LONG FINANCE

A Primer On The Risk Structure And Contractual Accrual Rate Of DB Pensions

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"To ensure the adoration of a theorem for any length of time,
faith is not enough; a police force is needed as well"

Albert Camus, The Rebel

Abstract:

The purpose of this primer is twofold – to explain at length the correct way in which to value defined benefit pensions liabilities, and to draw attention to a range of misconceived practices which have developed in the management of DB schemes. It considers the role of trustees and purpose of the scheme and fund.

We would like to thank many friends and colleagues for their comments on earlier drafts and, in particular, Reg Hinkley, Derek Scott and Andrew Slater. Any and all remaining errors are our own.

Introduction

This primer makes many major and minor points. Among the major points are:

The contractual accrual rate (CAR) is the rate of return necessary for a new contribution to accrue in value to be sufficient to meet all projected pension payments. The CAR of a scheme is the weighted average of those of the prior awards. This is the rate underwritten by the sponsor employer.

The valuation methods and discount rates specified by the Pensions Acts are counterfactuals. They value scheme liabilities as if all liabilities were being created at the date of valuation and those discount rates applied. The use of counterfactuals to value pension scheme liabilities renders the resultant figures totally unreliable as a basis for any scheme financial management decisions. The buy-out metric is simply another counterfactual.

By underwriting the CAR and defining a lifetime pension payment, the sponsor eliminates the longevity and many other risks to members. In effect the sole risk faced by members is the due performance of the contractual accrual rate. As the terms may be enforced through the courts when the sponsor is ongoing, this reduces to sponsor insolvency risk.

It is also worth distinguishing between real risks, that is to say the factors which increase or decrease the pensions ultimately payable and those arising from the measure used to reduce those liabilities to a present value, the discount rate. The true risk exposure of the sponsor is determined at the point of execution of the pension contract, when the CAR is set. Any actions by the sponsor to limit or modify this risk subsequently may only be properly done at the sponsor's expense

To ensure full security, the level of funding, of the accrued promise, sponsor deficit contributions (claims on the underwritten position) would need to be prompt – with the deficit cure period short, as it is with secured bonds. However, it should also be recognised that this period may be relatively long if the consideration is not member security but rather continuing performance of current payment obligations. This forbearance on deficit cure is the sole circumstance in which the trustees need to consider the quality of the sponsor covenant.

The duties of a trustee are to ensure current performance of accrued obligations, not to speculate over the future of the sponsor employer. The trustee obligation in this case would be limited to the monitoring and enforcement of the level of security, in an amount determined by the contractual accrual rate. This contrasts dramatically with the raft of responsibilities that the Pension Regulator has imposed on trustees. The employer sponsor is usually[1] the residual claimant to assets remaining after the discharge of all pension

[1] This is the norm, but not universal. There will be some pension arrangements where it is not specified in governing documentation that the sponsor is a beneficiary of residual assets. But it is grey, as there is legislation which provides for a refund to the sponsor if the assets are considerably greater than the value placed on the pension obligation, although that legislation has not been reviewed or revised for quite some time.

liabilities, and in this sense, it is also a member of the scheme, which means that the management objective of the trustees is compound.

It follows then that, as the risk-bearer, the sponsor should determine the investment strategy of the fund, not trustees or some other party. It also follows that if the sponsor employer does not wish to continue to bear this underwriting risk, then the costs of altering its risk profile should be borne by the sponsor employer, and not the scheme or fund. Indeed, the idea that a sponsor may limit its exposure in absolute terms is anathema to the very root of a defined benefit scheme.

It is not the proper purpose of a company to make provision for events occurring after its insolvency, which raises some fundamental questions for both regulation and current practice. Even requiring the sponsor to fund to the technical provisions level is going beyond the original contractual terms. Provided the scheme is funded to the level of the CAR, the sponsor company in distress with limited resources, should utilise those resources in the furtherance of the continuity of the company, pursuing the well-being of all stakeholders, not increasing the security of any particular class.

The central regulatory themes of protecting beneficiary members and funding to reduce Pension Protection Fund exposure are deeply suspect, even though they may be well-intentioned. It appears that one of the motivations of the Pensions Regulator in promoting the use of these methods, and indeed over-funding more generally, is protection of the PPF. The Regulator is conflicted and operates to the detriment of schemes and their sponsors.

As was noted earlier, the sole risk faced by scheme members is sponsor insolvency. It should be understood that this is a comparatively rare event. Companies are in fact more than twice as likely to cease trading through merger, acquisition or solvent liquidation than they are to fail insolvent. The risk to the member is the product of the likelihood of the event and its consequence, the loss experienced given insolvency. Insurance of rare but substantial events, such as these, is a more efficient solution than funding.

The most obvious way to protect members fully would be to have the PPF pay full benefits – the “haircuts” applied are unwarranted and the moral hazard arguments used to justify them entirely spurious. The PPF’s hair-cutting distorts the amounts due to members, which is usually far from equitable among members. The PLSA consolidation proposal, which is a remedy to these problems, is built upon exaggerated and fallacious arguments.

The current practice of calculating the cost of full buy-out, the s75 value, and making a post-insolvency claim based upon the deficit to this value breaches the fundamental English law concept of equity (in this case among creditors), and should be unenforceable in result.

The setting of the CAR, the determination of a contribution rate for new awards is a trustee responsibility. It is important that it should be equitable among members within the context of their mutual risk pooling and sharing. This contribution-setting process should not include or reflect any element of deficit repair; that is the sole responsibility of the sponsor

employer. Such subsidies can be achieved in opaque manners, such as the setting of an extremely low contractual accrual rate on new awards, by raising both employer and employee contribution rates.

The Contractual Accrual Rate (CAR)

The defining characteristic of a DB pension is the underwriting by the employer sponsor of an implicit rate of return on contributions made. This is the glue which holds everything together. The contribution made and the projected pension ultimately payable determine this rate; it is the rate of return at which contributions compound to the projected pensions promised. Once the award is made, this rate is generally fixed, for the life of the contract. This rate will only change if, prior to the full discharge of the promised pensions, the projection of benefits is modified, by changing assumptions (e.g. inflation expectations) or experience (e.g. longevity experience). We refer to this rate as the contractual accrual rate (CAR). It defines the progression over time of the value of the award. This is illustrated later. This is the contractual obligation expected of the sponsor employer.

The contractual accrual rate for a scheme is the weighted average of the contractual accrual rates of the individual awards over time. This is a complex and very slowly moving average. Other things being equal, as the population of active members ages, (unless they are replaced by new, younger members, which no longer happens with DB schemes closed to new members or future accrual) the CAR associated with new awards will tend to rise. With unchanged benefits terms, closure to new members will usually produce higher contractual costs, for a given level of contributions, for the continuing new awards to active members (so-called future accrual). It appears that many trustees or employer sponsors did not understand this point when closing to new members. Indeed, perversely, many employers took actuarial gains in their accounting for DB pensions at such closure events. We shall consider this more fully later.

Closure to future accrual means only that no new awards at all are made. The scheme is now running down as time passes and pensions are paid. The contractual accrual rate is invariant, unless the membership longevity or inflation experience differ from that previously assumed and projected.

Pensions as Deferred Pay

The rate is underwritten by the employer sponsor. It applies both to the contributions made by the sponsor and to the contributions made by members[2]. This shows the characterisation of a DB pension as deferred pay to be only partially true. The employer contribution is quite clearly deferred pay but the member contribution is an investment made from their gross pay, albeit tax-privileged. Most of the pension ultimately payable is in fact an investment return on the deferred pay, member contribution, and tax credit. It is worth noting that the protection of employee pay in insolvency is rather modest – that currently due is protected, but unpaid prior claims are limited to £800. Endnote i details the treatment of pay in

[2] This assumes that member and sponsor contributions secure similar benefits.

insolvency[i]. In other words, characterisation of a DB pension as deferred pay would not grant significantly superior treatment for active, deferred or pensioner members.

Contractually-Defined Scheme Funding

The most important thing to understand is that at the contractual accrual rate all pensions will be paid in full and on time. The sole risk faced by the scheme member is due performance by the sponsor of its underwriting guarantee. There is a relation between the required rate of return on assets held, at a point in time, necessary to discharge all liabilities on time and in full, and the contractual accrual rate. The contractual accrual rate is the native required rate of return when the asset considered is simply the contribution made. This means that we may validly consider solvency in these terms – if the required rate of return on assets held is above the embedded contractual accrual rate, the scheme is in deficit and if below, in surplus. The surplus or deficit in these cases are relative to the pension promise as made by the sponsor employer, and accepted by the member.

As a simple illustration, diagram 1 shows the evolution of the value of the pension promise, for a single year's award, for three scheme members, aged 25, 45 and 64 respectively, where the contributions are 15% of current salary. For simplicity, salaries and pensions have and continue to inflate at 3% p.a., and their expected longevity at age 65 is respectively 32, 29 and 26 years, with pensions payable as 1.5% of final salary from age 65.

The contractual accrual rates for these three members vary substantially: from 5.22% for the 25-year-old, to 6.39% for the 45-year-old, and to 12.18% for the 64-year-old. The weighted average is 8.03%. This divergence from the simple average (7.93%) of the individual rates is driven by the larger salary, and consequent higher contribution in cash terms, of the older employee.

For completeness we show, as table 1, the sensitivities of the contractual accrual rate to a 1% decline in the contribution rate, together with the sensitivity of the contribution rate to a 1% decline in the contractual accrual rate.

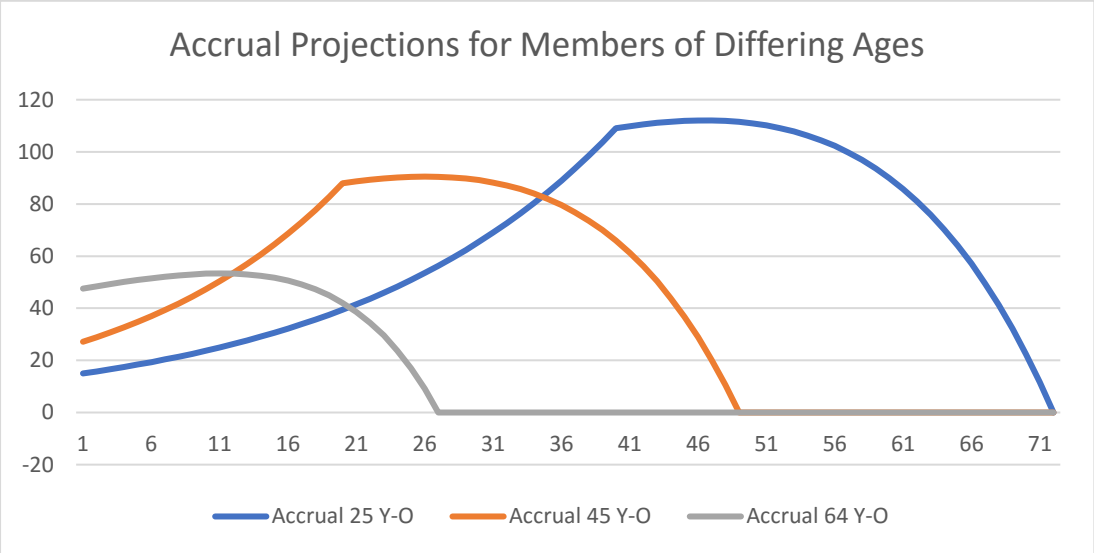
Table 1

	1% in Contribution Rate	1% in CAR
25 Y-O	13 b.p	25.1 %
45 Y-O	23 b.p.	21.8 %
64 Y-O	88 b.p	16.3 %

The effect of dropping the contribution rate by 1% from 15% to 14% of salary is to raise the CAR for the 25-year-old by just 13 basis points, but this rises to 88 basis points for the 64-year-old. In order to achieve a 1% decline in the CAR, it is necessary to increase the contribution rate from 15% of salary to 25.1% in case of the 25-year-old, but only from 15% to 16.3% of salary in the case of the 64-year-old. These sensitivities reflect the relative importance of investment returns in the total amount of pensions ultimately payable. One

consequence of these sensitivities is that relatively small changes in the expected return when pricing new awards may have large effects on the contribution rate required.

Diagram 1: Evolution of value of member claims



It is worth noting that the liabilities in respect of all members continue rising after retirement age has been passed, which raises questions as to the appropriateness of valuations which use differing (or dual) discount rates split by retirement age.

With no consideration of any investment returns, the level of funding (total contributions) at the time of award of these three pensions is sufficient to cover the first 15 years of pensions payments; everything thereafter is met from investment returns. The initial contribution, in this case, constitutes 5% of the pension ultimately payable for the 25-year-old, 12% for the 45-year-old and 25% for the 64-year-old. In fact, if an ongoing open scheme, pensions in this simple illustration may be paid from the annual contributions received until the twentieth year, when the 45-year-old's pension commences payment; over this time the scheme is cash flow positive based on contributions alone.

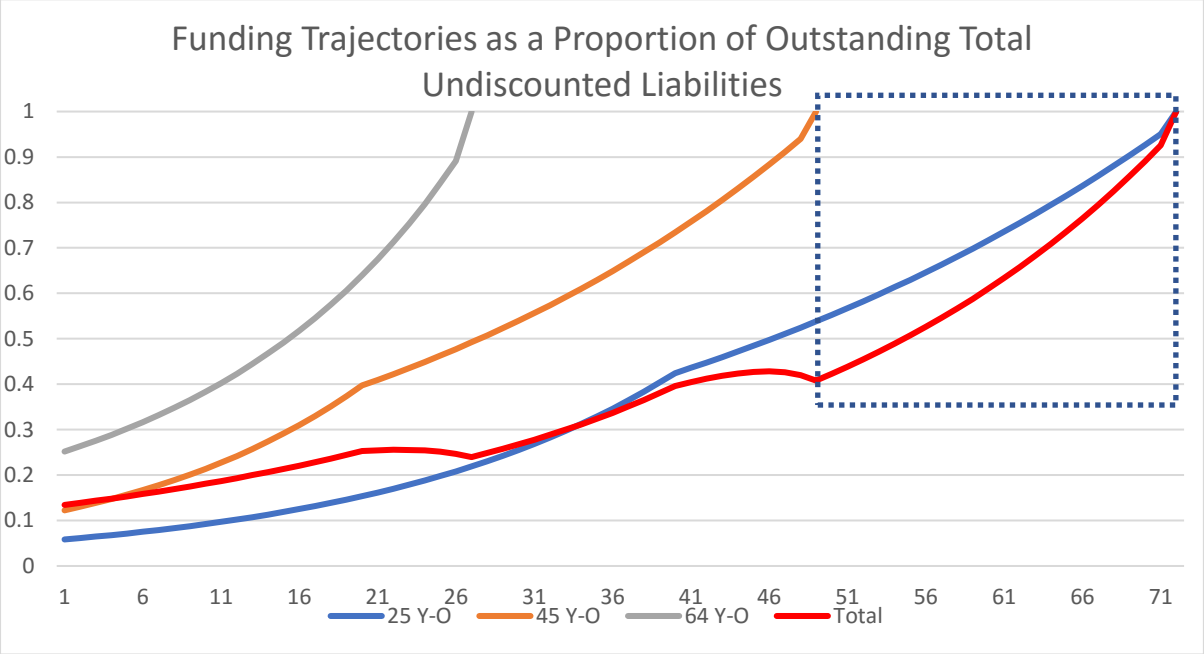
There are extremely powerful incentives built into the uniformity of benefit award. In this case, it heavily favours older members, which encourages younger active members to invest in their job specific skill sets while discouraging older members, who are in possession of experience and practised skills from leaving. It supports the employer's ambitions to retain skilled productive staff. We shall revisit this aspect of intra-generational risk-sharing more generally later.

While it is not evident in this simple deterministic setting, the investment and biometric risks faced by a 25-year-old span seventy-two years, while those faced by the 64-year-old span twenty-seven years. Of course, the collective pooling in such a scheme reduces the uncertainty and associated costs of the annuity insurance aspect to scheme and sponsor. While the likelihood of sponsor insolvency increases with the term, those with the highest exposure, younger members, have the least to lose. Put another way, the consequence of

the loss of pension for the younger members is far lower than for the older, where it may be catastrophic. By underwriting the CAR and defining a lifetime pension payment, the sponsor eliminates the longevity risk to members. In effect the sole risk faced by members is the due performance of the contractual accrual rate. As the terms may be enforced through the courts when the sponsor is ongoing, this reduces to sponsor insolvency risk.

Diagram 2 shows the evolution of the liability trajectories as a proportion of the total projected pensions outstanding at a point in time, for the three scheme members and their collective scheme.

Diagram 2:



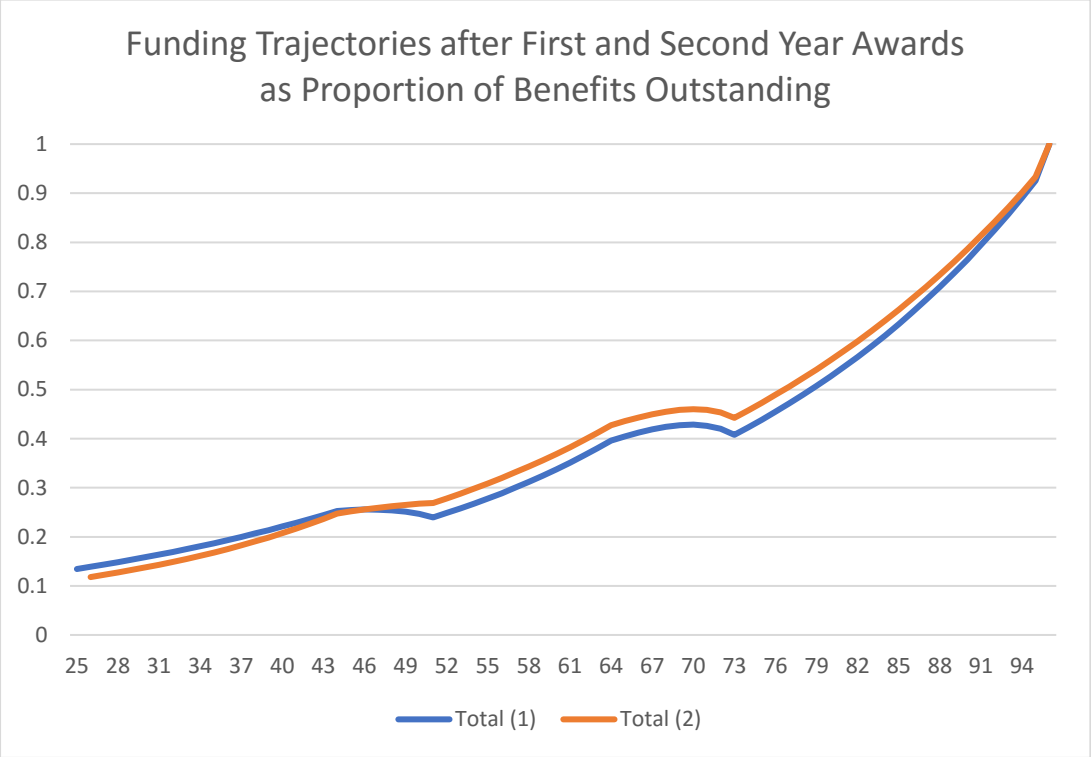
The contractual accrual rate has a memory. Examination of the period when only the 25-year-old has pension payments outstanding, indicated by a dashed box above, illustrates this. The stand-alone value of these benefits, calculated from the stand-alone 25-year-old's accrual rate, lies above that arising from the scheme accrual.

Next, we consider the effect of one year's passage of time. Contributions are received in respect of the 25-year old (now 26) and the 45-year-old (now 46), and the former 64-year-old is about to receive one year's pension.

The stand-alone contractual accrual rates of the 26-year-old and the 46-year-old are now respectively 5.26% and 6.50%; higher than the previous year as the investment term has shortened. However, when considered in the context of the scheme overall the contractual accrual rates for these are respectively 5.23% and 6.44%. The weighted average falls from the previous 8.03% to 7.16%.

The funding level as a proportion of liabilities outstanding is shown as diagram 3. Many find the level of funding required surprisingly low.

Diagram 3



This is a dramatic shift in the CAR, as would be expected with a near doubling of awards made, and the exclusion from further accrual of the most senior member, whose pension was the most expensive to provide. The total undiscounted liabilities have risen from £666.80 to £1140.06.

For open schemes, the effect of the discharge of pensions and the grant of new awards tend to offset one another. Changes in the age of the workforce due to new entrants and departures of existing active member employees also tend to offset one another. It is possible for an open scheme to exist in a form of equilibrium, where the admission of new members fully offsets the natural ageing with the passage of time of a pension scheme.

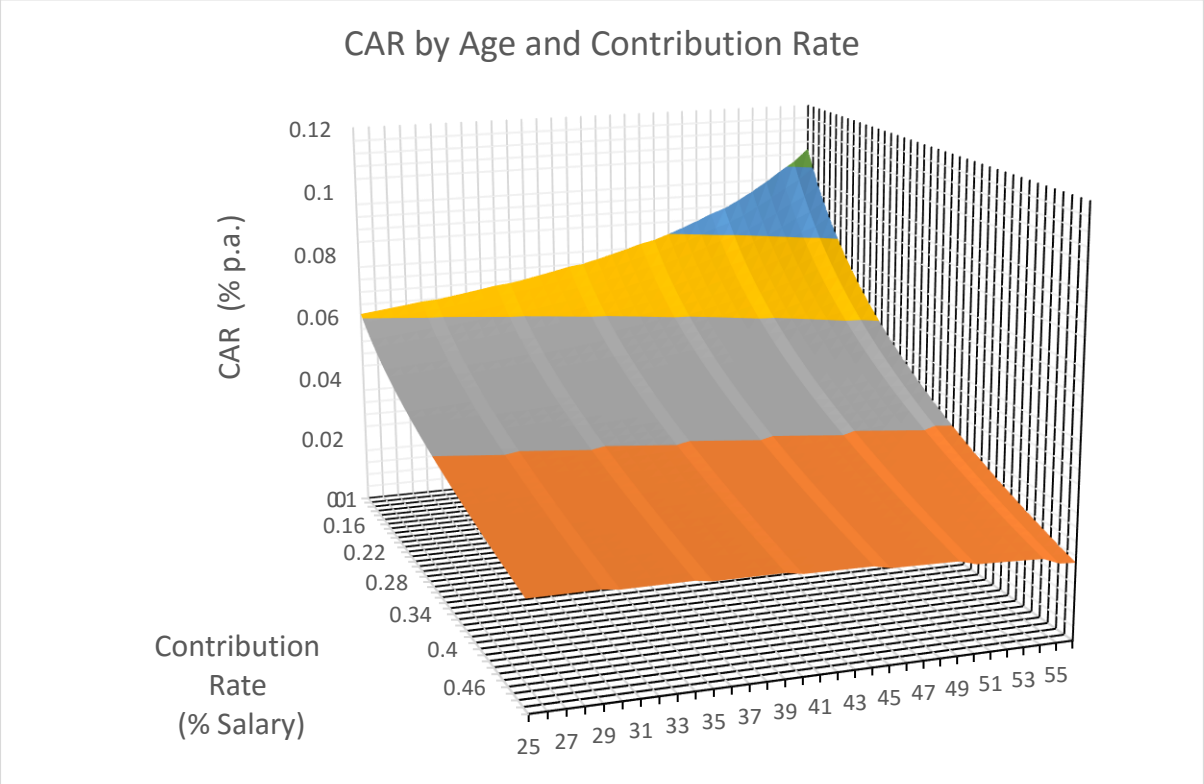
Intergenerational Transfers

There is much confusion over intergenerational equity in commentaries, which usually also refer pejoratively to DB pensions for older members as “gold-plated”. The risk to members is faced by all members, and has the same source, sponsor insolvency. Members’ claims on the scheme differ, as is illustrated later as diagram 7, but the value of the risk faced by the older member is greater than that faced by the younger. This contrasts with the risks which would be faced by the individual members under an arrangement such as individual DC.

There is intra-generational risk pooling and sharing within the DB design – the uniform accrual rate for a year of service and the application of a common contribution rate are intra-generational in nature. There are no inter-generational transfers – the arrangement, for an open scheme, is one of overlapping intra-generational risk pooling.

Moreover, the subsidy of older members by younger is actually a function of the level of contributions. This is illustrated, as diagram 4, which shows the CAR of members by age and contribution rate.

Diagram 4



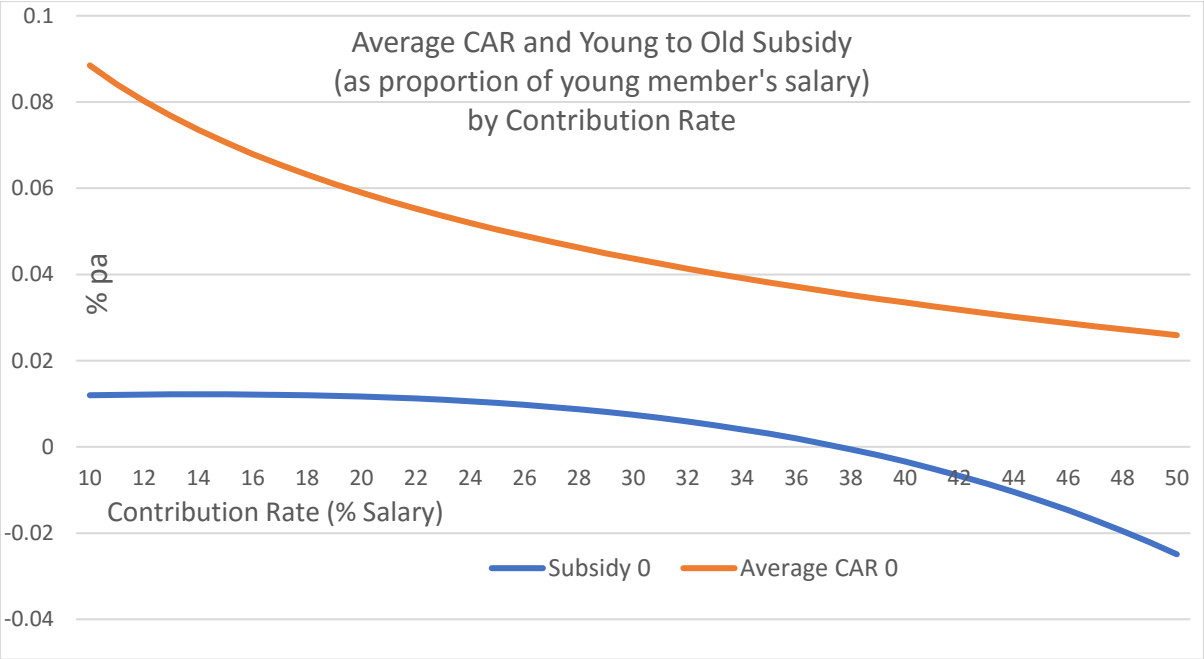
At low contribution rates, in this pedagogic example, and in the earlier example, the CAR enjoyed by older members is substantially higher than that of younger active members. However, as contribution rates rise and the level of CARs declines, so the situation changes. When contribution rates are above 37% of salary and the resultant CARs are below 3.6%, then there is transfer from the old to the young. As gilt yields are now well below this CAR level, we shall emphasise this point. In current circumstances of low gilt yields and expected returns, the old will be subsidising the younger members.

There is a further element which needs to be considered, the level of salaries to which these contribution rates apply. The degree of transfer or subsidy depends upon both the CAR and the amount, rather than rate, of contribution. This is illustrated for the pedagogic example as diagram 5. We see that at higher contribution rates, the subsidy, expressed as the product of the amount and the subsidy rate, is larger from the old to the young than it is from the young to the old at lower contribution rates. This should hardly surprise as at extremely high rates the amount contributed by the older may even exceed the total salary of the younger member.

(The step pattern evident in the CAR surface above arises from the granularity of longevity expectations embedded in this simple spreadsheet model – one year extension every five years.)

This arrangement is true risk-sharing, not an intergenerational inequity or subsidy.

Diagram 5



The collective nature of DB pensions does greatly simplify the scheme management task for the trustees and sponsor employer.

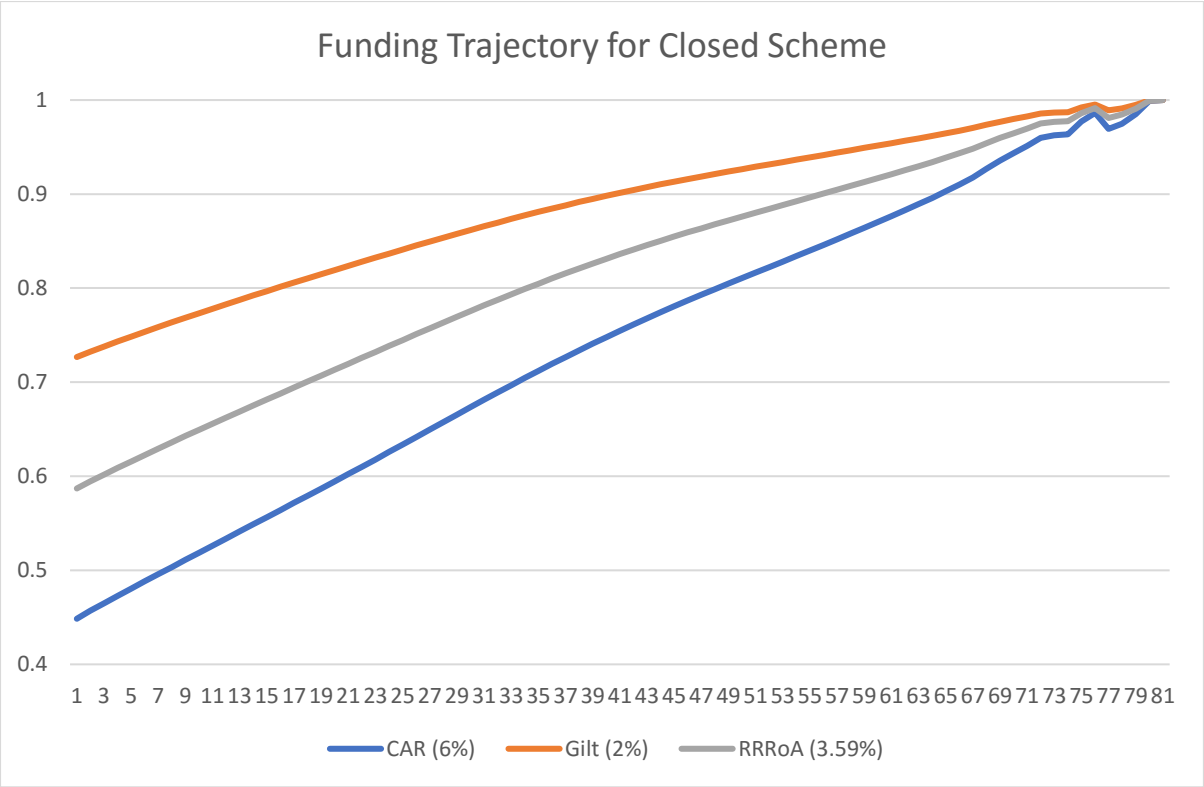
An Empirical Illustration

These pedagogic illustrations are informative, but for completeness we show, as diagram 4, the funding trajectory of an actual closed scheme using its contractual accrual rate (6.0%), together with the funding trajectory using the required rate of return on assets (3.59%), and as a counterfactual, a gilt rate of 2%. The perturbations evident above 95% funding are noise, an artefact of the mathematical algorithm used in calculation and arise from the small pension amount sizes and the granularity with which values were calculated.

The terms under which pensions were awarded result in a weighted average contractual accrual rate of 6%. Scheme investments have performed well over the life of the scheme and the required rate of return on assets held is now just 3.59%. Relative to the contractually promised return on contributions, the asset portfolio has outperformed by over 30% in capital terms. The level of funding is some 19 years ahead of that expected under the contractual terms. By contrast, the counterfactual gilt yield discount rate (2%) would require funding at 162% of that contracted. This is equivalent to prefunding the next 37 years of accrual under the terms originally contracted.

Of course, the further problem with the gilt based discount rate is that it will at the next valuation have some other value, and the trajectory from that point will be entirely different. The funding trajectory actually experienced by the required rate of return on assets will, of course, vary as the performance of those assets varies from the 3.59% required today.

Diagram 6



The contractual accrual rate defines the funding trajectory expected under the terms of awards. We shall discuss many of the consequences later.

If the contributions are invested in a fund, the returns achieved by this fund offset the liability underwritten by the sponsor employer. If the returns experienced by the fund are below this contractual accrual rate, the sponsor employer will need to make further contributions, and if returns are above this rate then the surplus accrues to the benefit of the sponsor employer. It is debatable whether these gains or losses are properly classified as employment expenses. As noted earlier, the contractual accrual rate fully determines the required progress of funding, the trajectory of asset values expected as due performance by the sponsor employer. To ensure full security of the accrued promise, sponsor deficit contributions would need to be prompt – the deficit cure period kept short, as it is with secured bonds. However, it should also be recognised that this period may be relatively long if the consideration is not member security but rather continuing performance of current payment obligations. There are similarities with cash-flow versus solvency concerns in bankruptcy evaluation. This latter situation, one of forbearance with respect to cure, would require consideration by the trustees of the viability of the sponsor, the strength of its covenant. This is the sole circumstance in which trustees have any need to consider the sponsor covenant, or indeed any aspect of the future beyond those factors determining the ultimate pension liability.

The risk and reward in this situation are borne by or accrue to the sponsor employer. It follows then that the sponsor should determine the investment strategy of the fund, not trustees or some other party. It also follows that if the sponsor employer does not wish to continue to bear this underwriting risk, then the costs of altering its risk profile should be borne by the sponsor employer, and not the scheme or fund.

The hedging of risks is by the sponsor and should take place within that company[3], not the scheme. When the CAR is used to calculate the accrued liabilities, there is no interest rate exposure and no justification for interest hedges in either portfolio or the sponsor company. The sponsor will be exposed to longevity and inflation experience, and changes in assumptions where these are made. If hedged, this should be undertaken within the sponsor company, and placed and evaluated in the context of the sponsor company's other exposures to these risks. This is integrated risk management within the company, not, as currently advocated, the scheme.

Independent Schemes

The idea has arisen that the scheme and its fund exist to ensure payment of all pensions no matter what the condition of the sponsor is. This essentially regards the scheme and fund as independent of the sponsor. It is tantamount to considering the scheme as an independent insurance company, and the pension contract is fairly described as one of insurance covering, as it does, the biometric risks of individuals. It is not unusual for companies to create "captive" insurance companies in pursuit of the efficient management of their insurance needs, but this independent entity idea deserves some further unpacking.

It is sensible for the sponsor to establish a trust to hold assets securing the accrued benefits, just as it might for a secured bond. The trustee obligation in this case would be limited to the monitoring and enforcement of the level of security, in an amount determined by the contractual accrual rate. This contrasts dramatically with the raft of responsibilities that the Pension Regulator has imposed on trustees. Indeed, as noted earlier, the only circumstance in which trustees would need to consider the sponsor covenant would be if it were to show forbearance and extend the period within which cure of any deficit relative to the contractual accrual rate funding value was required.

Distribution of Member Claims

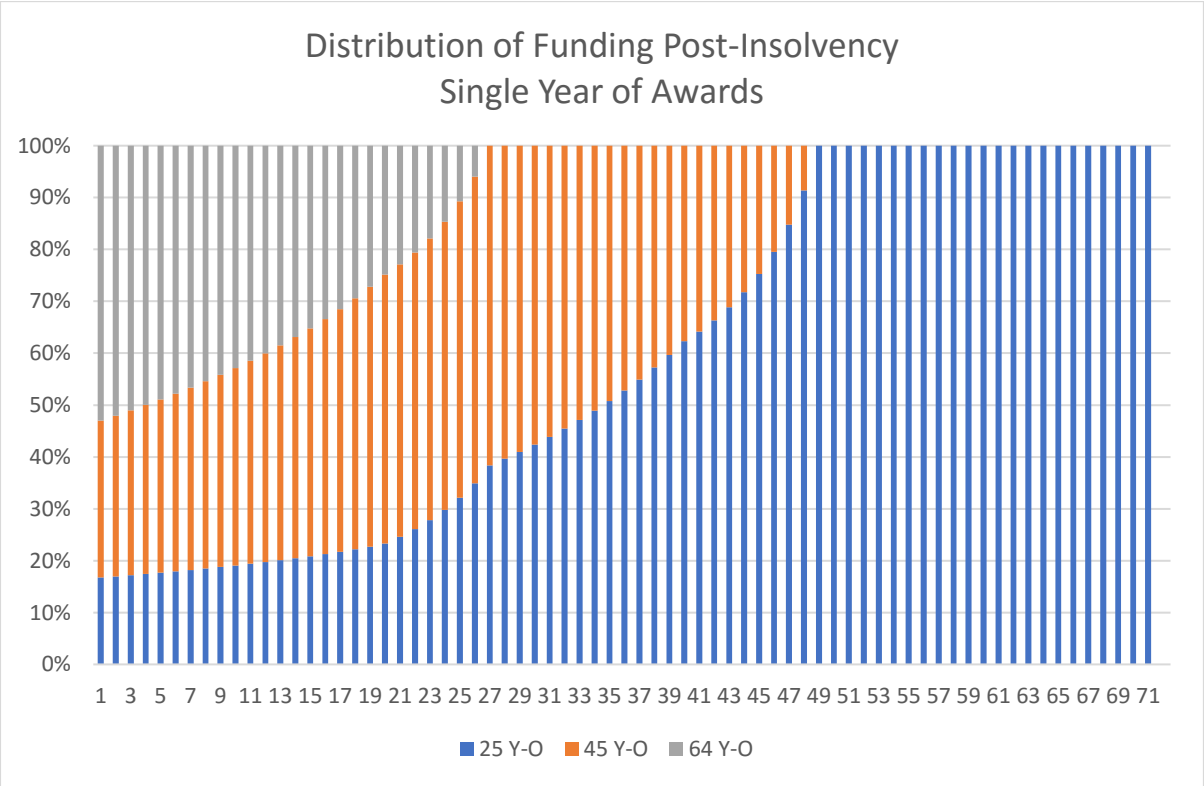
On sponsor insolvency, this fund would be available to the members. It is an accrued value, not the discounted value of future benefits promised. However, at the contractual accrual rate, these two values coincide. The contractual accrual rate, and funding levels calculated using it are time consistent.

[3] We recognise that the differing tax treatments in effect may alter this basic position, and indeed, more generally, from a corporate finance standpoint, that it is usually preferable to hedge a risk as close to its place of occurrence as possible.

It is also worth noting that, post insolvency, in liquidation, the distribution of these assets among the classes of members differs. For the earlier three-person pedagogic scheme, in the single contribution year case, this is illustrated as diagram 7.

This diagram illustrates another aspect of the DB arrangement, which is that the amount of money at risk for any year's contributions is heavily biased towards the older members. Obviously, as member entitlements vary with the length of their service (and salary level), so this diagram will vary. Indeed, it was the earlier practice of giving priority in liquidation to members in payment, with the possibility of leaving little or nothing for active and deferred members that made up a large part of the 1990's thrust for reform, memorably the Allied Steel and Wire campaign.

Diagram 7. Distribution of funding among members post-insolvency as proportion of total funding



The Pension Protection Fund's hair-cutting of pensions paid under their arrangements, such as the cap and form of indexation, also distorts the amounts due to members and is often far from equitable among members. The payment of full pensions to members in payment, with modification to CPI indexation, the 10% haircut on others and the maximum pension cap on active and deferred members together alter the relative rights materially. Millionaire pensioners receive all while millionaire actives are severely cut back.

Underwriting and Deficit Repair

It might perhaps seem sensible for a sponsor wishing to rid itself of the underwriting commitment to create such an independent insurance company, but as the establishment

of a scheme and fund under trust arrangements do not extinguish its commitment; this cannot be the case in current practice.

Buy-out of liabilities and wind-up of the scheme does extinguish the underwriting commitment, but is very expensive. It should be understood that as annuities are expensive due to the regulation of life insurance companies, and buy-out values consequently high, most schemes would, and should, be in deficit on this measure. Further, for a given amount of ultimate pension, the cost of buying annuities for pensioners in payment differs from the cost of buying (deferred) annuities for active and deferred members. The use of this buy-out metric is simply the use of another counterfactual.

It is also obvious that the underwriting commitment is an obligation of the sponsor alone. This means that new award contributions should not be used to subsidise the sponsor costs under this commitment. While there is much risk sharing and risk pooling within the structure of a DB scheme, it does not extend to members sharing in the underwriting of the contractual accrual rate. The nonsense of a member guaranteeing an investment rate (in whole or part) to themselves should be self-evident. Such subsidies can be achieved in opaque manners, such as the setting of an extremely low contractual accrual rate on new awards, by raising both employer and employee contribution rates.

There is an element of support for the idea of the scheme and fund being independent in the notion of prudence and the definition of the technical provisions level. That difference might be thought of as equivalent to equity capitalisation in, for example, a captive insurance company. It is possible to rationalise the development of a technical provision excess over the best estimate or underwritten value in terms of risk limitation to the sponsor – a smoothing buffer.

This excess security is a not-uncommon feature of secured bond issues, where it is justified as being beneficial to the instrument holder as it cushions against adverse post-insolvency pre-liquidation distribution price developments. It may also function as a buffer, lowering the likelihood of calls under the underwriting or security provision guarantee, as losses of up to this magnitude may be absorbed.

There then remains the question of the speed of reinstatement to the technical provision level. However, in requiring the sponsor to fund to the technical provisions level, the scheme is going beyond the original contractual terms. This is similar to Charles Goodhart's "taxi problem", where the tired traveller arriving at a railway station is delighted to find a solitary cab waiting at the taxi rank, but is then disappointed to hear that the driver cannot take the trip as the rules state that there must be a cab on the rank at all times. We shall revisit the risk limitation concept later.

However, notwithstanding the technical provisions, the scheme remains supported by the underwriting of the sponsor, and claims upon the insolvent estate of the sponsor (s75 PA1995) are still made. This claim is based upon the cost of buying out the scheme on commercial terms, being the difference between that and the assets of the scheme. This is an instance where the law is deeply suspect as it breaches the principle of equity. The

sponsor was liable for the contractually accrued value, not the buy-out value. It is the source of incentives for other creditors to seek higher priority and specific and superior security. It has spawned a "pre-pack" insolvency industry.

While the idea that the scheme may continue beyond sponsor insolvency and pay pensions from its resources is potentially attractive, it is not supported by the provisions of the Pensions Acts which envisage the purchase of annuities or entry into the Pension Protection Fund, and scheme wind-up. There are a small handful of schemes where the original sponsor no longer exists, but it appears that the majority of these have some form of Potemkin employer, with little or no substance. Of course, a truly independent scheme would need to have regard to the future and its own sustainability, and risk management would become a valid concern for trustees.

However, the presence of the PPF shows that the level of security to member benefits provided by technical provisions is rather more illusory than real. Unless the scheme has sufficient resources to buy benefits in the open market equal to or better than those offered under PPF terms, it will enter the PPF, and members will receive only PPF benefits. Even though PPF benefits may be as little as 50% of the scheme benefits accrued, there are few instances where funding to technical provisions levels would be sufficient to enable the purchase of PPF or superior level benefits. The excess funding over best estimate is simply lost to the PPF and does not benefit members. Member security would be enhanced only if the level of technical provisions was very substantial, approaching or beyond self-sufficiency, allowing open market purchase of better-than-PPF benefits.

If the objective really was to provide pensions regardless of the condition of the sponsor, the question arises as to why the sponsor does not simply buy pensions policies for members from a commercial insurance company. In that case, it would never create any underwriting commitment. Considerations of cost, along with questions as to the extent that such arrangements would facilitate the retention of staff, confound the analysis of that potential solution. The earlier analysis also shows one aspect of the difficulty entailed – the variation among members and over time of the cost of their benefits.

Self-Sufficiency and Overfunding

There is a more basic question: should a sponsor company make provisions for the service of pension commitments beyond its own lifetime?

It is a fundamental feature of English law, and many other legal systems, that a person's debts and obligations cease to accrue on death. This holds for both natural and juridical persons. The obligations do not transfer to heirs and successors. This is often misleadingly, and incorrectly stated as "your debts die with you", when in fact they crystallize and become payable, as the value accrued to date. It is self-evident that the person cannot perform the future actions promised; consideration of what might have been is clearly futile.

In other words, it is not the proper purpose of a company to make provision for events occurring after its insolvency. It is as misguided for a company to over-provide security for

its pensions promises as it would be to the company to create and fund a trust for the payment of dividends to shareholders to take place after the company's insolvency.

There is also an issue of equity among stakeholders to be considered. Favouring one class, pension beneficiaries, above all others, is inequitable. This holds true even if insolvency does not occur.

This raises some fundamental questions for both regulation and current practice. The specific questions arising range far and wide, from the trivial to the profound. They include valuation procedures taking present values of projected cash flows that arise after sponsor insolvency, to concepts such as the "self-sufficiency" of the scheme. The central regulatory themes of protecting beneficiary members and funding to reduce Pension Protection Fund exposure are deeply suspect, even though they may be well-intentioned.

A company should rightly be concerned with actions that continue or enhance its sustainability, which serves to the advantage of all stakeholders. As part of this process, honouring the due performance of its existing contracts and commitments is paramount. But not more.

The establishment of a trust to administer[4] the scheme raises further issues. The beneficiaries of an occupational pension scheme, current and past employees, are not the only members of the scheme. The employer sponsor is usually[5] the residual claimant to assets remaining after the discharge of all pension liabilities, and in this sense, it is also a member of the scheme having an interest in it, albeit of a different class. This means that the management objective of the trustees is compound. It is not simply to look after the interests of one class of member. In many regards, this is analogous to the standard situation of corporate finance, where creditors have fixed claims and the equity owners are the residual claimants. The most remote claimants, the equity owners, have the most control.

The analogy is also helpful inasmuch as, analogously with stakeholders and the assets of a firm, members have an interest in the trust, not in its assets. In this regard, the strategy of transferring and encashing DB pensions enabled by pensions "Freedoms" can be seen as a gross error of judgement. How could a company operate if its long-term creditors or equity

[4] It has become common practice to use the existence of trustees to delegate to them responsibility for certain discretions regarding the pension obligation, for example pension increases, as specified in the governing documentation. But the trustees do not, in any sense, own the resultant obligation.

[5] This is the norm, but not universal. There will be some pension arrangements where it is not specified in governing documentation that the sponsor is a beneficiary of residual assets. But it is grey, as there is legislation which provides for a refund to the sponsor if the assets are considerably greater than the value placed on the pension obligation, although that legislation has not been reviewed or revised for quite some time. Many UK pension schemes, after A Day in 2006 had, until 2010 (later extended to 2016), to preserve the refund rights of sponsors. The supporting legal argument for trustees to agree to retain such rights was that it kept the sponsor aligned with the future success of the scheme.

holders could help themselves to the company's assets at any point in time, at the sole discretion of those stakeholders?

It is also worth distinguishing between real risks, that is to say the factors which increase the pensions ultimately payable and those arising from the measure used to reduce those liabilities to a present value. The former include longevity, and wage and price inflation, and the latter, under current practice, market interest rates. Changes to the expectations of the former alter the true cost of provision, the contractual accrual rate. When valuation is conducted using the CAR, there is no interest rate risk.

Changes in the currently mandated valuation discount rate do not in and of themselves have to have cost implications. It is only when interim actions are based upon those valuations that this becomes the case. Unfortunately, solvency regulation, with its requirements for deficit repair contributions, operates in just such a manner. This is also true of cash equivalent transfer values – pensions freedoms have granted an attractive option to scheme members, which is integrally linked to the (actuarially utilised) discount rate. This is extremely costly to many schemes in the current environment[6].

However, the true risk exposure of the sponsor is determined at the point of execution of the pension contract. In this regard, it is analogous to the fixing of a coupon at issuance for a debt instrument. Any actions by the sponsor to limit or modify this risk subsequently may only be properly done at the sponsor's expense. Correctly, such actions should be conducted by and within the sponsor company, not the scheme.

A sponsor company may validly decide that it no longer wishes to bear the risk associated with its underwriting of the scheme, but in doing so, the costs incurred should be for its account, not members, not the scheme. Moreover, as these costs arise from a change in corporate risk preference or tolerance, they really should not be classified as pensions or even labour costs.

It is disappointing to see some trustees accepting broad limitations on deficit repair contributions. Indeed, the idea that a sponsor may limit its exposure in absolute terms is anathema to the very root of a defined benefit scheme. Once restricted, this is a defined contribution arrangement. In particular, it is inappropriate for the terms of new awards to contain elements of deficit repair; this would constitute subsidy of the sponsor's cost liability by members.

The setting of extremely low expected return rates in the pricing of new award contributions is one, perhaps subtle, way of doing this. It lowers somewhat arbitrarily the scheme CAR. The risk exposure of the sponsor is relative to this rate and the use of a low expected return both limits the sponsor's downside and increases their upside, to the detriment of beneficiary members. We should remember that the member's claim is fixed, if

[6] This may not be the case if the trustees either resort to commissioning insufficiency reports from the scheme actuary or using higher best estimates for expected investment returns. Few do, it seems as these practices are actively discouraged by the Pensions Regulator.

investment returns subsequently prove to be higher, there will be no participation by them in those gains.

The pricing of new awards involves the choice of terms which set a particular contractual accrual rate, and raises the question of what this rate should be. Obviously, it may take any value, depending on the generosity of the sponsor. There is one “natural” rate: the rate of return on the contributions that the sponsor expects to be able to earn. For a risk-neutral employer, this sets a nil value to the current price of its underwriting guarantee. Assuming that the investment returns available to the sponsor are similar to or above those available directly to members, this would be fair or equitable to them.

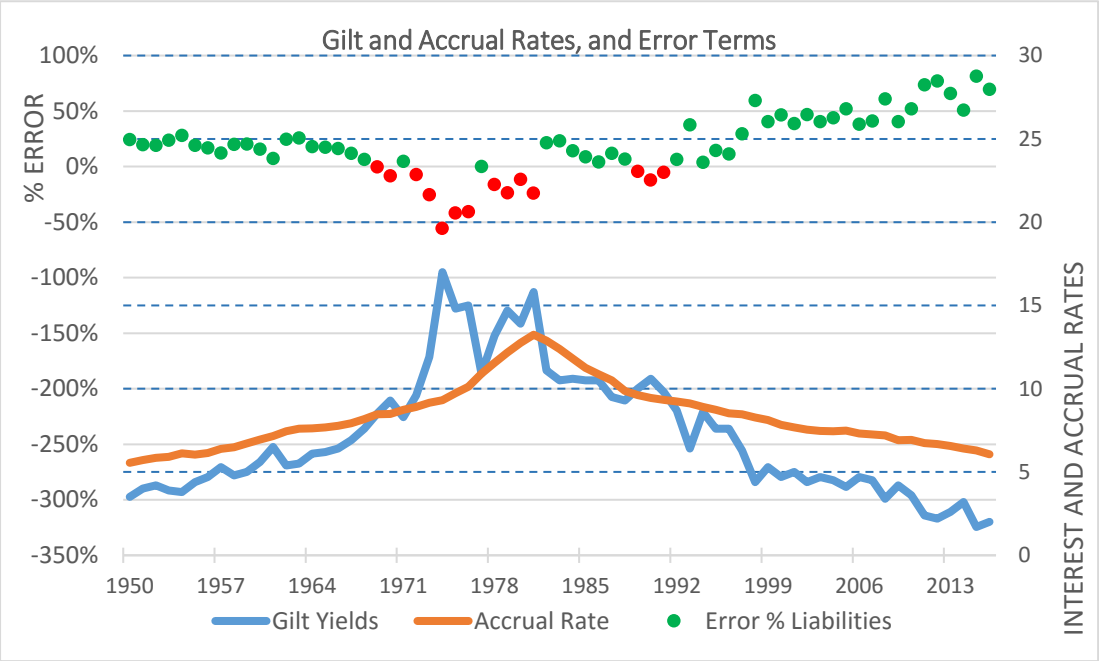
However, the scheme CAR will not equal the current expectations; it is a weighted average of outstanding prior awards which will have differed in value according to the circumstances prevailing at the times of award.

Clearly this “natural” or expectations CAR is related to one of the two Pensions Act specified methods of scheme valuation, which may be the expected return on assets. However, it is not quite the same. As noted earlier, the CAR for the scheme is a weighted average of all prior awards, while the expected return on assets is a valuation of all liabilities as if this rate applied to all of them; that is: the mandated approach is a counterfactual, not a representation of reality. Similarly, the alternate specified method, using a bond based rate, is also a counterfactual. Of course, if the assets held are all bonds, the expected return on assets and bond basis are convergent. This is an example of performativity at work and, in this pensions situation, has a profoundly negative form. A view which is unreal comes to dominate that which is true and fair.

The mandated methods are applicable in one particular circumstance, that is the valuation of a portfolio of liabilities for or on transfer. The most obvious of these is a bond based valuation of all liabilities such as transfer to the PPF or buyout through commercial bulk annuitisation. It appears that one of the motivations of the Pensions Regulator in promoting the use of these methods, and indeed over-funding more generally, is protection of the PPF. The Regulator is conflicted and operates to the detriment of schemes and their sponsors.

It should also be noted that even if a scheme follows an investment strategy which is bond based, the average bond yield on its portfolio of liabilities, its CARs, which have been acquired over time, will differ from the point-in-time value of the yield at valuation.

Diagram 8:



We show, as diagram 8, the evolution of the actual CAR for an open scheme, together with gilt yields and the error in valuation arising from the difference. Green circles are liability proportional overvaluations, and red under-valuations.

The descriptive statistics for these series are shown in table 2.

Table 2:

	Minimum	Maximum	Mean	St. Dev	S.D. Proportional
Gilt Yields	1.70	17.00	7.19	3.73	52%
Accrual Rate	5.55	13.24	8.36	1.95	23%

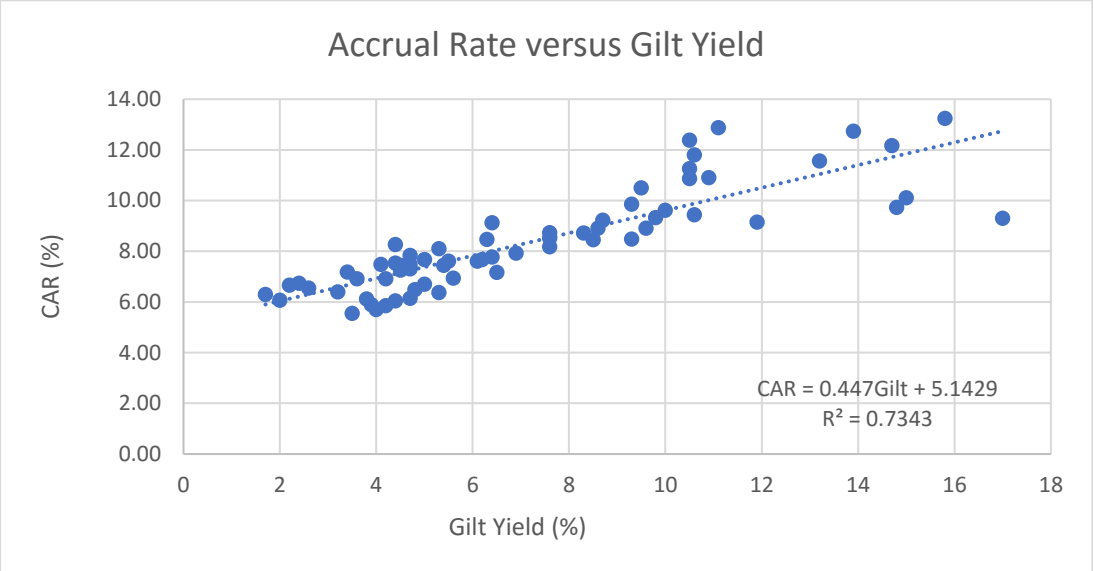
The stability of the CAR relative to gilt yields is pronounced. It should be realised that far from all of the variation of the CAR arises from explicit choice, and variation of the contribution rate. Much is due to the changing inflation experience, as well as changes in the wages, number and age of active scheme members. In addition, some arise from differences between longevity assumptions and subsequent experience.

It should also be realised that the terms of the CAR of a single year's award need not be rigorously set on the basis of the expectations at that point in time, as what matters for the overall scheme CAR is the position after that year's awards are included. Indeed, this was the root of the historic practice of setting contribution rates and allowing these to persist over many years. It also makes explanation of pension terms to active members much simpler.

Many have taken the weighted average nature of the scheme CAR as grounds for proposing an averaging over time of a gilt based discount rate. While this would have produced higher

discount rates than the spot value, against the background of steadily declining gilt yields which has prevailed for over 30 years, it does not appear that such averaging approaches yield better estimates of the CAR. We illustrate this in diagram 9 which shows the CAR and gilt yields, along with their linear regression[7].

Diagram 9:



It is evident that the relationship exhibits heteroscedasticity. The persistent problems with deficits that we have seen over the past decade or two arise from the fact that gilt yields have fallen, and liability present values risen, far faster than the scheme CAR – as is entirely expected due to the term average nature of this rate.

For a mature open scheme, the liabilities discharged in any year typically lie in the range 2.5% - 5% of the total undiscounted liabilities, with new awards typically giving rise to new liabilities with present value in a similar range. In other words, the extent of influence of the new award CAR over the aggregate scheme CAR is small. The process is extremely smooth even with relatively large movements in market opportunities and resultant return expectations. As illustration, consider a scheme which has a CAR of 10%, and now makes new awards for the current year at a CAR of 2%, then the new scheme CAR would lie in the range 9.6% - 9.8% (5% and 2.5% as above).

One of the most prominent issues with market prices is that they show variability which is an order of magnitude greater than this. Incidentally, this volatility phenomenon cannot be explained by economic or financial fundamentals. This is the “animal spirits” of J.M. Keynes.

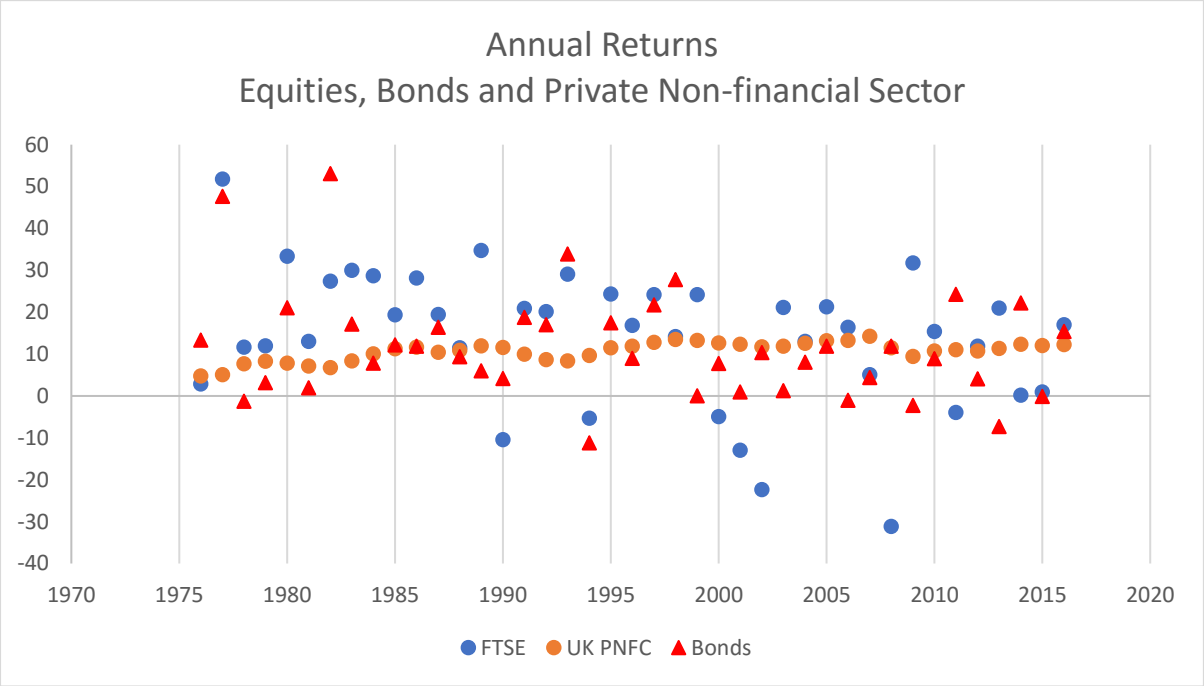
There is a related issue, the overlapping of investment returns. While the 25-year-old will share only one year of contribution membership and common investment return with the 64-year old, the 25-year-old will also share common investment returns over the full retirement period of that 64-year-old. The 25-year-old and the 45-year-old have far longer – an additional 19 years of active membership as well as the extended retirement life expectation. While this is irrelevant to the DB scheme member, as they have fixed defined

[7] Up to lag 50, no moving average regression improved upon a simple linear regression.

claims not exposed to investment risk, it is material in the case of hybrid arrangements such as collective DC, and important in determining the sponsor's exposure tenor.

By way of illustration of the variability of financial asset relative to corporate profitability, we show the investment returns of gilts and UK equities in diagram 10, together with the profitability of the UK non-financial private sector.

Diagram 10



There are no statistically significant relations between equity, bond or private non-financial sector returns. Of the three series, it is only the returns of private non-financial sector companies which exhibit autocorrelation and degrees of predictability. The first-order autocorrelation of the empirical CAR series shown earlier in diagram 8 averages 88%.

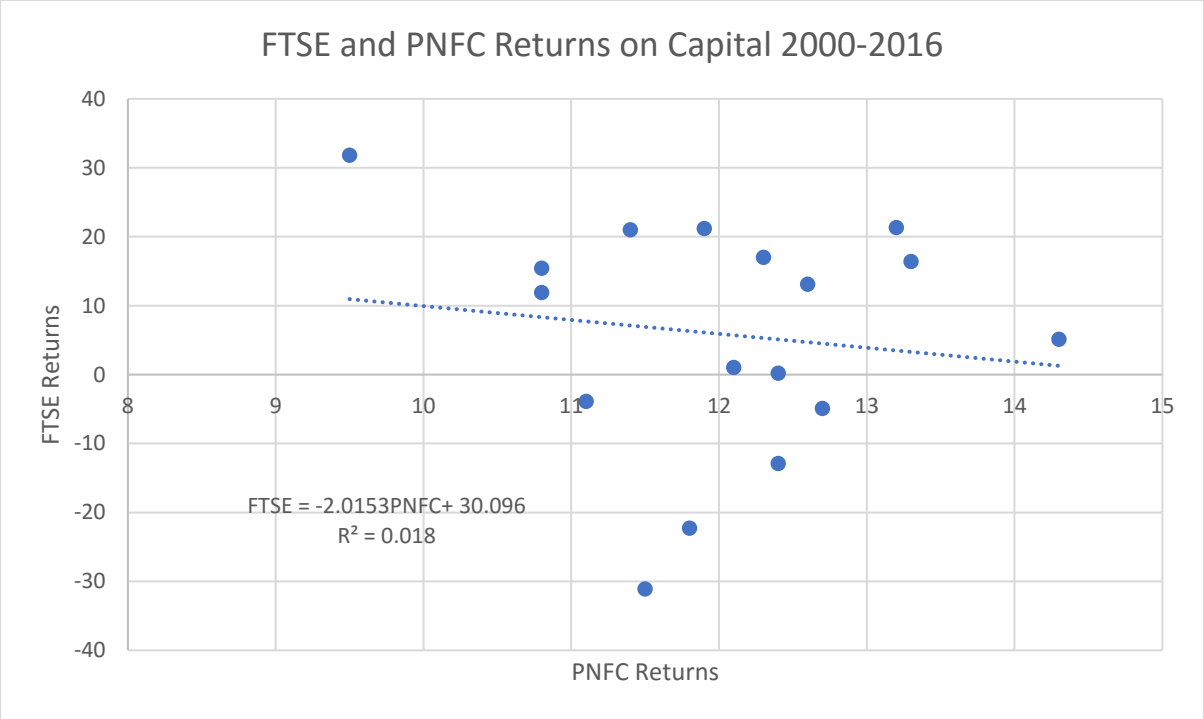
It is notable that for all the dependence upon long-term expected returns in the pension world, there does not appear to be any study of the relation between the estimate made and subsequent performance. By way of trivial contribution here, we will note that historically, in simple linear representations, today's gilt yield forecasts between 88% and 90% of the proceeding ten and twenty year returns from gilts. By contrast today's gilt yields forecast 85% of ten-year equity returns and just 75% of twenty-year. The experienced returns from gilts have been consistently below those expected from the acquisition yield as rates have declined, and convexity or reinvestment effects become relevant. By contrast, equity returns were markedly higher than gilt returns in the pre-2000 period, but have underperformed gilts subsequently. This result may be considered "predictable" given the rise of liability driven investment strategies and a pronounced and extremely substantial asset allocation shift from equity to bonds since 1995. Performativity at work again.

As expected, there is a weak negative relation between the profitability of the UK private non-financial sector and gilt yields, with lower yields being loosely associated with higher

Private Non-Financial Companies profitability. However, there is no relationship between equity returns and PNFC profitability in the post-2000 period, as is shown in diagram 11.

We are reminded of Warren Buffett's homily: *"the price you pay determines your rate of return."*

Diagram 11



Risks to Member Pensions

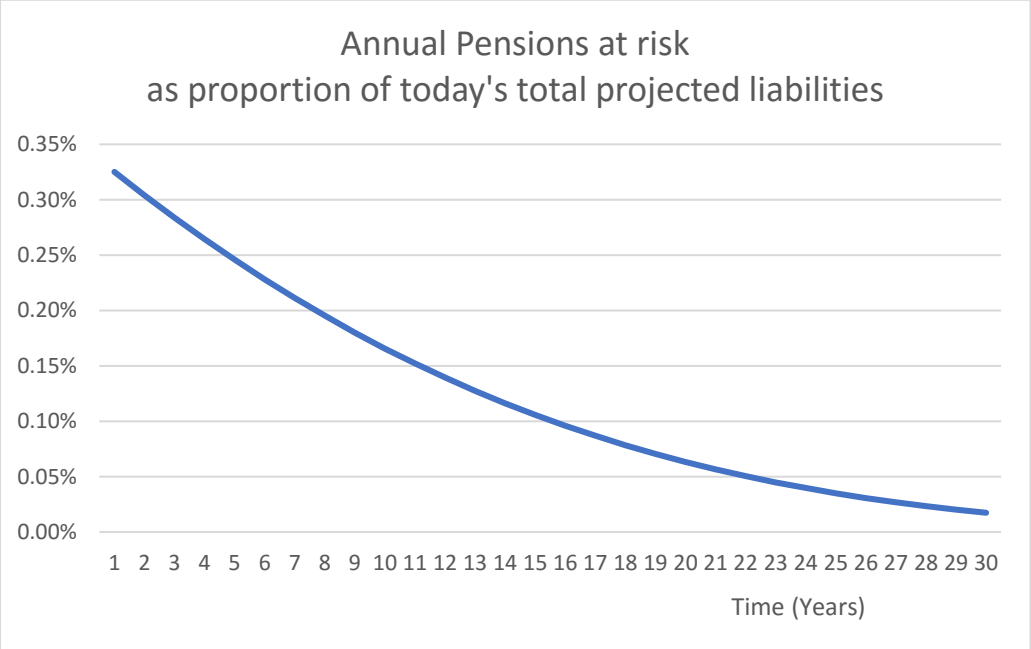
As was noted earlier, the sole risk faced by scheme members is sponsor insolvency. It should be understood that this is a comparatively rare event – in recent times the rate of insolvency of active companies has been just 0.4% p.a. The highest rate ever experienced was in the 1991/92 recession, when it peaked at 1.6% p.a. Companies are in fact more than twice as likely to cease trading through merger, acquisition or solvent liquidation than they are to fail insolvent.

The risk to the member is the product of the likelihood of the event and its consequence, the loss experienced given insolvency. If the scheme is funded to best estimate, where this best estimate is derived under the mandated methods, that is, valuing all liabilities using bonds or the expected return on assets, there is a 50% likelihood that the scheme will be unable to discharge all liabilities in a timely manner. The *Pensions and Lifetime Savings Association* (PLSA) consolidation studies are correct this far, but that does not mean that 50% of today's pension liabilities may be lost. On sponsor insolvency, the Pension Protection Fund enters the picture and it serves to limit the losses of scheme members to those arising from the PPF's "haircutting" of member benefits.

The most obvious way to protect members would be to have the PPF pay full benefits – the "haircuts" applied are unwarranted and the moral hazard arguments used to justify them entirely spurious.

In fact, as most schemes are closed to new members and future accrual, their liabilities are declining as the schemes are paying current pensions and not adding any new members. The result is a rapidly declining annual risk exposure to scheme members. This exposure is shown, for a typical closed scheme, in diagram 12. Its cumulative value is just 3.78% of today's liabilities. The PLSA consolidation proposal is built upon exaggerated and fallacious arguments.

Diagram 12



There is a discontinuity introduced by sponsor insolvency. The scheme no longer has the sponsor underwriting of the CAR to rely upon. The scheme crystallises in the sense that there are no longer any active members, only deferreds and pensioners in payment. The scheme should be funded to the level determined by the CAR. Any deficit to this level of funding is a proven claim in the insolvency proceedings.

The CAR is the required rate of return on assets needed to meet all payments; this is true both pre-and post-insolvency, when the scheme is funded to the CAR level. The sufficiency of assets, post- insolvency, is determined by the likelihood of achieving this investment return.

The current practice of calculating the cost of full buy-out, the s75 value, and making a claim based upon the deficit to this value breaches the fundamental English law concept of equity, and should be unenforceable in result.

The open question is whether funding to the CAR is likely to prove sufficient for the scheme to run-off without recourse to the PPF or buy-out. In some circumstances, such as applied in

the mid/late 1970s, this would have been the case. Indeed, there were extended periods then when full commercial buy-out could have been achieved with CAR-level funding. More recently, the full buy-out value lies far above the CAR value. After sustained periods of declining gilt yields, the CAR level of funding is likely to fall well short of buy-out values.

Concluding Remarks

The use of counterfactuals to value pension scheme liabilities renders the resultant figures totally unreliable as a basis for any scheme financial management decisions; further, this extends to regulatory policy and guidance based upon these values.

The use of counterfactuals introduces volatility and bias into valuations. The specific mandated counterfactuals also introduce entirely spurious risk factors into management concerns. This comes about because regulatory practice requires actions which are predicated on these values.

An entire cult of extra objectives has been developed for and by trustees; the Pensions Regulator has been the principal cheerleader for these developments. The duties of a trustee are to ensure current performance of accrued obligations, not to speculate over the future of the sponsor employer.

It is inappropriate for the management of a sponsor to condone any funding beyond that required under the terms of award of the pension. To do so, is inequitable to other stakeholders.

The idea of self-sufficiency, which has taken hold, is similarly flawed. It amounts to seeking to fund the scheme at or close to the levels at which scheme assets will be sufficient to buy-out liabilities with a commercial insurance company. This is far above that contracted by the company.

There is one possible justification for such behaviour on the part of the sponsor company: that it improves the risk profile of the company – which would, of course, benefit other stakeholders. It would require the investment in excess pension scheme funding to have a superior risk/return profile than the company. As we observed earlier, the average return on capital in the private non-financial sector currently far exceeds the expected returns of market-traded financial assets.

Clearly there is a wide distribution of risk and return profiles among the population of companies with defined benefit pension schemes, but even among those in distress, there is a problem. Provided the scheme is funded to the level of the CAR, the sponsor company in distress with limited resources, should utilise those resources in the furtherance of the continuity of the company, pursuing the well-being of all stakeholders, not increasing the security of any particular class.

Trustees should be wary of actions and statements which lead to the creation of expectations on the part of members, as they may be held liable if those expectations are not met.

All too much of the Pensions Regulator's guidance and practice is predicated upon the idea that member benefits accruing after sponsor insolvency should be met by the scheme and sponsor. All too much of the Regulator's guidance seems to be motivated by its objective of protecting the PPF.

This and the use of counterfactual valuations have led to the effective demise of private sector DB pension provision.

[i] The Insolvency Act 1986 only entitles preferential creditors to their outstanding salary (which also includes commission) for the four-month period immediately preceding the insolvency, and up to a ceiling of £800. You are also entitled to be treated as a preferred creditor for accrued holiday pay (up to six weeks) and certain occupational pension payments. Any additional amount you are owed (or relating to periods longer than four months) ranks as ordinary debt along with the bulk of other creditors.

The situation is a little more complicated. If there are insufficient funds to pay from the insolvent business, all is not lost. The individual can apply to the National Insurance Fund (NIF) for outstanding payments including salary, notice, holiday and redundancy pay. The NIF is operated by the Redundancy Payments Office and is the most useful first port of call in claiming outstanding payments, although the process can be complex and time consuming.

To qualify for NIF payments the employer must be insolvent and the employment needs to have terminated. The individual must also have done everything they can to get their payment, including applying in writing to their ex-employer for the payment within six months of the date their employment ended.

A claim to the NIF is also subject to ceilings. This includes a cap of £430 a week for unpaid salary up to a maximum of eight weeks; up to six weeks' holiday pay to a maximum of £800; and outstanding statutory notice, up to a maximum of £430 a week. An individual's statutory minimum notice is one week for every year worked, up to 12 weeks.

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