

Editor: So it acts autonomously without reference to the individual actuarial bodies?

HHS: Yes. That was worked up by the Groupe Consultatif and transmitted directly to Brussels without reference back. In another case, the Groupe Consultatif provided the solution to a clause which was proving difficult. It has been with much pleasure that we have approved an award of a Finlaison medal to John Martin, who has been chairman of the Groupe. Not many other professions have generated such unanimity in Europe.

Editor: You have recently laid great stress by the development of professionalism.

HHS: Yes, actuaries can provide the discipline needed without all the regulations but our professionalism is fundamental to that and it is something that we should not treat lightly. In the UK it enables us to give the policyholder a better deal. We are active in many areas, in pensions with Guidance Notes, and in the developments in gener-

al insurance. This will only continue if we can convince people of our professionalism. There is then scope for building up the numbers in the profession.

Editor: Will this not bring about a dilution in the profession?

HHS: There is a closeness, the sessional meetings which attract a high proportion of the relevant experts in particular fields and through the dining clubs and the like. The emphasis on the regions is an effort to retain these advantages of closeness particularly as we develop CPE.

Editor: There seems to be some concern over the scale of CPE and the level which will be required.

HHS: The amount is not very big compared with other professions. We have to start with something that is acceptable and the Joint Education Committee is currently considering this. The Institute and the Faculty are cooperating to make sure that all steps forward are taken jointly. CPE, for exam-

ple, had its proposals developed in the south and in taking this further, we are talking closely to Scotland. The proposals must suit north and south and there will be some changes.

Editor: To what degree will the Faculty and the Institute continue to be distinguishable? Is there not a danger of running along like Tweedledum and Tweedledee?

HHS: A year ago I was anxious that we should be seen taking steps together. We have seen greater joint activity, which is much more important than the idea of merger, which would be very emotive. I want these cooperative ventures to continue.

Editor: May I wish you another year of further good progress?

HHS: I am sure this will continue with the commitment and enthusiasm of many of our members. As a President one cannot but be impressed by the degree of their professional commitment.

Measure for Measure

2. Statistics and Continuity.

Nick Ryan and Jon Spain's second article illustrates what they mean by Discounted Value Return (DVR).

The principle of Discounted Value Return (DVR) is the capitalisation of prospective proceeds at each end of the time interval, solving certain equations subject to a continuity condition over that interval. The DVR is the return which makes the figures balance.

We base our calculations upon reinvested indices. Earlier work was carried out for a wide ranging

UK pension fund sample¹ over the years 1979 to 1984. The principles survive the transition to a notional fund, and the processes can certainly be, indeed have been, applied to real funds. The difference lies not in the methodology, but in the questions one is asking. In evaluating the performance of particular funds or a collection of them, evidently actual fund data are used. When benchmarking, one would also track the behaviour of the benchmark, utilising the same principles. Here we investi-

gate global statistics, and the use of Market Values and their associated Return (MVR).

In calculating the indices, no account has been taken of expenses, but then this equally affects the market value returns we quote for comparison. Further, for this article, we have allowed for "typical" weightings across the major UK asset categories. All in all, we are satisfied that the data we are using are appropriate for the purpose of explaining, and illustrating, the DVR concept. We again emphasise that the object is to be broadly right rather than precisely wrong.

Gilts – An Illustration

As an initial illustration, the *market* value of a portfolio of over-15-year bonds, with income reinvested, would have increased from 100.00 on 31 December 1989 to 104.16

on 31 December 1990. At the beginning and end of that year, the relevant published gross redemption yields were 9.78 percent per annum and 10.66 percent per annum respectively. The MVR was, quite simply, 4.16 percent per annum, but this is very limited information. It takes no account of the increase in redemption yield and, even more important, it totally ignores the long term income guarantee.

Suppose we capitalise the prospective asset proceeds, using the rate of return of 9 percent per annum, assuming that interest is payable annually in arrears. For convenience, a 15-year bond model has been used. This is of course oversimplified, but it is the principle which is important, rather than the details. On this basis, the portfolio would have been capitalised at 106.3 on 31 December 1989, and at 118.1 a year later. As 118.1 divided by 106.3 does not equal the required 1.09, 9 percent per annum is clearly *not* the figure sought. However, if we discount at 11.4 percent per annum, we obtain initial and final values of 88.4 and 98.5, which do fit (because 88.4 times 1.114 equals 98.5).

The Spline

Conceptually this is very similar to the *spline*. A physical spline is a flexible piece of wood or metal used by naval architects to construct a smooth curve between fixed points. In numerical analysis the term has been adopted to refer to the process of fitting a known curve to empirical data, where the curve must not merely go through the datapoints, but also have continuous first and second derivatives. Often the fitted curve is made up of a collection of short pieces, which have to fit together without "jerks". But the essential point is that the ship should swim. In the numerical analysis case, the assumption is that there is some underlying physical process, which we are unable to describe by a simple equation, but which we can approximate more or less accurately, and which

Table 1. DVR Compared With MVR

Year	Monetary Assets Perpetuity		15 Years Perpetuity		MVR
	Perpetuity	15 Years	Perpetuity	15 Years	
	DVR (1)	DVR (2)	DVR (3)	DVR (4)	
	pa	pa	pa	pa	pa
1963	9.2%	8.5%	11.3%	10.7%	10.6%
1964	16.7%	14.0%	7.5%	3.7%	-4.7%
1965	10.2%	9.9%	10.0%	9.7%	8.6%
1966	7.4%	7.1%	4.2%	3.7%	0.6%
1967	4.4%	2.6%	12.2%	11.7%	18.4%
1968	9.8%	7.5%	20.6%	19.8%	25.0%
1969	7.7%	6.9%	2.0%	-0.9%	-6.4%
1970	9.8%	8.9%	2.8%	2.7%	-0.9%
1971	7.5%	9.7%	18.0%	18.7%	41.1%
1972	14.6%	11.6%	14.8%	12.8%	7.9%
1973	8.7%	6.7%	-19.3%	-13.9%	-22.3%
1974	17.2%	15.6%	-31.4%	-26.2%	-38.7%
1975	17.6%	18.1%	27.6%	27.8%	97.4%
1976	20.6%	20.4%	16.4%	16.0%	6.0%
1977	19.4%	20.5%	24.7%	25.1%	46.4%
1978	16.4%	15.7%	14.0%	13.2%	5.2%
1979	24.7%	24.3%	20.9%	20.4%	9.0%
1980	17.4%	17.6%	20.1%	20.3%	30.1%
1981	11.3%	10.7%	12.4%	11.8%	10.3%
1982	13.0%	14.7%	17.3%	18.3%	34.7%
1983	11.8%	12.2%	16.7%	16.8%	25.0%
1984	22.0%	21.8%	23.6%	23.5%	25.1%
1985	16.3%	16.2%	17.2%	17.2%	18.1%
1986	16.3%	16.2%	19.7%	19.6%	23.4%
1987	15.1%	15.2%	11.3%	11.6%	9.6%
1988	17.8%	17.5%	15.5%	15.2%	11.1%
1989	20.9%	20.7%	24.9%	24.7%	30.2%
1990	15.8%	15.6%	4.3%	3.3%	-6.5%
Mean :	14.3%	13.8%	12.1%	12.0%	14.8%
S.D. :	5.0%	5.3%	12.4%	11.6%	24.0%

is known, or expected, to be fundamentally "well behaved".

The parallel for pension funds is that "performance", which is probably not a single atomic entity but a compound of many factors, cannot be measured *directly*, but has to be estimated from the available data. DVR is a spline-like solution. The example above assumed redemption of the gilts portfolio at 15 years. An even simpler approach is to assume that the income will be receivable for ever - roughly equivalent to a further reinvestment of the principal - and this produces a DVR of 13.5 percent per annum. There are certainly other approaches, not all of which may be entirely familiar, and readers may have alternatives to suggest.

Equities

Turning to UK equities, one com-

monly adopted approach is to value the prospective dividends in perpetuity - just as we did in the last paragraph for gilts - allowing for some future growth. A variation is to assume that the holding will be sold after, say, 15 years, at a price consistent with the income growth. For these calculations, we have assumed that growth would average 50 percent of the DVR, which we believe to be justified by experience.

The Model Fund

The various reinvested FT-Actuaries indices (UK Equities, UK Bonds and UK Cash) have been rolled up, with no net cash flow. The notional fund has been rebalanced annually, using figures published by PDFM² for private sector funds. Property and overseas equity-type holdings have been added into UK Equities (the Real component), and Index Linked Gilts and overseas bonds into UK Bonds (the

Monetary component). Thus we have four variants, with Real and Monetary assets taken as a 15-year term or as a Perpetuity. For each we have calculated DVRs over the 28 single calendar years 1963 to 1990, as shown in Table 1, together with the MVR. Single calendar years may seem somewhat short-termist, which is hardly our target impression. The rationale for using single years is solely to build up a series of independent values to be statistically tested, say at the 5 per cent level of significance.

Statistical Testing

This is not the place for an extended discussion of significance levels in the analysis of economic time series, but to summarise, 10 per cent may allow figures to emerge which are not sturdy enough to bear the weight of construction likely to be placed upon them, while 1 per cent may require either inordinate labour of data capture or too long an investigation period for the results to be practically useful. We take 5 per cent as a reasonable compromise.

Taking the pair of sequences DVR(1) and DVR(2), we first test the variances against each other, using the F test. The critical value is 2.16, and the variance ratio is

1.13. Testing the means for equality using the "compound variance" t test, we have $t = 0.35$, well within the critical value of 2.01, and so conclude that the means are not significantly different.

In the same way we may reasonably conclude that the means of DVR(3) and DVR(4) are the same. However, the variance ratios are clearly outside the limit and we cannot compare them with DVR(1) and DVR(2). Even more important, we cannot compare any of the DVRs with the MVR.

It is also worth observing that the standard deviation of MVR is more than 60 percent greater than its mean, which is scarcely a good omen for confidence. All the DVRs are internally much less prone to deviate.

Problems

DVRs can be affected by extreme conditions over short periods, under which a solution may not exist. Over the very short term this tends to indicate that the data have a "natural break". This in itself can be a useful warning sign. However, over longer periods - more precisely, over longer series of data, or with more refined sampling grids - these problems vanish and the dif-

ferences between approaches become less marked, as will be seen later on in this series.

We have restricted ourselves in this paper to 4 + 1 calculations, but obviously many more variants could have been accommodated. To take but one factor, the non-perpetuity numbers could have been computed for 5, 10 or 25 years. In practical calculations relating to an individual fund or universe of funds, one would of course include expenses, allow for six monthly rather than annual interest payments, and use a denser set of sampling points. The latter is particularly important, and will be discussed in a later article.

References

1. Spain, J G. "Monitoring Investment Performance for Long-Term Investors", The Investment Analyst, April 1986.
2. Phillips & Drew Fund Management Limited, "Pension Fund Indicators", April 1991.

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Comparing Disclosure

Eric Short reflects on the need to review disclosure of life company expenses.

The Securities and Investments Board (SIB) has, for over five years, been wrestling with producing a set of rules setting out how life companies should disclose expenses to their policyholders and potential policyholders.

Actuaries and the life assurance industry both thought that the question had been resolved when SIB adopted its proposals to show expenses as a reduction in yield within the product particulars given with the cooling-off notice.

However, as Chris Hairs explained in *The Actuary*, January 1991, these

rules were not acceptable to the Office of Fair Trading (OFT) and the whole question was thrown back into the melting pot when Trade and Industry Secretary Peter Lilley, upheld the view of the OFT and ordered the SIB to produce a new set of rules within 18 months.

The Review

The whole question of disclosure is currently being examined by the Quality of Information Working Group, headed by Miss Colette Bowe, group director, retail markets, at SIB, and composed of representatives of the Self-Regulatory Organisations (SROs), two of the Recognised Professional Bodies