers. Is the authors' optimism regarding the prospects for these products justified? Is there a genuine customer benefit from these products?

I firmly believe that the answer is 'yes' to both of these questions, but I must caveat this belief by trusting that this industry and this Profession can overcome some of the current hurdles, particularly some of the legislative challenges, along the way. This does not necessarily mean that we should wait around for changes to happen, but that we should promote ways to meet customer needs proactively, in ways which work with, rather than act against, Government policy.

Second, will domestic companies succeed or will overseas companies dominate? The U.K. industry contains enough dynamism and innovation to take on all these new techniques and innovations, but the best way to ensure that the overseas players will become dominant is to stay on the sidelines, and the challenge is clearly on. Are actuaries well equipped to develop and to market these products? It would be sad to end this meeting if the answer to this was 'no', but I feel that we must rise to the various challenges to make this a resounding 'yes'. We need a better and a wider understanding of the required hedging strategies and instruments, and to help to deliver these more cost-effectively to the market. We also need a closer connectedness with the needs of the customers and the distributors to ensure that there is clarity, understanding and transparency of the products offered, and the ways to develop and to share a deeper understanding of the risk management activities and processes which are required to provide long-term guarantees at an acceptable price to an informed market.

I thank the authors for their work on this paper, which I am sure will be formative in helping shape the new market, not just in the U.K., but also in other European markets.

**Mr Finkelstein** (replying): I am sure that I speak for all the authors when I say that we are very pleased with the enthusiastic and generally positive feedback which we have received regarding the paper.

Variable annuities have certainly been very successful internationally, and they are growing in

importance and popularity in the U.K. and in major European markets. The size of the turnout here is, no doubt, a reflection on the potential importance that these products and the methods for manufacturing them will have on the U.K. market.

I agree with the closer that the discussion tonight focused on two main areas: the definition of the product, and what it means for the customer, and the underlying risk management. On the subject of definition, some have asked whether the phraseology 'variable annuity' is appropriate, and whether more general terms like guaranteed products or unit linked with guarantees could be used.

Interestingly, and importantly, most companies have specific brand names for their products. Forgive me if you are from a company where I do not list one, but terms such as accumulator, five for life, i2Live, Europerspektiva, Platinum, Twinstar are a few examples. The term 'variable annuity' may not even feature. No doubt U.K. companies will continue to find attractive marketing names for their products, too. Internationally, as a class of business, the jargon 'variable annuity' is being used, and we think that it is right to investigate what is covered within this definition.

Simple guaranteed products, or guaranteed unit linked, could arguably be too general a phraseology for what is involved. It is the way in which the guarantees are offered which affects both the customer proposition and the way in which they are manufactured. An important characteristic, which I mentioned earlier, is that the guarantees may be offered on externally managed funds as opposed to internally managed funds. Therefore, the insurance company, in general, may not be able to control the underlying asset exposures, and selling equities in falling or volatile markets, for example, will not be a viable risk management method.

This is an important distinction with more traditional with-profits or CPPI business, which affects the customer's exposure to equities after falling or volatile markets, the nature of the guarantee provided, and how it needs to be risk managed, as we pointed out in ¶1.5 and in Section 10.

About the proposition, this is the way in which a now retired chief financial officer of a major insurance company once explained it to me at one of our internal seminars. He pointed out that there is a non-trivial probability, possibly 20% or so, that a person aged 65 today will live to age 100 (depending on the mortality table which you use, and the longevity improvements for which you allow).

If you think about what has happened in the last 35 to 40 years: we saw man on the moon; we saw Concorde come and go; we saw oil crises in the 1970s; we had a stock market crash in 1987; we had a deep recession in the early 1990s; then we had a technology boom, complete with mobile phone and Internet bubbles. Where are we now? We have North Sea oil running out; we have Russia squeezing the taps on Europe's gas supplies; we have record oil prices; we have a so-called war on terror; we have global warming; certain food costs are on the rise; and we have a credit crunch. Who knows what is going to happen in the next 35 to 40 years? On top of this you want the wealth which you have accumulated through your retirement savings over a 35 to 40 years' period to last you for another 35 to 40 years, and to maintain your standard of living in retirement while not working. Let us get realistic!

Purchasing a traditional annuity on historically low interest rates and historically light mortality is not going to give you a good standard of living when you live a long time. Income drawdown is a very attractive product, but wait for a year when markets fall by 25%, and you still have a withdrawal of 7% to 8% to live on in that year, ½% per month perhaps. Even if the product was only 50% in equities and these fell by only 15% — if you withdrew another 5%, your lifetime savings are down by a fifth — due just to that one year's experience. You would have to withdraw less going forward. The insurance company in the non-guaranteed income drawdown product will write to you and will tell you to draw down less. So, that does not work.

The variable annuity is a product which can offer you upside exposure, periodic ratchets to lock into the growth of managed fund exposure, gives you some inflation protection if you should live a long time, but, at the same time, guarantees that, no matter how long you live, no matter what the managed fund return is, your income will not be materially less than it would have been

had you bought a traditional annuity. To me it is a no-brainer, it is a very attractive product, and it is now just a challenge to explain that product concept to our distributors. You can forgive them for not being attracted to it on day one, because they did not know about it. They did not invent it. It is our job to invent it and it is our job to explain it.

When the guaranteed minimum withdrawal benefit for life products first came out in the U.S.A., all the focus groups and all the distributor surveys were very lukewarm. No one thought that it would be a successful product. It is an abstract concept. You really have to put yourself in the shoes of someone who is coming up for retirement, or someone advising someone who is coming up for retirement, to appreciate how it works and why it is so attractive. As we know, today it is the best-selling product in America — so much for the distributor surveys in the early years, just after it was launched.

We have had some discussion about charges and whether it is worth giving up 1% of the upside of the managed fund to have that floor and protection. There is a price to be paid. It is clearly a transparent price. It is clearly reflective of the market cost of hedging. It has a lot of merit to justify a 'treating customers fairly' price. It also has to have a loading to provide a return on the residual capital at risk. After all, it is the insurance company's business to sell risk, professionally to manage risk, and to profit from selling risk.

However, I ask you if the managed fund delivers 10% and my mum gets 9% instead of 10%, is that such a big deal for the floor and the minimum standard of living which she would otherwise have got in the year when the managed fund has -15%? A 1% charge for the guarantee does not seem to be too unreasonable to me. On the contrary, it is commercially very attractive.

My final point on the proposition is that the product concept which we used in the paper is just one example. There are clearly other market segments and other price applications offering a guaranteed benefit in conjunction with upside. Also, a very neat way of paying for the guarantee is through a slightly reduced upside, as opposed to an upfront single premium insurance.

Much has been said in the discussion about the risk management for these products. Traditional with profits and CPPI are interesting alternatives. No doubt these products will continue to compete with the variable annuity. However, modern risk management techniques, as I mentioned earlier, really only started developing since the Black-Scholes paper (Black & Scholes, 1973). That was 20 years after Frank Redington's (1952) terminal bonus and interest rate immunisation systems for traditional insurance got going.

What this paper seeks to do is to describe how modern risk management hedging techniques can be used to manufacture such products with modern techniques and on efficient capital budgets. It does not claim to carry out all the possible investigations into the amount of capital at risk, and it makes it clear, in ¶¶10.9.3 and 10.9.12, that a company expecting to write significant volumes of this business would need to consider carefully the finer details, such as trading costs, variation margins and collateral management, as well as a wider range of scenarios, in order to investigate the effect of this on the hedge. If we had to try to address all those details, this would have been a much longer paper. Maybe there is a case for a Part II.

The subject of dynamic lapse behaviour was also discussed. This was allowed for in our paper. It is described in ¶10.9.10, among other places. Generally, the idea is that policyholders are less inclined to lapse policies when guarantees are in the money, and more inclined to lapse them when they are out of the money, and are becoming of a less perceived value to the customer. This needs to be allowed for, certainly in the pricing, so that you do not mis-price the product. When initially setting up a hedge, you might want to be more realistic about the policyholders not being so rational, because, otherwise, if you are conservative and prudent, you will tend to over hedge. However, at least have some margin in your pricing, so that you can afford to increase your hedge if you need to do so.

There was a question about the middle players, and if you do not have scale. Suffice to say there are outsourcing solutions available, and reinsurers are getting into the game to help you out. I also wholly agree with those who have commented that the systems and the technology are only a small part of what is required to manufacture such products. Intellectual capital, in the form of the experience in areas covering the quantitative analysis of the capital markets,

trading, operational risk management, etc., are key. This all poses a challenge, as well as an opportunity, for the U.K. life insurance industry as well as for the Actuarial Profession. I am confident that we will rise to the challenge.

**The President (Mr N. J. Dumbreck, F.I.A.):** I normally struggle with papers of more than 50 pages, but I thoroughly enjoyed reading this one. I am delighted that the discussion has done it justice. We now express our thanks to all of the authors, to the opener, to the closer and to all of those who participated in the discussion.