The Long-Term Analysis of Investment Performance

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In the UK, in general, the major investment institutions have liabilities, which can broadly be described as "long-term". This is the case for life offices, and particularly so for pension funds.

Most investors wish to verify that their, or their agents', transactions are profitable, and commonly subject the details to exhaustive analysis. So far as I am aware, such analysis is normally based upon market values ("MV"), which are essentially short-term.

For some time, it has bothered me that the long-term requirements may be subordinated to short-term criteria, for there is no obvious link between the two. In the following, I attempt to define a Calculated Value Return or "CVR", and to show how it might be used, once calculated. I would stress that this is written in the context of typical UK pension funds, with which I am normally involved.

In carrying out periodic Actuarial Valuations, in assessing the long-term funding adequacy of a pension fund, it is known that many UK Consulting Actuaries value the assets by means of a discounted cash flow approach, to be consistent with the valuation of the corresponding liabilities. This is not the place to air in detail the merits and demerits of this approach, but the aim is normally to produce stability in the required contribution rate, where this can be justified.

I would emphasise that MV is of use in some situations, but not necessarily in the measurement of the assets for a long-term investigation of a portfolio of associated liabilities. Why, then, should the monitoring of the assets be carried out on an MV basis? Until now, the answer must be that there has been no obvious alternative.

Having reviewed relevant literature, I find that this is actually not a new topic. Even so, given the amounts involved with UK pension funds, I feel that it warrants further consideration. For example, G. S. Minto[2] mentioned the possibility of not using MV, but no alternatives were pursued. Later, D. M. Eadie[3] used the words "... comparison with the actuarial assumption ...", but only in passing. G. Cocks[4] quoted H. D. Mills[5] as proving that money-weighted returns were suitable for "actuarial comparisons".

The point that assets and liabilities are interdependent was extremely clearly stated by G. M. Lindey[6], who included the words "... pension fund trustees should be made more aware of the importance of the distribution of their fund's assets relative to its liabilities".

Probably, the next relevant stage was J. B. Marshall's introduction[7] of the long-term return. While I think that this was a definite advance, and I know it to be used, I feel that it does not go far enough. In particular, the results are too sensitive to the one set of assumptions adopted at the end.

Investment performance measurement has also been discussed by the Institute of Actuaries, following a paper presented by J. P. Holbrook[8], who mentioned the possibility of using something other than MV. Later on in the paper, he dismissed the idea, in which, perhaps surprisingly, he was only supported by the few who expressed an opinion on this particular aspect.

In the context of such a long-term Actuarial Valuation of a UK pension fund, the following is fairly typical of what many UK Consulting Actuaries do in practice, although I should mention that there are variations. Having fixed a rate of interest as the main criterion, the fixed interest securities' expected income and capital payments are discounted. For equities, and similar types of holding, the current level of income is discounted, allowing for some degree of growth. A refinement sometimes encountered is to incorporate the value of the proceeds, on certain assumptions, if sold after a certain period. I shall call the total asset value so derived the "Long-Term Value" or "LTV".

This is a very much simplified description of what is, in reality, part of a highly complex operation, but it should serve for the purpose of this note. It will be observed that, depending upon the various relative assumptions for return and growth, the LTV may exceed the MV. This should

not be regarded as a problem, provided that the assets and liabilities have been valued consistently, bearing in mind the particular purpose of the exercise.

In assessing returns over, say a year, based upon MV, it is fairly clear that the opening financial conditions, the closing conditions, and the intermediate terms for new money may be quite different. In statistical terms, a mean is effectively being calculated for a distribution, which is inherently unstable, leading to a high deviation. I submit, therefore, that the returns commonly published are of little use, even for comparison purposes.

If, however, one could ensure that the conditions were neutralised over the period, then such problems should not arise. Although one is still left with the intermediate terms, this is not such a problem for two reasons. In the first place, for the typical fund, the effect would be second-order, as new money should not be a dominant feature. Secondly, because of the way new money will be treated below, a certain consistency is achieved, after all.

We should remind ourselves that investment is an art, rather than a science, to be truly measured over a long period. Accordingly, it is far better to be broadly right than precisely wrong. In order to obtain stability, which should be the aim, we can hardly do better than use the long-term valuation method for monitoring the performance of assets. This is because MV is the unit of measurement for speculators, and not for prudent investors charged with meeting long-term liabilities.

Given a specified portfolio, and some net new money, and subject to any rearrangement of the assets, one can value the assets under a set of assumptions which include a rate of return, r, together with a rate of dividend growth, g. The end-year assets can be valued, using the *same* set of assumptions. One can then test the opening and closing values for equivalence, by accumulating the initial value and the net new money at rate r.

The CVR is defined as the assumed rate of return, r, which ensures that the result of this accumulation is equal to the year end value.

More likely than not, the model would be run a number of times, with different values for r, in order to find equivalence and hence the CVR, but, in practice, that would not be a problem. Further, by using such a model, it should be possible to distinguish the efficiency, or otherwise, with which satisfactory terms had been negotiated in respect of new money, by, for example, considering trends.

Having put forward the theory, I think that it may be of interest to see how the figures compare in practice. For this purpose, I have taken a client's fund, with their permission, which has been monitored by a well-established firm, since the beginning of 1979.

There have been four complete years' experience, during which time the Market Value increased from £1.34m to £3.58m, including net new money of £0.47m. Thus, investment income plus capital appreciation accounted for £1.77m. During the calendar years 1979-82, the market-based time-weighted annual returns were 13.7%, 27.1%, 14.1% and 29.2%, in that order.

I should add that, while I know that time-weighted returns are normally considered appropriate, I have effectively used money-weighted returns, in order to simplify the annual calculations. As it happens, based on MV, the two types of return were very close, probably because net new money accounted for only 21% of the growth, over four years. Accordingly, I believe that no bias has been introduced from this particular direction.

In assessing the LTV, the fixed interest holdings have been notionally reinvested in the stocks underlying the 25 year High Coupon Gilt Index. Similarly, the equities and the property units have been notionally reinvested in the shares underlying the *Financial Times* Actuaries' All Share Index. An allowance for growth, at half the CVR adopted in the calculations, has also been incorporated. Net current assets have been taken into account at face value.

While the above is not at all precisely what I do for a real Actuarial Valuation, it is, in my opinion, likely to yield reasonable results for the purpose in hand, which is one of illustration. However, I do not suggest that such a broad approach would always be appropriate, if the use of the CVR were generally adopted in the future.

The figures are shown in the Appendices, from which it will be seen that the equilibrium CVR's were 22.5%, 14.4%, 13.8% and 11.7%. As the equity part of the portfolio was dominant in every year, let us consider what a representative equity portfolio would have yielded. Using an internally generated reinvested form of the *Financial Times* Actuaries' All Share Index, with no new money coming in other than dividends, the CVR's would have been 31.2%, 20.0%, 9.8% and 15.3%.

It can be stated immediately that these two mini-series of returns do not follow one another exactly, but I do not think that was to be expected. For the actual equities held were not representative, and there were other holdings. Even so, the high returns I have derived on equities come from the period during which the limit on dividend increases

was removed, and this is the sort of pattern I would be expecting, particularly since, later on, corporate profits fell away. Although the equity market certainly started moving up in the second half of 1982, the last year of the experience, this did not occur because a higher level of income was anticipated, which should be the dominant factor for long-term institutions.

Having written the above, I feel that I should conclude by giving a purpose for which CVR's should be regarded as useful in practice, apart from concentrating the trustees' minds upon what is important, namely the very long term, and what is not. I have in mind the treatment of the "early leaver", on which I have written elsewhere[9]. The particular aim is to revalue a capital benefit in line with the actual investment performance of the fund, without running the risk of using returns which might disappear, because of the wide fluctuations that do occur in MV. If the alternative series of fund returns are compared, it will be seen that the CVR's are "smoother" than those associated with MV, although I appreciate that not too much statistical weight should be attached to the behaviour of one fund over four years.

Nevertheless, I hope that the figures presented above will make it clear to those involved that, as I believe, a reliance upon market values may be dangerous, in that investment strategies may be subordinated to the aim of demonstrating "good performance". I expect to receive all the reasons why the above should not be regarded as correct, and I look forward to having the chance to argue the case further.

References

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APPENDIX

1. Year: 1979

Returns (% pa):	Long-term: 22.50	Market: 13.70
Equity Yields:	Initial: 5.79%	Final: 6.87%
Gilt Yields:	Initial: 12.33%	Final: 11.82%

	Market	*Long-term*
Values at beginning		
UK Equities	681.0	350.5
OS Equities	130.0	66.9
Property	276.0	142.0
Fixed Interest	175.0	96.4
Cash	78.0	78.0
	1,340.0	**733.8**
Values at end		
UK Equities	830.0	506.9
OS Equities	109.0	66.6
Property	359.0	219.2
Fixed Interest	237.0	125.2
Cash	117.0	117.0
	1,652.0	**1,034.9**

Build-up of net new money		
Quarter (1):	48.819 =>	58.305
Quarter (2):	47.748 =>	54.205
Quarter (3):	−1.314 =>	−1.418
Quarter (4):	23.623 =>	24.230
Total:	118.876 =>	**135.322**

Equivalence of funds	
Original long-term value:	733.8
"Interest on fund":	165.1
Accumulated new money:	135.3
Expected final "LTV":	1,034.3
Actual final "LTV":	1,034.9
Percentage agreement:	**100.1%**

Note
All amounts are in thousands (sterling).

APPENDIX

2. Year: 1980

Returns (% pa):	Long-term:	14.40	Market:	27.10
Equity Yields:	Initial:	6.87%	Final:	6.10%
Gilt Yields:	Initial:	11.82%	Final:	12.11%

	Market	*Long-term*
Values at beginning		
UK Equities	830.0	792.0
OS Equities	109.0	104.0
Property	359.0	342.5
Fixed Interest	237.0	196.0
Cash	117.0	117.0
	1,652.0	**1,551.5**
Values at end		
UK Equities	1,192.0	1,009.9
OS Equities	134.0	113.5
Property	392.0	332.1
Fixed Interest	445.0	376.7
Cash	71.0	71.0
	2,234.0	**1,903.2**

Build-up of net new money			
Quarter (1):	47.579 =>	53.523	
Quarter (2):	–5.868=>	–6.383	
Quarter (3):	34.330 =>	36.106	
Quarter (4):	44.104 =>	44.852	
Total:	120.145 =>	**128.098**	
Equivalence of funds			
Original long-term value:			1,551.5
"Interest on fund":			223.4
Accumulated new money:			128.1
Expected final "LTV":			1,903.0
Actual final "LTV":			1,903.2
Percentage agreement:			**100.0%**

Note
All amounts are in thousands (sterling).

APPENDIX

3. Year : 1981

Returns (% pa):	Long-term: 13.80	Market: 14.10	
Equity yields:	Initial: 6.10%	Final: 5.89%	
Gilt yields:	Initial: 12.11%	Final: 13.88%	

	Market	*Long-term*
Values at beginning		
UK Equities	1,192.0	1,053.8
OS Equities	134.0	118.5
Property	392.0	346.6
Fixed Interest	445.0	392.7
Cash	71.0	71.0
	2,234.0	**1,982.5**
Values at end		
UK Equities	1,386.0	1,183.1
OS Equities	212.0	181.0
Property	420.0	358.5
Fixed Interest	501.0	503.8
Cash	112.0	112.0
	2,631.0	**2,338.4**

Build-up of net new money		
Quarter (1):	27.906 =>	31.248
Quarter (2):	11.371 =>	12.328
Quarter (3):	3.734 =>	3.919
Quarter (4):	33.456 =>	34.001
Total:	76.467 =>	**81.496**

Equivalence of funds	
Original long-term value:	1,982.5
"Interest on fund":	273.6
Accumulated new money:	81.5
Expected final "LTV":	2,337.5
Actual final "LTV":	2,338.4
Percentage agreement:	**100.0%**

Note
All amounts are in thousands (sterling).

APPENDIX

4. Year: 1982

Returns (% pa):	Long-term: 11.70	Market: 29.20	
Equity yields:	Initial: 5.89%	Final: 5.26%	
Gilt yields:	Initial: 13.88%	Final: 10.25%	
		Market	*Long-term*
Values at beginning			
UK Equities		1,386.0	1,395.5
OS Equities		212.0	213.4
Property		420.0	422.9
Fixed Interest		501.0	588.5
Cash		112.0	112.0
		2,631.0	**2,732.3**
Values at end			
UK Equities		1,934.0	1,738.9
OS Equities		245.0	220.3
Property		431.0	387.5
Fixed Interest		796.0	703.6
Cash		169.0	169.0
		3,575.0	**3,219.3**
Build-up of net new money			
Quarter (1):	21.887 =>	24.112	
Quarter (2):	40.168 =>	43.044	
Quarter (3):	31.261 =>	32.585	
Quarter (4):	64.772 =>	65.674	
Total:	158.088=>	**165.416**	
Equivalence of funds			
Original long-term value:			2,732.3
"Interest on fund":			319.7
Accumulated new money:			165.4
Expected final "LTV":			3,217.4
Actual final "LTV":			3,219.3
Percentage agreement:			**100.1%**

Note
All amounts are in thousands (sterling).

APPENDIX

5. Years 1979–1982

Returns (% pa):		Long-term: 15.50	Market: 21.00	
Equity Yields:	Initial:	5.79%	Final:	5.26%
Gilt Yields:	Initial:	12.33%	Final:	10.25%

	Market	*Long-term*
Values at beginning		
UK Equities	681.0	508.8
OS Equities	130.0	97.1
Property	276.0	206.2
Fixed Interest	175.0	140.2
Cash	78.0	78.0
	1,340.0	**1,030.3**
Values at end		
UK Equities	1,934.0	1,312.6
OS Equities	245.0	166.3
Property	431.0	292.5
Fixed Interest	796.0	533.7
Cash	169.0	169.0
	3,575.0	**2,474.2**

Build-up of net new money		
Year (1979):	118.876 =>	200.755
Year (1980):	120.145 =>	171.680
Year (1981):	76.467 =>	94.830
Year (1982):	158.088 =>	167.728
Total:	473.576 =>	**634.993**

Equivalence of funds	
Original long-term value:	1,030.3
"Interest on fund":	803.2
Accumulated new money:	635.0
Expected final "LTV":	2,468.5
Actual final "LTV":	2,474.2
Percentage agreement:	**100.2**%

Note

All amounts are in thousands (sterling).