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PENSION SCHEMES AND BEST ESTIMATES

by

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1. INTRODUCTION

SSAP 24 [1] introduced the novel concept to actuaries of using "best estimates" for pension scheme valuations.

Strictly speaking, the requirement is merely that the actuary should give his best estimate of the long term cost of a pension scheme but, in my view, he cannot do this credibly without investigating the effect of using "realistic" assumptions.

The problem I envisage, therefore, is a credibility gap evident to clients, auditors and investment analysts if different actuaries valuing the same pension scheme could propose different "best estimate" bases leading to materially different costs.

This paper expands on my views of what may constitute a "best estimate" long term valuation basis. It also considers the way in which such a basis is utilised to determine "cost". It does not consider in any depth the short term valuation bases appropriate to discontinuance valuations (but see section 8).

2. THE COST OF WHAT?

I have several times heard the cynical suggestion that it is pointless being too precise in our actuarial assumptions when we cannot even forecast what benefits will ultimately be provided from a pension scheme.

Evidence is cited of "best practice" being imposed on pension schemes by legislation (preservation, anti-franking, preserved pension increases, etc) as well as of "surplus led" benefit improvements over the past 20 years.

The natural consequence of such a view is for the actuary to err deliberately on the cautious side of "best estimate". This creates surplus. This surplus is then used either for further benefit improvements or for convincing legislators that more "best practice" can be imposed on schemes without too much real financial strain arising.

My view, and I am sure that of auditors, is that we should only value existing scheme benefits, making no implicit provision for future benefit improvements (except for "discretionary" pension increases). Then any actual benefit improvements, whether they be voluntary or by legislation, can be explicitly costed on implementation.

3. HOW MANY VALUATIONS?

I have also heard it suggested by a number of practitioners that in the fullness of time SSAP 24 will lead to separate calculations being made for "pension cost" and for "funding cost" for all companies. This follows the current situation in the USA where these two costs often bear little resemblance to each other. I believe that SSAP 24 is sufficiently widely drawn and that most UK companies are sufficiently reactionary to ensure that, in the vast majority of cases, pension cost will be equal to funding cost for the foreseeable future.

There are arguments that Trustees (and members) will require more security in the funding of a scheme than is implied by using a "best estimate" cost.

I do not have much sympathy with this "requirement" because it will be news to most of them that previously recommended contribution rates may not always have been "best estimates".

If Trustees were previously willing to accept what was then perceived to be a "best estimate" contribution rate, why should their views change if less cautious "best estimates" are proposed?

One potential spanner in the works is the feasibility of "best estimate" pension costs being negative due to the existence of a large surplus. Auditing firms are gradually uniting in the view that such negative costs are acceptable and can be said to give a "true and fair view".

Some companies claim it is unreal to do this unless there is a firm prospect in the very short term that money will be repaid from the scheme. This also is acceptable and gives a "true and fair view".

Despite the theoretical appeal of negative pension costs, I believe it is wrong to use them unless money is being paid back to the company.

Consequently I believe that the concept of "best estimate" will be required for funding a pension scheme as well as for accounting purposes. Actuaries will therefore have to be able to justify (particularly to themselves) why their chosen method and assumptions lead to a best estimate of the cost of a pension scheme.

4. VALUATION METHODS

Before I stray into the realms of actuarial valuation bases I feel it is worth having a brief foray into actuarial methods and their appropriateness for determining "best estimate" costs.

Actuarial valuation methods are well described in a working party report on pension scheme terminology [2]. It is clear from studying this report that there are just two basic families of funding methods, the past service (or "accruals") methods and the total service methods.

A. Total Service Methods

All total service methods are intrinsically variations on the Entry Age Method.

I am continually being persuaded by people studying the pension funds exam that, all other things being equal, the contribution rate under the Aggregate Method tends asymptotically to that under the Entry Age Method. This illustrates that the Aggregate Method is really equivalent to the Entry Age Method with any surplus or deficiency being spread uniformly over the remaining working lifetimes of the existing members.

It is generally accepted that the Entry Age Method fits the concept behind SSAP 24 more closely than any other method (the concept being that costs are met uniformly over an employee's working lifetime). It therefore follows that the Aggregate Method, if re-expressed as the Entry Age Method together with a variation in cost, also fits naturally the requirements of SSAP 24.

Although I may be reading more into the intentions of my predecessors than they themselves appreciated, I believe the Aggregate Method effectively developed from the Entry Age Method (which is analogous to the net premium method of valuing a life office). It was much appreciated for the stability of costs which it produced and the ability to spread on a simple basis any costs of benefit improvements which accrued as benefit fashions changed.

In my view many actuaries misunderstand the concepts underlying the Aggregate Method and, like accountants, prefer an "accruals" approach. They also tend to fight shy of explaining and justifying their use of the Entry Age Method (or one of its close

relations) and have taken the simple option of converting into the arithmetically equivalent Attained Age Method, a complete change in philosophy.

The other important total service method is the Standard Contribution Method. This is quite clearly a variation of the Entry Age Normal Method except that the chosen standard contribution rarely these days bears any relationship to a standard entry age contribution, having been derived during times when actuarial assumptions were noticeably different to those currently used.

The Standard Contribution Method has also developed from industrial relations bargaining. A typical example is where the employer has got tied into contributing to a pension scheme at a set multiple of the members' contributions. There are many schemes with such multiples written into their rules.

Theoretically a Standard Contribution Method does not meet the requirements of SSAP 24 because the regular cost is not closely connected with the cost of providing the benefits uniformly over an employee's working life. Nevertheless, the existence of such a fixed "basic cost" of the scheme is likely to render the method acceptable to auditors.

There are also schemes where this multiple is so ingrained in tablets of stone that the scheme may validly be treated as a money purchase scheme rather than as a defined benefit scheme.

B. Past Service Methods

The accruals methods are popular amongst both actuaries and their clients because people think they understand them.

They is also encouragement in the surplus legislation and in the disclosure aspects of SSAP 24, both of which require reference to be made to projected accrued liabilities.

The Attained Age Method is perceived by many to be an acceptable funding method and to meet the requirements of SSAP 24. I find this hard to accept because, by its very nature, it funds for surplus to accrue during inter-valuation periods. This is because the normal contribution rate disclosed by such a valuation is greater than the cost of providing benefits for service between the valuation dates on the Projected Unit Method (unless, of course, the fund is closed to new entrants).

I have also heard it argued that the Attained Age Method is acceptable for valuing a closed fund. People using this argument normally continue to say that the normal contribution rate will be reassessed at each valuation and any surplus will be spread over the expected remaining working lifetimes of the members. In my view this makes no sense. If the approach is to have any validity then a standard contribution rate should be set at the date the fund become closed using the Attained Age Method and all subsequent valuations should be made using that standard contribution in a Standard Contribution Method. In these circumstances the Standard Contribution Method would become acceptable for SSAP 24, even though conversion to the Entry Age Method would have been better.

As you will have gathered, in my opinion the Attained Age Method is completely inappropriate to use either for funding a pension scheme or for accounting purposes.

The Projected Unit Method has gained much popularity in recent years as being the most logical method of funding and for determining accounting costs.

Bearing in mind the significant changes in the shape of the working population in the UK and elsewhere over the next few decades, and the effects on pension scheme

membership of voluntary entry, the accruals methods, and in particular the Projected Unit Method, are inherently unstable. The calculated normal contribution rates are likely to climb as the average age of the membership increases.

My only comment on other past service methods is that if they can be demonstrated to meet the criteria set out in SSAP 24, then they are acceptable.

A final point for this section relates to how a company which runs an open scheme and a closed scheme should be treated for accounting purposes. In my view the same method should be used for both schemes because we are talking of only one group of employees in total. This would be independent of how the schemes are actually being funded. In certain circumstances this may contradict my assertion in section 3 that funding methods and accounting methods will in practice be the same, but there has to be an exception to prove the rule.

5. ACTUARIAL VALUATION BASES

We are all aware that it is the gaps between certain economic assumptions which are crucial to the results of actuarial valuations. Many of us have relied on conventional wisdom such as that propounded by E M Lee in his Introduction to Pension Schemes [3] which gives the following central ranges of future values as being possibly appropriate:

Element	Percent
Price Inflation	6 – 8
Real Earnings Growth	0 – 2.5
Dividend Yield	4 – 6
Real Dividend Growth	0 – -3
Real Investment Return	3 – 5

These ranges appear to be based on information in respect of the relatively short periods since 1952 and 1969. I accept that we have no valid way of determining assumed interrelationships in the future except by analysing comparable past relationships.

Having reviewed the underlying data used by Mr Lee, I found it difficult to justify there being any real relationship between the crucial items in a valuation basis. Nevertheless I knew we needed to have a relationship in order that our valuations should have validity. Until recently, I had accepted "conventional wisdom" without having been able to find any genuine justification for it.

In addition, my superficial study of the works of C D Daykin [4] and Professor A D Wilkie [5] did not give me a sufficiently practical insight into why a particular basis should be any more a "best estimate" than any other.
Thus I identified my personal credibility gap and decided that my first move had to be to look for further historical data. This I found in a BZW publication [6] covering UK investments from 1918, in a Watson's data base for RPI and average earnings since 1809, and in a Society of Actuaries' publication [7] for USA data since 1926. Further details are given the Appendix.

Regrettably, much of the older data lacks homogeneity, but it is nevertheless useful in giving an idea of trends.

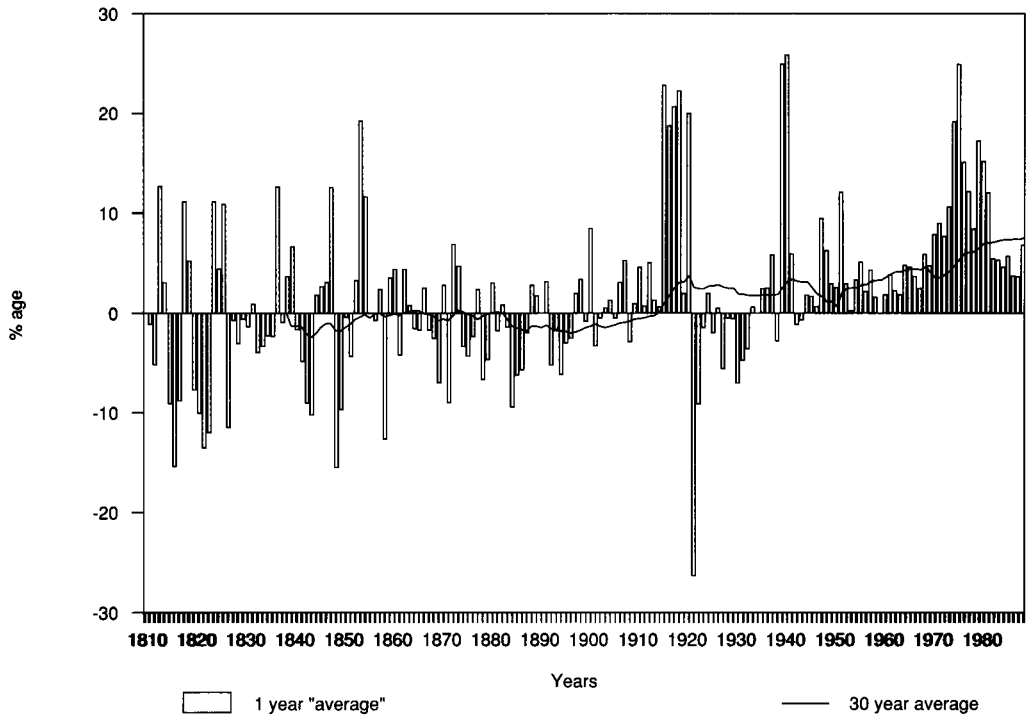
I made a number of investigations into this data and what follows summarises my conclusions.

I make use of 30 year and 60 year moving averages to demonstrate trends in full appreciation of the shortcomings of this approach. Nevertheless I believe they give very similar answers to those which are available from more valid approaches whilst maintaining an appeal to the layperson.

I reviewed many other averaging periods but chose 30 years and 60 years as those possibly spanning long term economic cycles. I do not try to justify on economic grounds any of the relationships I observe, largely because for each economist who agrees with me a hundred would disagree, whatever my observations were to indicate.

Because of publishing deadlines I have not included data for 1989. I suspect its inclusion would have had no material effect on the trends being observed.

A. Price Inflation



The above graph shows movements in the retail price index on a calendar yearly basis since 1809. It also shows the moving average over successive 30 year periods.

It is interesting to observe that persistently high inflation is a modern phenomenon and may only be a "blip" in the long term.

I believe that Mr Lee's range of values between 6% and 8% in the long term is a bit pessimistic (ie, high). In choosing an appropriate rate, however, one obviously must have regard to current levels of inflation but also to the resulting levels of the other items of the valuation basis. The interrelation between the rates is dealt with further on in this paper.

I have an inherent dislike for using an inflation rate as low as 5% for this assumption, mainly because of questions that one receives from clients from time to time such as:

"You have told me the cost of 5% increases in pensions, how much extra would it cost to index-link them?"

"We have the cost of 5% increases to pensions in payment, how much would we

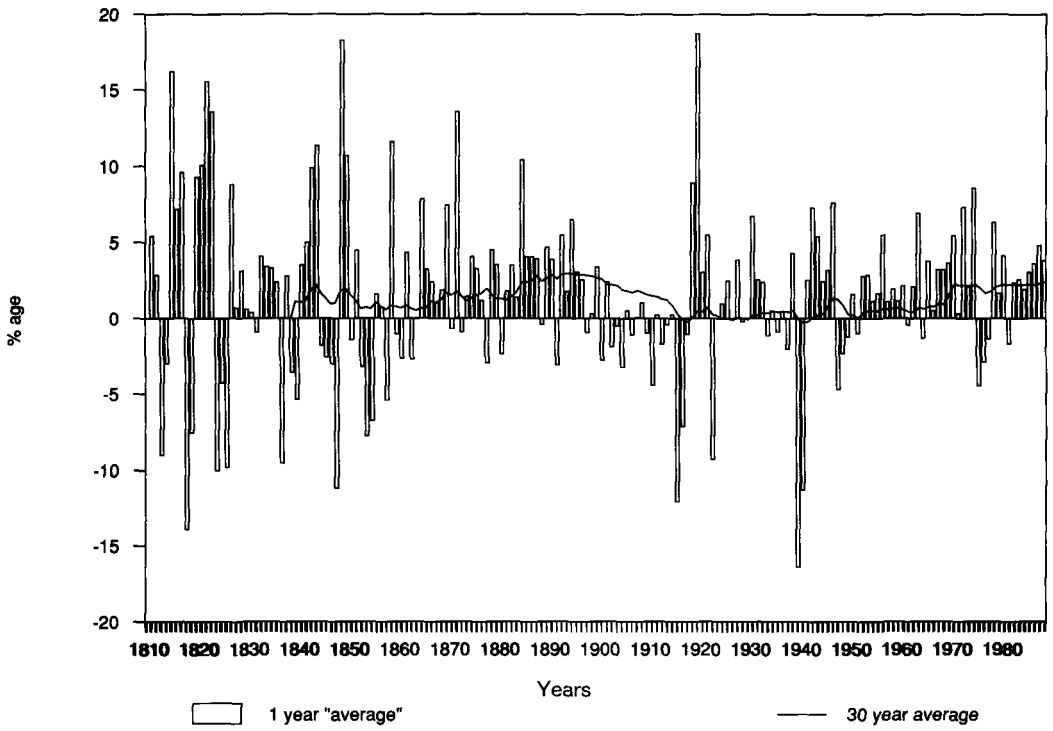
save if we gave 5% or the RPI if lower?"

The latter question is actually harder to answer because it is affected by all levels of price increase assumed which are above 5%. I would normally expect to use a net rate of pension increase of 4.5% for such calculations.

Nevertheless, 5% may be an appropriate assumption for a long term of up to 80 years. It has the advantage that the other elements of the basis are likely to be within a range which is acceptable to the clients and their auditors.

It also has the advantage (?) of erring on the side of caution in a scheme with some fixed (rather than real) liabilities. A "best estimate" for such a scheme could involve using a slightly higher rate of, say, 7%. This could have interesting implications on the choice of the investment return assumption.

B. Real Earnings Growth



The above graph shows the calendar yearly growth in earnings for the period from 1809, as well as a moving average over 30 years.

The last 20 points on the 30 year average demonstrate a flat relationship between earnings and prices over the past 50 years or so. The implied gap is between 2.25% and 2.50%. This is at the top of the range suggested by Mr Lee. The previous 60 points tell a slightly different story but these may have been influenced by the slightly eccentric data base being used for earlier years. In particular the industries covered may have been out of line with the "national average".

It must be stressed that the relationship I am looking for applies only to national average earnings movements, not to the earnings movement of a specific company or industry. Consequently I have opted to believe the slightly more reliable recent data and choose 2.5% as an appropriate gap to be added to the RPI assumption (nb. not multiplied by).

Considering further the subject of inter-industry pay relationships, the USA data includes the following:

	Average annual wage increase		
Industry	**1952-1965**	**1966-1981**	**1982-1987**
	%	%	%
Mining	3.72	8.24	3.09
Construction	4.28	6.85	3.02
Manufacturing	3.85	7.01	4.17
Transportation	n/a	7.23	3.49
Wholesale Trade	3.94	6.49	3.94
Retail Trade	3.21	5.55	2.13
Finance	3.53	6.09	5.57
Services	n/a	6.74	4.70
Total Private Non Agricultural	3.64	6.34	3.44
Consumer Price Index	1.40	6.84	3.79

Regrettably I have not been able to get similar figures for the UK.

Some judgement is clearly required as to the general movements of earnings of the members of a pension scheme relative to the national average either as a short term or as a long term variation.

Promotional and other variations in earnings during the members' careers should be taken into account on top of general earnings inflation.

As a word of warning, not too much reliance should be placed on snapshot comparisons of average pay by age. This is because they are distorted by the effect of new entrants, which is clearly indicated by the way such averages nearly always fall at higher ages. An unsophisticated use of these snapshots will usually result in the "age variations" in pay being understated.

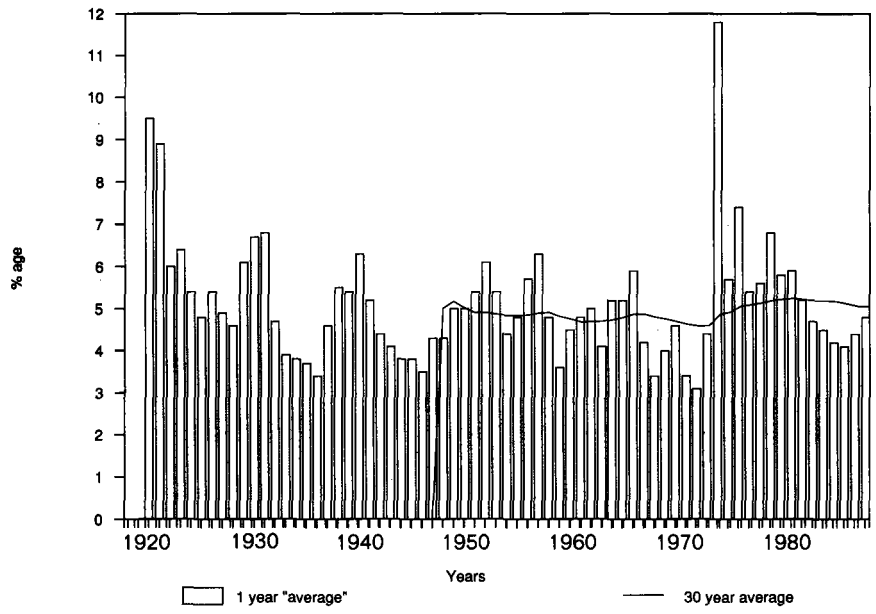
A more reliable analysis is from a "proper" salary experience which deals only with members in service throughout the period under review.

Examples of promotional scales which are based on increases actually experienced in the late 1980s, include the following:

		Annual Promotional Increase at age				
		22	27	32	42	52
		%	%	%	%	%
Large Retail Outlet						
Management	– Men	8	4	2	2	2
	– Women	5	3	2	-	-
General Staff	– Men	2	2	2	2	-
	– Women	5	4	3	1	-
Large Manufacturer						
Staff	– Men	6	5	4	2	1
	– Women	4	3	3	2	-
Works	– Men	6	-	-	-	-
	– Women	6	-	-	-	-
Large Service Company						
	– Men	8	8	7	2	1
	– Women	5	4	1	-	-

As a final point in this section, SSAP 24 has led us to determine average remaining service lives. These indicate that the average "long term" for existing members is normally between 10 and 15 years. Perhaps this should lead us to consider the "gap" between earnings and inflation as being a short term assumption. In any event, short term variations (see section 7) could have material effects.

C. UK Equity Dividend Yield



The above graph shows the dividend yield on UK equities in the middle of December each year from 1918 to 1988. There is also a 30 year moving average.

The inference I draw is that the use of UK equity dividends other than 5.0% probably takes too much account of short term fluctuations.

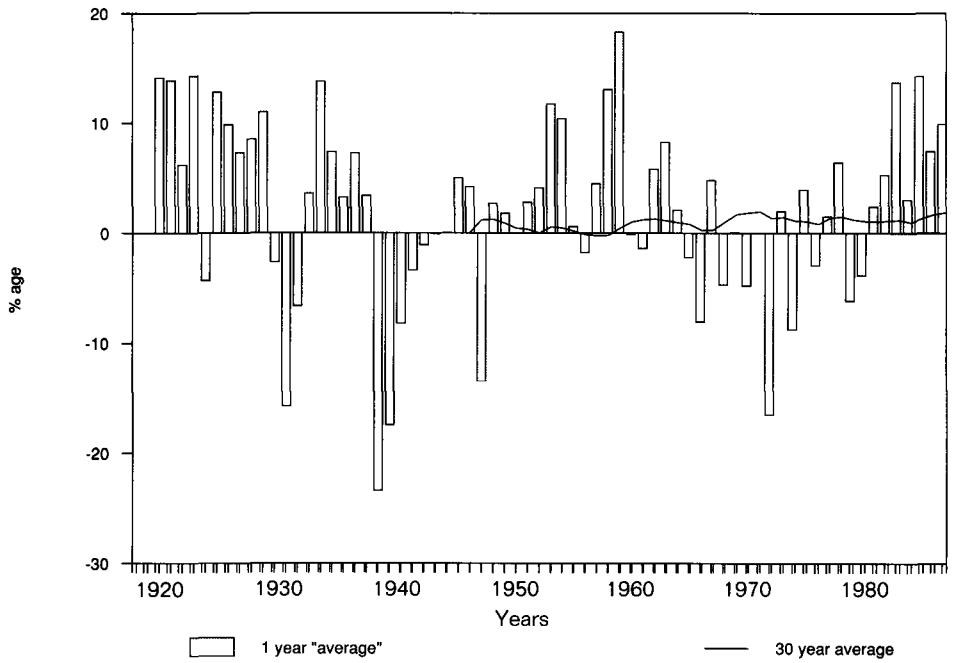
I am aware that certain people are likely to argue from time to time that there has been a fundamental change in the market which affects the expected level of dividends. Maybe this appeared true in 1935 (3.7%), 1972 (3.1%) and 1976 (7.4%) but I await more convincing evidence.

Nevertheless, there has been an interesting trend in declared dividends in the USA:

	Dividend Yield %	**Dividend Payout Ratio** %
1936	4.65	71
1946	4.16	67
1956	3.73	51
1966	3.37	52
1976	3.97	41
1986	3.47	57

I do not have comparable information for the UK.

D. Real Dividend Growth



The above graph shows real growth in UK equities over the period since 1918 as well as a 30 year moving average.

Far from there being a negative gap over the long term (as suggested by Mr Lee), the implication is that there may be a positive gap. The 30 year average rarely falls below zero and the 60 year average (shown later in this paper) demonstrates a positive gap of just under 1.0%.

The long term real rate of return on UK equities could thus be taken as approximately 6% (Dividend Yield plus Dividend Growth).

Because of the way investment return is defined, dividend growth is effectively used on both sides of a valuation balance sheet. I believe that it can be valid to use apparently different assumptions on each side. I will demonstrate how and why with an example:

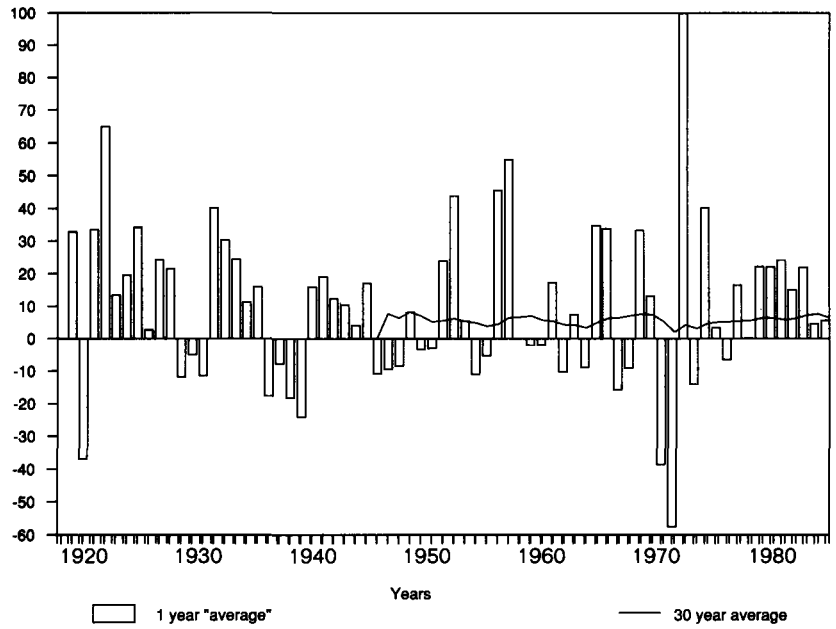
Price Inflation	6%
Dividend Growth	7%
Return on Equities	12%

The selected valuation basis uses a composite investment return of 10% because the scheme will not perform as well as equities over the long term due to dealing expenses and to investment in other securities. In order to put a logical value on the assets, which are being valued in this case as a notional investment in the FT Actuaries All Share Index (I do not propose to justify this method of valuation here), it is necessary to use a basic rate of dividend growth of 5% (Investment Return minus Dividend Yield) in the valuation of the assets.

Thus, a negative rate of real dividend growth can be a valid assumption, but perhaps not for the reasons suggested by Mr Lee.

E. Real Investment Returns

(i) UK Equities



The above graph shows real returns on UK equities for the period since 1918 as well as a 30 year moving average.

No real conclusion can be drawn on the level of "real" returns (except that they are positive) until one looks at longer moving averages. The 60 year average (shown later in this paper) shows a real rate of return on UK equities of between 5% and 7%. This coincides reasonably well with the "actuarial" return of dividend growth plus dividend yield, which also adds up to about 6%.

Interestingly, the average real return to a USA investor on the Standard & Poors Stock Composite Index over the period 1926 to 1987 was 6.4%.

This leads me to hypothesise that in the long term:

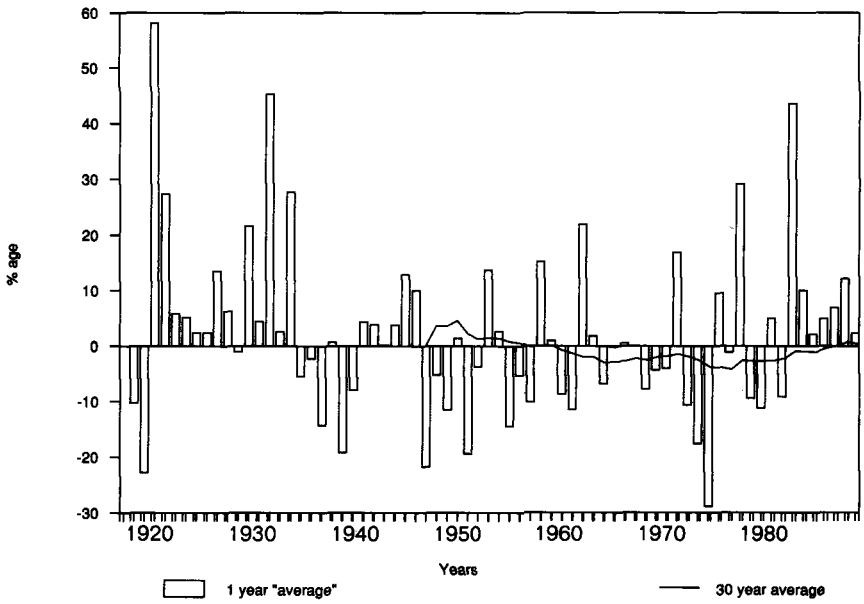
* Real returns available in all developed markets are equal.

* Exchange rates vary inversely with relative levels of price inflation.

* There is no financial advantage or disadvantage in investing in any particular developed market.

I do not have the data nor the desire to investigate or develop these hypotheses at present, but they may be worth revisiting one day. They are demonstrably untrue over the short term.

(ii) **UK Gilts**



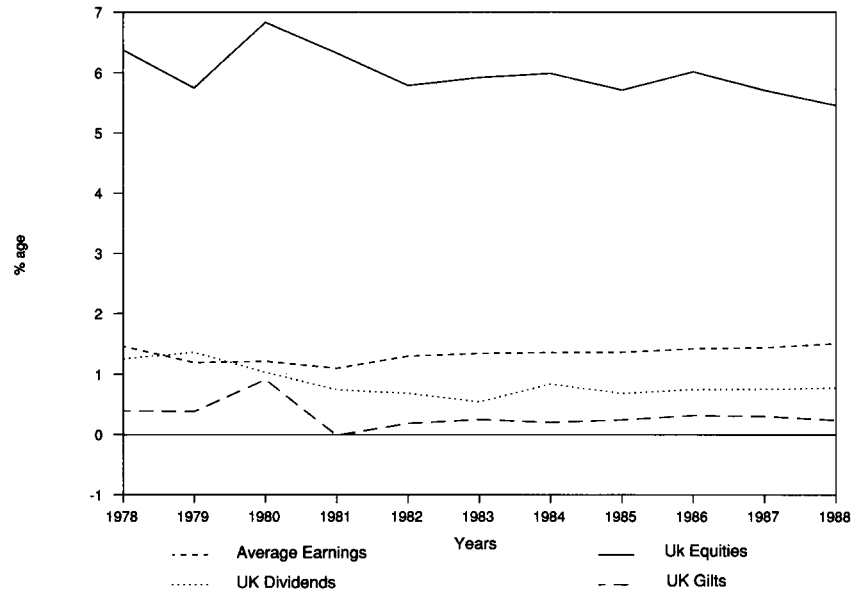
The above graph shows the real return on an annual basis of UK gilt investment together with a 30 year moving average.

What is interesting from this is that the real return on UK gilts has been approximately 6.0% lower than the real return on UK equities over most longer periods since 1918. The 60 year average shows a real rate of return on UK gilts of between 0% and 1%. (The comparable average real return to a USA investor of long term US government bonds over the period from 1926 to 1987 was 0.6%).

A conclusion which could be drawn is that there is no justification for conventional UK gilts forming part of a long term investment strategy when guaranteed positive real rates of return are available from Index-linked gilts.

I am aware that the UK gilt market is currently reducing and of the reference in the 1989 Budget to a new capital securities market. Nevertheless, I do not believe that fixed interest securities of any type should be considered as a long term investment for pension schemes except as a constituent of some risk optimisation strategy.

F. 60 Year Moving Averages



The above graph shows 60 year averages of the real return on UK equities, the real return on UK gilts, the real growth in equity dividends and the real growth in average earnings.

I mistrust the evidence of this graph as it is based on only 11 points but it is, unfortunately, the best I can achieve with the data base I have been able to use.

As mentioned in section 5B, I believe the level of real average earnings shown in this graph is distorted and I have disregarded it in the following sections.

6. THE BUILDING BLOCKS OF A BASIS

The implication of the figures shown in section 5 are that the following values may be appropriate for basic economic assumptions in a valuation basis:

Element	Percent	(RPI = 5)	(RPI = 8)
	%	%	%
Real Earnings Growth	2.5	(7.5)	(10.5)
Dividend Yield	5.0	(5.0)	(5.0)
Real Dividend Growth	1.0	(6.0)	(9.1)
Real Return on UK Equities	6.0	(11.3)	(14.5)
Real Return on UK Gilts	0.5	(5.5)	(8.5)

A. Investment Return

In my view, the real long term investment return should lie between 3.5% (a long term real return on index-linked gilts) and 6.0% (the real return on UK equities).

The actual return chosen should depend on the optimum long term investment strategy appropriate to the scheme and its sponsors, rather than on the current strategy (which is probably best regarded as a short term tactical variation). Thus, if it is determined that the optimum investment mix is 80% UK Equities and 20% ILG (disregarding the availability of such stocks), the implied real composite investment return is 5.5%.

I prefer to treat investments in overseas economies (bonds or equities) and in property as though they were in UK Equities. My justification is that a major reason for such investment is to achieve a return which is better than that of UK Equities. Data we have about the success of such strategy is too small and too short term to draw meaningful conclusions. Consequently I like to measure the performance of such investments against UK Equities, with any gains or losses emerging at successive valuations. I also refer you to my hypotheses in section 5E(i).

I suggest that anticipated returns due to good or bad stock selection/asset allocation/ market selection should be treated only as short term variations (see section 7). This is because of my perhaps cynical view that nobody will exceed the "average" in the long term.

For avoidance of any misunderstanding, I would suggest that the above rates are taken to be net of dealing expenses, but there is scope for flexibility here.

There is clearly a problem in determining an appropriate rate for an insured scheme invested in with profits deferred annuity contracts or in a deposit administration contract. As a practical approach I would assume these gave a real return of about 3%, although I currently have no justification for this.

As a final point, some pension schemes are partially taxed due to having excessive surpluses. Conventional wisdom proposes that the investment return assumption should be adjusted to take account of this (implying that tax is a long term feature of the scheme). My view is that the tax only affects the value of future income in the short term, not the liabilities. Consequently, this tax should be allowed for as a short term variation in the level of the investment income being valued and should not affect the investment return assumption.

B. General Pay Increases

The basic real increase in National Average Earnings (NAE) is about 2.5%. I do not believe that any group of individuals can be expected to experience general pay increases in the long term which differ significantly from the NAE.

Nevertheless, it is possible to predict that pay rises in certain industries may lead or lag behind NAE over the foreseeable future (ie, the short term) and it is valid, if not vital, to make an appropriate adjustment for this. I would argue that this should be a short term adjustment, but am easily swayed for presentational reasons into using a composite long term rate. After all, the future service lives of the current workforce is relatively speaking only a short term.

I also favour the use of career pay scales to represent variations in earnings relative to general pay increases. My justification is that if I ignore a known factor which has some effect on a valuation result, or if an approximate allowance (eg. plus 0.5% for a promotional scale) does not reasonably reflect the shape of expected pay movements, then the basis cannot be my "best estimate".

C. Other Economic Assumptions

My views on rates of pension increase and of dividend growth are adequately exposed in section 5, apart from any short term variations, which are dealt with in section 7.

It is often necessary to make assumptions about movements in the basic state pension and the earnings limits for NI purposes. The current government links these to prices but, for political reasons, gives a "bonus" from time to time. Future governments may aim to reinstate an earnings link. Clearly some individual judgement is required here. My first thought is to put in a real rate of growth of 1%.

For the time being I propose to link the £60,000 "cap" strictly to prices.

D. Statistical Assumptions

With modern computer software available I can see no justification for disregarding any event (eg, withdrawal, ill health retirement, early retirement) which can occur within a pension scheme. The method for obtaining appropriate assumptions is well documented.

Conventional wisdom has erred on the side of caution in these assumptions and has condoned allowing any surplus or deficiency to emerge at successive valuations.

I can see no reason (except in small schemes, where general industry experience might be appropriate) for using other than anticipated actual experience when setting statistical assumptions. It is effectively required by the principle of "best estimate". Also, as conventional wisdom continually reminds us, these assumptions have less effect on the valuation results than the economic assumptions, so the use of a more accurate estimate is unlikely to have any more of an impact on the results than a minor adjustment to one of the "gaps".

As a matter of information, my view of withdrawals from pension schemes is that they are more dependent on duration of service since entry than on age. Nevertheless it is probably acceptable, particularly in smaller schemes, to use age dependent rates as an approximation to reality on the assumption that the new entrant profile remains stable.

A recent investigation into a large organisation (20,000 members with turnover of about 15% per annum) demonstrated the following pattern:

Duration X	Number of new entrants remaining after X years	
	Males	Females
0	1,000	1,000
1	787	748
2	646	611
3	553	513
4	472	440
5	402	388
10	242	229
20	165	105

The pattern did not vary very significantly for entry ages of up to 40. Clearly such assumptions depend on the experience of the individual employers, but it is worth bearing in mind when you make an investigation.

I am aware that normal employee turnover is affected by the state of the economy but I know of no reliable link with movements in the economic assumptions. I accept that my approach to withdrawals tends to short-termism but it is difficult to be otherwise.

7. SHORT TERM VARIATIONS

Almost by definition there will be short term variations from the underlying long term basic assumptions within a valuation basis. Conventional wisdom dictates that the financial implications of such short term variations should be allowed to emerge at successive valuations or, in extremely adverse circumstances, be met by a cash injection into the scheme. The reasoning behind this is that the long term assumptions are only a succession of short term assumptions added end to end and, implicitly, if one takes account of a short term variation, one ought to amend the long term assumption succeeding it.

I have recently read a valuation report where the reason given for reducing the assumption for long term dividend growth by 0.5% (there were no other changes in the basis) was the very high dividend growth experienced between the valuations. I am aware, however, that there were "political" reasons behind this change which otherwise would appear to be unjustifiable as a prediction of future relationships.

The advent of SSAP 24 has, in my opinion, rendered this approach obsolete. Despite not having to make annual valuations, we will be asked to give an annual reassessment of the position taking into account experience over the year. The financial implications of any known and significant variations from the actuarial assumptions (which will effectively form a "benchmark") will have to be identified. A corollary is that any short term variation which can be predicted confidently should be taken into account before it happens, rather than at the end of the period. I do not believe that less predictable variations (eg, general movements in a short term economic cycle) should be taken into account, but this is an area for personal judgement.

A senior actuary recently argued forcibly with me that short term variations in the investment return can be disregarded because they affect both sides of the valuation balance sheet and therefore cancel each other out. In the situation under discussion the short term variation was a consequence of the growth in dividends. This affected the absolute levels of the stream of income being valued, but not the stream of outgo. It should have been taken into account.

I believe that the way in which we are going to have to present our results, showing a gradual rather than discrete movement of liability and asset values, dictates that we should assume short term variations are succeeded by long term assumptions.

On this basis, the levels of long term assumptions should not be influenced by any short term variations in them which are adopted in the valuation.

One of the consequences of using short term assumptions in the valuation of liabilities is the variation in the absolute level of the normal contribution rate for future benefits as the assumptions run into the long term. GN9 asks us to comment on such a variation in our valuation report so it will need to be identified as a part of the valuation. It is also arguable whether the "regular cost" for SSAP 24 purposes should just be the long term cost disregarding short term variations in the assumptions: I believe the use of short term assumptions will be acceptable.

A. Investment Return

The only short term variation in investment return that we can confidently predict is the growth in dividends. For example UK equity dividends grew in 1988 and 1989 by over 8.5% in each year in real terms. A large percentage of this was predictable by early in each year and one might predict further real dividend growth of about 5% in 1990.

If this additional investment return is used to value liabilities, I suspect that the significant increases in the values of liabilities from year to year will tend to lead clients and their

other advisors to view our figures with scepticism, however carefully we explain the concepts. If, however, we write up the value of assets immediately to reflect the additional anticipated growth, I believe that all parties will understand and accept our reasoning.

For example, if assumptions are:

Composite investment return	10%	
Price Inflation	6%	
Dividend Growth	7%	(for determining investment return)
	or 5%	(for valuing assets)

Then predicted real dividend growth of 5% p.a. for 2 years would be 4% p.a. higher than the basic assumption (see also section 5D). The value of the equity element of the assets being valued would therefore be written up by about 8%.

B. Investment Policy

The financial consequences of short-term variations ("tactical asset allocation") from the optimal long-term investment strategy should be allowed to emerge at successive valuations. This is because the success or otherwise of such a policy can only be properly measured when the "normal" position is regained. It may appear to be "doing well" part way through but there is always the risk that the investment manager mis-times his re-entry into the long term strategy and loses all he has gained.

It is really for this reason that I propose that asset valuations should be based on a notional long-term investment portfolio, rather than on any short-term deviations which consist the actual portfolio at the date of the valuation.

C. Other Variations

Other short term variations which are predictable tend only to affect the liabilities of a pension scheme and should therefore be included in the valuation of these liabilities.

8. SHORT TERM VALUATIONS

The purpose of this paper is to rationalise the views of actuaries on what constitutes a "best estimate" long term valuation basis. It would be incomplete, however, without a brief reference to the problems associated with closed funds and discontinuance valuations.

Closed funds rely on short term factors, but not necessarily on current market conditions. There is considerable scope for individual judgement but it is nevertheless worth having regard to the principles which would be adopted for a long term valuation of a continuing scheme.

Discontinuance valuations are theoretically dealt with having regard to current market conditions and, in particular, to current non profit deferred annuity rates. By comparison with long term assumptions, these tend to be based on real investment returns of 3% or less.

It is feasible that the value of discontinuance liabilities on this basis can exceed the "best estimate" value of past service liabilities on a continuing basis. To a layperson, this is clearly a nonsense and suggests the approach is wrong. Nevertheless, whilst Trust Deeds remain in their current form there seems little alternative.

I do not offer a solution to this conundrum.

A consequence is that the required contribution rate in a long term valuation could temporarily have to be determined by the required growth in discontinuance values.

A further complication, however, is the impending Social Security Act 1990. This broadly, will impose a debt on the employer if a scheme is wound up and has insufficient assets to cover leaving service benefits, including pension increases in deferment and after retirement at the rate of 5% per annum or the RPI if lower.

At first sight, this appears to impose a significant potential burden on the employer, particularly where the scheme makes little or no provision for pension increases after retirement.

Nevertheless, I consider that such a potential liability is irrelevant to SSAP 24 costs because company accounts are intended to reflect its finances as an on-going enterprise. Winding up the scheme would be a commercial decision into which account would be taken of any possible debt. Furthermore, if the company terminates, the least of its worries is a debt to its pension scheme.

I do not believe, therefore, that this new "legislation led" benefit improvement should in isolation affect the method of funding a scheme or of determining its pension cost.

9. THE STATUTORY SURPLUS BASIS

I understand that this is referred to in the Government Actuary's department as "the Chancellor's Basis". Its features are:

Price Inflation	6.5%
Real Investment Return	2.0%
Real Earnings Growth	0.5%
Dividend Yield	5.0%
Real Dividend Growth	-3.0%

The question is, how strong or weak is this basis by reference to the assumptions summarised in section 5 relating to "best estimates"?

A. The assumption for price inflation is at an acceptable level.

B. Real earnings growth is low at 0.5%, initially indicating a weak basis.

C. Real investment return is 2.0%, compared with "best estimate" real returns on UK equities of 6.0%.

D. The first important "gap" is the one between basic earnings growth and investment return which, at 1.5%, errs on the cautious side for a continuing pension scheme.

E. The second important "gap" is the one between RPI and investment return which, at 2.0%, is also very much on the cautious side for a continuing pension scheme. As an aside, where pension increases are in line with the RPI but are not guaranteed in the rules, a gap not lower than 3.0% can be used.

F. The third important "gap" is the dividend yield of 5% (investment return minus dividend growth), which is at an acceptable basic level but, as it makes no provision for currently known short term dividend growth it errs on the side of caution.

G. An alternative way of looking at these assumptions is that the allowance for RPI is 2%

too high for consistency with the other elements of the basis. The investment return is perhaps slightly low to be a "best estimate" by comparison with an RPI of 4.5% and is very low where pension increases are not linked to the RPI.

Thus, the Chancellor's Basis bears little relation to a "best estimate" and should not be used as such. Looked at as a whole, the basis is well designed for its purpose, being very cautious in the valuation of liabilities in a continuing scheme and slightly cautious in the valuation of assets.

What is also clear is why it is not applied to insured schemes.

10. CONCLUSION

We are looking for best estimates of cost. These can only be determined by reference to "best estimate" valuation bases although such bases do not have to be used. If an acceptable best estimate of cost can be derived using an unjustifiable basis, the basis should be adjusted to a justifiable one which gives an equally acceptable best estimate of cost.

I believe all actuaries should determine their own assumptions by reference to some "universal" best estimate economic parameters. Appropriate ones may be those shown in section 6. Also, "best estimate" statistical assumptions should be adopted where the size of scheme warrants such accuracy.

There would still be considerable scope for actuaries to use their individual judgement in assessing variations in the universal economic assumptions to make them appropriate to an individual scheme.

Any departures from a "universal" approach and "best estimates" for statistical assumptions should perhaps be detailed in the valuation report.

As a matter of presentation I suggest that clients might appreciate it if the section in the valuation report on assumptions indicated the possible financial impact of unpredicted variations in the actual experience.

The information given in this paper can also be used by actuaries who do not like a "universal" approach to justify to themselves and to clients/auditors/stockbrokers/analysts how the basis they have selected can be reasonably considered a "best estimate".

The views expressed and the mistakes made in this paper are my own. Nevertheless, I am grateful to former, current and future colleagues for comments they have made whilst I was preparing the paper, to the providers of the data, to Fergus Mackie for operating the micro so effectively and to Hazel Tully for her word-processing skills.

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APPENDIX

Data and its Sources

1. Retail Price Index : 1809 - 1850 : Gayer, Rostow & Schwarz Domestic and Imported Commodities.
   1850 - 1871 : Rousseaux Overall Price Index
   1871 - 1914 : Board of Trade Wholesale Price Index
   1914 - 1947 : Ministry of Labour Cost of Living Index
   1947 - 1988 : Retail Price Index

   Sources : Cambridge Historical Statistics via Professor A D Wilkie/The BZW Indices

2. Equity Price Index : The BZW Indices

3. Equity Dividend Index : The BZW Indices

4. Equity Yield (running) : The BZW Indices

5. Gilt Price Index : The BZW Indices

6. Gilt Yield (running) : The BZW Indices

7. Earnings Index : 1809 - 1849 : European Historical Statistics
   1850 - 1879 : G H Wood Wages
   1880 - 1919 : A L Bowley Wages
   1920 - 1937 : Ramsbottom Wages
   1938 - 1955 : Ministry of Labour Gazette
   1956 - 1962 : British Labour Statistics All Categories
   1963 - 1967 : Average Earnings All
   1968 - 1979 : Average Earnings Old
   1980 - 1988 : Earnings Index New

   Sources : Cambridge Historical Statistics via Watson Calculating Services Ltd.

The data used for years from 1920 is as follows:

Year	1	2	3	4	5	6	7
1920	122.4	93.7	137	9.5	76.7	5.5	63.8
1921	90.2	84.7	115	8.9	85.2	4.9	49.6
1922	82.0	119.8	111	6.0	94.5	4.4	40.9
1923	80.8	125.9	125	6.4	94.3	4.5	40.3
1924	82.4	145.6	122	5.4	97.0	4.3	41.5
1925	80.8	183.0	135	4.8	93.2	4.5	41.7
1926	81.2	179.2	149	5.4	91.7	4.6	41.9
1927	76.7	200.6	151	4.9	94.1	4.5	41.1
1928	76.3	231.7	163	4.6	95.3	4.4	0.8
1929	75.9	191.7	180	6.1	89.6	4.7	40.6
1930	70.6	158.9	163	6.7	97.2	4.3	40.3
1931	67.3	125.7	131	6.8	92.6	4.5	39.4
1932	64.9	162.3	118	4.7	125.6	3.3	38.9
1933	65.3	204.9	123	3.9	125.5	3.3	38.7
1934	65.3	245.6	140	3.8	156.1	2.7	38.9
1935	66.9	269.9	154	3.7	147.0	2.9	39.5

Year	1	2	3	4	5	6	7
1936	68.6	310.7	163	3.4	143.2	2.9	40.7
1937	72.6	258.9	185	4.6	125.8	3.3	42.2
1938	70.6	220.4	186	5.5	119.0	3.5	42.8
1939	88.2	213.6	178	5.4	115.9	3.6	44.7
1940	111.0	191.8	185	6.3	130.2	3.2	49.9
1941	117.6	224.0	180	5.2	139.8	3.0	54.2
1942	116.3	252.8	172	4.4	39.4	3.0	57.5
1943	115.5	270.8	169	4.1	134.6	3.1	60.2
1944	117.6	293.4	172	3.8	138.1	3.0	62.8
1945	119.6	299.2	175	3.8	154.4	2.7	65.9
1946	120.4	340.7	185	3.5	166.8	2.5	71.4
1947	131.8	319.3	211	4.3	138.8	3.0	74.5
1948	140.0	294.6	194	4.3	135.6	3.1	77.3
1949	144.1	264.4	205	5.0	119.3	3.5	78.6
1950	147.8	279.2	214	5.0	119.9	3.5	81.9
1951	165.7	287.5	240	5.4	104.2	4.0	90.9
1952	170.6	270.6	254	6.1	99.2	4.2	96.2
1953	171.0	318.9	265	5.4	108.8	3.9	99.2
1954	176.7	454.0	306	4.4	111.2	3.8	103.7
1955	185.7	480.4	355	4.8	95.8	4.4	110.8
1956	189.8	413.4	365	5.7	88.6	4.7	119.5
1957	198.0	384.6	374	6.3	78.9	5.3	126.0
1958	201.2	542.6	397	4.8	88.1	4.8	130.5
1959	201.2	811.0	449	3.6	84.7	5.0	132.0
1960	204.9	789.7	541	4.5	74.6	5.6	137.3
1961	212.7	766.4	561	4.8	64.4	6.5	141.9
1962	217.6	732.5	566	5.0	76.2	5.4	148.2
1963	221.6	840.9	610	4.1	74.9	5.5	161.4
1964	232.2	752.1	692	5.2	69.0	6.1	166.9
1965	242.9	803.6	739	5.2	67.8	6.2	181.2
1966	251.8	717.2	749	5.9	66.4	6.4	188.8
1967	258.0	950.2	706	4.2	63.7	6.9	199.7
1968	273.1	1301.9	783	3.4	57.8	7.6	218.2
1969	286.1	1105.6	782	4.0	53.4	8.5	236.9
1970	308.6	1037.1	844	4.6	50.6	9.3	269.4
1971	336.3	1456.8	876	3.4	59.5	8.3	294.5
1972	362.0	1720.0	943	3.1	52.2	9.6	340.2
1973	400.4	1119.4	871	4.4	42.5	11.9	384.5
1974	477.1	506.7	1058	11.8	30.8	17.0	497.5
1975	595.9	1196.3	1206	5.7	36.7	14.8	593.8
1976	685.7	1101.7	1442	7.4	36.3	15.0	663.4
1977	769.0	1642.9	1570	5.4	47.4	10.9	733.9
1978	833.5	1743.3	1727	5.6	41.1	13.2	845.7
1979	977.1	1790.1	2154	6.8	37.3	14.7	1007.8
1980	1124.9	2268.4	2328	5.8	39.6	13.9	1208.0
1981	1260.4	2403.8	2509	5.9	34.8	15.8	1331.0
1982	1328.6	2943.3	2708	5.2	47.4	1.1	1436.0
1983	1399.1	3610.2	3002	4.7	49.7	10.5	1551.0
1984	1463.2	4484.7	3571	4.5	48.0	10.6	1653.0
1985	1546.5	5232.0	3888	4.2	48.2	10.5	1800.0
1986	1604.0	6353.2	4609	4.1	48.4	10.5	1934.0
1987	1663.2	6594.6	5134	4.4	51.4	9.5	2102.0
1988	1776.3	7096.7	6027	4.8	51.4	9.3	2330.0