Discount Rates, Defined Benefit Pension Schemes, And Their Sponsors

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Foreword

Meta Commerce is a part of the Long Finance research programme managed by Z/Yen Group. The programme aims to identify and structure the critical questions underlying the long-term viability of the financial system.

Inspired by David Hilbert's 23 questions project of 1900, the Meta-Commerce programme brings together financial experts across a range of disciplines with a view to producing a framework of questions in order to prioritise future research and direct action.

By helping to identify a set of core questions that link economics, finance and society., and that need solving in order to have a working financial system., Meta-Commerce maps the road to Long Finance and contributes to its overarching goals - to expand frontiers, change systems, deliver services and build communities.

Three clear issues resonate through our various research areas and questions:

Fairness across different cultures — does fairness as a concept increase as wealth increases and, if not, what other organising principles for financial services could create desirable outcomes?

Trust across different cultures — what creates and destroys trust, where?

Value across cultures and time — what is the dynamic between value and price (which could be an expression of long-term and short-term concerns), and is value always higher than price?

Interlinking all three issues and money is the role of "credit creation in the modern economy". Long Finance seeks funding to develop a clear exposition of the choices society faces, the pros and cons of each choice, and a narrowing down to some probable outcomes – with some of the possible avenues being:

Leverage as usual — striving to return to ‘normal’;

No leverage — removing the ability of banks to create money, leaving overall levels of credit in government;

Strict leverage — setting some firm level of banking leverage, e.g. 1:1 or 8:1, as well as some overall leverage level in society – what mechanisms might exist to determine such;

‘Optimal’ leverage — attempting to find some form of equation or indicator that could be used as a measure and target (cognizant of Goodhart’s Law);

Abstract

This paper examines the way that discount rates are used for the evaluation and management of pension schemes. It proposes a method of discount rate determination which could be used for establishing the accrued value of the liabilities of the sponsoring employer (the contractual accrual rate (CAR)) which has particular merits for the management of Collective Defined Contribution schemes

Introduction

This is a long-discussed topic but one which remains unresolved. It is very much a dialogue of the deaf. The discount rate utilised is central to scheme evaluation and management, as may be judged from a simple experiment. If we value USS[1] using the discount rate applied by the government to the Teachers' Pension Scheme (cpi + 2.4%), while leaving all else the same, then the liabilities of USS have a present value of just £53 billion. This is comfortably below the assets held at the March 2020 valuation of £66 billion and even more so at year-end 2020, when assets were £80+ billion. In this latter condition, USS can be seen as one of the strongest major financial institutions in the UK, with assets at 150% of liabilities, and certainly not in need of the heavily publicised massive increases in new contribution rates, or cuts to benefits.

This brief first describes the role and function of a discount rate. It then proceeds to propose a method of discount rate determination not presently in use, for which the case will be made that this is the rate that should be used for the fundamental purpose of establishing the accrued value of the liabilities of the sponsoring employer. We refer to this rate as the contractual accrual rate (CAR).

The note continues by considering methods presently in use, such as those contained in the Occupational Pension Schemes (Scheme Funding) Regulations 2005 (OPS (SF) 2005). After this, it examines methods that were once utilised, such as cash-flow projections for both assets and liabilities. All are found wanting. Finally, it ends with a discussion of Collective Defined Contribution schemes, followed by consideration of some practicalities for the introduction of the CAR.

The Role And Function Of A Discount Rate

Functionally, a discount rate is a measure, albeit concerned with the time dimension. It reduces payments occurring at different future times to a common basis today. Accordingly, the IASB[2] statement of the principle that "the discount rate reflects the time value of money but not the actuarial or investment risk" is sound. For a pension liability, it should be the accrual cost of the liability, which defines the trajectory of the amount of that liability, from inception to discharge.

Invariance is a desirable characteristic of any measure if we are to have comparable results. In the case of pension liabilities, the rate would ideally be invariant over time. Time consistency in the discount rate would mean, all else being equal, that the liability amount calculated at a given date would be the same when derived by discounting future cash flows as when accruing from the original contributions or any intervening valuation.

[1] Universities Superannuation Scheme
[2] International Accounting Standards Board

It is notable that throughout the history of discounting, in pensions and more widely, the discount rates employed have been smoothed. This can be viewed as an implicit recognition of the undesirability of a volatile discount rate. Indeed, some interpret the CIPFA[3] based discount rate for UK local authority schemes as a smoothed rate to this day.

Using any externally sourced discount rate which varies over time will produce arbitrary costs or gains arising from the movement in the discount rate and not from any fundamental change to the projected pension benefits. If acted upon, this volatility can only be costly to the scheme. Variation of the discount rate amounts to variation in the timing of recognition of the amount of a liability; lower rates imply a more rapid recognition of the cost, even though the ultimate projected payments are themselves unaltered. The secular decline in interest rates which we have seen over the past 40 years, a process exacerbated by QE, has contributed more to the perception that DB schemes are unaffordable than any other source of variation.

The nearest that the IASB comes to recognising this problem is in an interpretations committee note dated 16th July 2013 which indicates that they should "revisit the paragraph relating to judgment (sic) as it should not change from period-to-period and should be consistent". It is rather more than judgment which, all else equal, should not change.

The choice of a discount rate is purpose-specific. For example, the discount rate appropriate for valuing the accrued pension obligations of an employer differs from that appropriate for estimating the replacement cost of those liabilities in a market. In this replacement cost case, the discount rate can and should vary with market conditions, but by contrast, the discount rate applicable to previously incurred pension liabilities should not.

The IASB encounters long-term financial contracts in a number of their standards. However, there is a lack of intellectual consistency in the methods specified for discount rate selection, which is evident in their various published '*basis for conclusions*' documents. To highlight just a few, IFRS 17 (Insurance Contracts) specifies that the initially chosen discount rate, which determines the amount of profit to be recognised over the life of a long-term contract, should, in the absence of contra-indicating experience, be held constant over the term of the contract. It is silent, however, on the manner in which that original discount rate should be chosen, and it can thereafter vary at each reporting date (but without affecting the rate of profit recognition).

IFRS 16 (Leases), in defining the liability for lessees under long-term leases, specifies that the lease payments shall be discounted using the interest rate implicit in the lease**.** It changes only if this is warranted by experience. In contrast to the IFRS pensions or insurance standards, where the rate is exogenous, this lease rate is endogenous to the contract.

The contractual accrual rate (CAR), which we propose for the valuation of pension liabilities, and discuss later, shares this endogenous property, and only varies if this is warranted by experience differing from the assumed parameters driving projections of future pensions payments e.g. increasing life expectancy.

The key insight here is that the discount rate is intrinsic to the contract, a rate of return which the employer company has implicitly agreed to pay. For a DB pension, this is the rate of return that the company has implicitly promised to underwrite on the contributions in order to discharge the liabilities

[3] Chartered Institute of Public Finance and Accountancy

on time and in full. In other words, it is the rate at which contributions and assets should accrue over time.

The discount rate specified in IFRS 19 for the valuation of employee benefits is the prevailing yield on high-grade corporate bonds at the time of valuation. The Occupational Pension Schemes (Scheme Funding) Regulations 2005 specify: "The rates of interest used to discount future payments of benefits must be chosen prudently, taking into account either or both

(i) the yield on assets held by the scheme to fund future benefits and the anticipated future investment returns, and
(ii) the market redemption yields on government or other high-quality bonds"

Clearly each of these formulations is flawed, as they are exogenous and time-variant.

The requirement for discount rates to be chosen prudently is also problematic. The parameters for the projection of the ultimate benefits are themselves required to be actuarially 'prudent' values. As a result, this introduces double counting, or more correctly, a compounding of prudential margins into the formulation. Any adjustment for prudence would ordinarily not be fixed and invariant, as the uncertainty which this reflects varies from time to time. Introducing such a variable element into a measure - the discount rate - is clearly undesirable. It is also interesting to note that the accounting standard calls for best estimates of both benefits parameters and the discount rate.

There is a related issue with the question as to whether the discount rate should reflect the sponsor employer's credit standing. Of course, the discount rate observed in markets for high-quality bonds would reflect the credit standing of their issuers. While it may be true that the value of the pension to members should take into account the likelihood of the sponsoring employer defaulting, that does not mean that the employer should also do this in their representation of their obligation. Reporting the value of a liability as being reduced because the employer may be unwilling or unable to service it in the future is completely inappropriate; that would be a fundamental breach of the basic principle of good faith in commercial dealings. The valuation is in any case of a 'going concern', not an insolvent enterprise. Discount rates should never be adjusted to reflect one's own credit standing in the estimation of one's own liabilities.

Even when valuing a member's pension claim for the member, it is inappropriate to make allowance in the discount rate for the sponsor's default likelihood. Again, this is because this would introduce a time-variant element to the measure. If it is desired to reflect the consequences and probability of employer default, this should be done by adjusting the benefits projections, taking account of any umbrella insurance like the UK's Pension Protection Fund

By way of ending to this section, we should touch briefly on the use of market values for liabilities. The simplest example would be the valuation of a corporate bond which is traded in public markets; the market price is observable. It is the value to the marginal buyer in that market, it is not a fair representation of the amount of the issuer's obligation. In the 2008 financial crisis, we saw a number of banks valuing their debt on the basis of the market price of that debt, when that debt was deeply discounted to reflect their perceived difficulties and likelihood of failure. This is a criticism of so-called 'fair value' accounting methods.

As pension liabilities are not tradeable, this is not an issue with DB pensions. There are sound public policy reasons for DB pensions to be untraded and inalienable. However, they should be and are transferable among schemes in the UK. This non-tradability means that we cannot observe their

"market value" to scheme members, among whom, as a heterogenous group, we should expect considerable variation.

The Contractual Accrual Rate

The rate which should be used for discounting or accruing pension liabilities is that rate that is endogenous to the contract. It is the required rate of return on the contributions made that will deliver the benefits projected under the award. We refer to this rate as the contractual accrual rate (CAR). This is similar in nature to the IASB's standard for lease liability valuation, IFRS 16. The rate is time consistent: at any given date, the amount returned by discounting will equal the amount arrived at by accrual from contract inception. For a fixed set of assumptions, with regard to the parameters that determine the projected benefits under the award, it is unique. Unless the experience with respect to these parameters (e.g. life expectancy) differs from that previously assumed, the rate is invariant.

Where experience differs from that assumed, its effect on the contractual accrual rate is typically small, of the order of a few basis points. Experience is of marginal impact on parameters, for example, one year in forty of wage growth or one year in 25 of post-retirement pension inflation. Of course, over time these marginal impacts may aggregate to substantial amounts, in the process of converging to the ultimate cost of the liabilities. These changes to the rate arise because of explicit differences in the true benefits ultimately payable. However, the volatility of the rate under existing accounting and actuarial funding standards combines both these changes and other changes to the discount rate due to movements in market yields.

By far the dominant influence in current actuarial and accounting practice is the variability of the discount rate - the market yield or expected return on assets. Both the asset portfolio and the liabilities exhibit similar high volatility under current practice. The ultimate benefits, however, do not possess the level of volatility attributed to them by current discounting practices.

As schemes mature, their ultimate liabilities are known with ever-growing certainty. This means that the volatility of the discount rate plays an increasing role in the overall volatility of the liabilities under current practice. The consequence of this is a wide range of more capital-intensive investment management strategies which are concerned with hedging effects due to the variability of the discount rate e.g. buying and holding gilts rather than growth assets. However, this is to hedge the measurement of risk (i.e. the impact of the discount rate), rather than the actual risk of the scheme.

For a scheme overall, the contractual accrual rate is the weighted average of its awards made over time and across members. It may be that awards are priced on the basis of the currently expected rate of (market) return on contributions, but the rate overall will be a long-run complex average of those awards. It will move only slowly, with new awards and new experience. It is possible that some elements of awards made as much as 70 years previously will contribute to this scheme average. We illustrate the mechanics of calculating the CAR for a scheme in Appendix A.

It is most unlikely that any two companies will have pension schemes with identical characteristics, which means that their CARs will differ. However, these differences are true differences and comparable e.g. they are due to the amount of contributions invested and the relative generosity or otherwise of the promised pension.

The CAR is independent of the way in which the liability is financed. In fact, this is a desirable property in the valuation of the obligations of a sponsor company. Values arrived at using the CAR are accurate, faithful representations of the accrued obligations of the sponsor company.

Financing And The Pension Fund

This basic point, of independence of a liability from its financing, has been largely lost in the discussions of discount rates that have occurred over the past 20 or so years. The liability is fixed in amount (for a given set of pension projection parameters), and though we may finance this in a range of ways, this financing does not alter the amount of the liability. Different methods of financing would, though, alter the burden on the sponsor company of discharging this liability.

If we are using any discount rate other than this contractual accrual rate, we are producing counterfactual values for the employer's liabilities. For example, the expected rate of return on assets does not return an accurate estimate of the present value of a scheme's liabilities. The expected return on assets does not inform us as to the employer's liability, but it does, when accurate, inform us as to the expected sufficiency or otherwise of the existing assets in meeting the scheme's liabilities without further recourse to the sponsoring employer.

The deficiencies of this method become obvious with the question: "*What rate would be appropriate for an unfunded scheme (like the Teachers' Pension Scheme)?*" Moreover, if the scheme reports a notional deficit when using such a rate, it simply means that the sponsor employer is faced with a shortfall, but as it is one which is derived using that rate, the sponsor is also exposed to further accruals of the notional deficit at that rate.

Of course, the expected return on assets is subject to management choice as to the riskiness of the assets held; and there is an incentive to choose risky assets since these may be expected to deliver higher returns in the future, which would have the effect of lowering today's valuation and deferring costs.

Recently the actuarial practice has emerged of using two distinct discount rates for different classes of members. Typically, this consists of a relatively high rate (based on so-called growth assets) for active and deferred non-pensioner liabilities and a lower rate, usually close to gilts, for pensions in payment. Both are chosen exogenously. This is central to the UK Pensions Regulator's proposed new DB funding code. The argument used to support this is that different investment strategies are being followed, growth assets for the actives and bonds and gilts for pensioners in payment.

This is a fallacious argument in that it may be true that these asset allocation strategies are being followed, but the amount of the liabilities is independent of how those liabilities are financed. The amount of the liabilities, whether calculated by the accrual of contributions or discounting of the projected pension payments, and the implicit discount rate are determined by the terms of award. It is a rate determined by the sponsoring employer – the contractual accrual rate.

The Pensions Regulator's central approach in the proposed new DB funding code is to focus on the fund and not on the cost to the sponsor employer. Its concept of low-dependency on the sponsor and low-risk, low-return assets is entirely misconceived. It is perhaps not widely understood that a reduced dependence on the sponsor employer requires both overfunding on a very large scale and investment of those assets in low-risk, low-return assets. This concentrates risk in low-risk, low-return assets (e.g. government bonds), and misallocates capital from growth in the real economy, as ever more of these gilts need to be held to satisfy regulatory requirements.

As this basic point of the independence of a liability from its financing has been largely lost in the discussion of discount rates, it is worth restating it. The CAR liability is fixed in amount (for a given set

of pension projection parameters), and though we may finance this in a range of ways, this financing does not alter the amount of the CAR liability.

Purpose Of The Fund

It is as well to begin with a little history. Prior to the passage of the 2003 Debt on Employer legislation in the UK, occupational defined benefit pension schemes did not have, should shortfalls arise, any effective enforceable claim on the sponsoring employer. At best, it was arguable that custom and practice had led expectations to harden to enforceable member rights.

The waters were muddied by the inter-positioning between sponsor employer and scheme member of a trust to administer the scheme. The trust arrangement has its origins in the 1921 Finance Act, and the tax concessions from which schemes benefit when HMRC authorised. Among other things, this arrangement leaves the scheme member at one stage removed from the employer; it would be for the trust not the member to seek remedy for any employer delinquency.

Notwithstanding this situation, it is notable that the UK accounting standard FRS 17[4] which was originally published in 2000 but only fully effective in 2005, after a long transition period, required the disclosure of scheme deficits on the employer balance sheet. The origins of the international standard, which also requires recognition of deficits by the employer, were even earlier. "The Board's predecessor, the International Accounting Standards Committee (IASC), approved IAS 19 Employee Benefits in 1998, replacing a previous version of the standard. IASC developed the revision of IAS 19 in 1998 following its consideration of the responses to its exposure draft E54 Employee Benefits published in 1996."[5]

In this situation of no recourse other than moral suasion, it was reasonable to consider solely the fund as the source of payment for pensions. In this view, the assets, and the fund assets alone, are being held to pay the pensions when due in full and on time. Against that background, the use of the expected return on assets as the discount rate has a certain appeal. Adequacy of the fund to deliver the benefits was then the central issue.

The assets had a secondary value as collateral security for the accrued liability, should the scheme sponsor become insolvent and the scheme close and enter run-off. The valuation method for assets with these different purposes may or should also differ. Clearly today's market values are appropriate for the collateral security role. However, today's market values of assets may be entirely irrelevant with respect to their future role in paying pensions.

For equities, financial theory looks upon market values as being the discounted present value of the future cash flows, but the implicit discount rate in that construction is unobservable, as the cash flows are themselves only projections. Several empirical academic studies suggest that the rate here is both high and hyperbolic.

Historically, it was common, for solvency evaluation, for both the assets and the liabilities to be treated as present values of their projected cash flows. These projected cash flows were then reduced to present values using a common discount rate. The values derived in this way for assets held could and did diverge markedly from their market values. This undermined the value of the fund as collateral. An argument for this approach, although flawed, was that the solvency ratio derived in this

[4] This standard (FRS17) was replaced by FRS 102 in January 2015

[5] International Accounting Standard IAS 19 Employee Benefits, Basis for Conclusions, June 2011, IFRS Foundation

way was proportionately correct, if inaccurate in monetary terms. Unfortunately, the correct analysis for the long term, under conditions of risk and uncertainty, is that the discount rate applied to assets should increase relative to the instantaneous rate, while that for liabilities should decrease. In other words, two different rates are applicable, and they relate to the absolute and relative levels of long-term risk of respective benefit estimates and asset cash flows.

The rapid acceptance of the application of market prices for assets owes much to the timing of when this approach was being advocated. In the late 1990s and early 2000s the market values of equities were highly inflated, dividend yields were low, and the abolition of the advance corporation tax credit in 1999 should have created a 20% decline in the value of UK equities were they to be valued by these cash-flow methods. Assets valued in this way were much lower than their market prices. The move to market prices was one where this flattered the balance sheet of pension funds, and by extension allowed corporate sponsors to "unlock" these supposed surpluses through reducing their payments to the scheme during "pension contributions holidays".

Returning to the mainstream of this note. We are interested here principally with the valuation of the promises as made by the sponsoring employer. We are concerned to establish what the company must pay in the absence of any further consideration. This should also be an input to the scheme; it is the value with which assets should be compared for the purpose of solvency calculations.

The role of the fund has changed from its historic role as the source of finance from which pensions are paid. First, the asset portfolio serves to defray the employer's costs of producing the projected pension benefits and second, to serve as collateral security for members in the event of sponsor insolvency. In this situation it is entirely appropriate to value those assets at market prices.

On insolvency, the value of assets at market prices is relevant to scheme members; this will determine the pensions they can then buy elsewhere in the market (although in practice most will transfer to the Pension Protection Fund). There is no reason to believe that, even if a scheme is fully funded at insolvency, these assets will be sufficient to buy replacement pensions in the market. However, the employer sponsor has fulfilled its obligations and there should be no claim on the insolvent estate of the firm.

There is considerable confusion as to the obligations of the sponsor with respect to funding levels, to which we shall return later.

At insolvency in the UK, it is relevant to consider the market replacement cost and a variant on that, the Section 179 value, the market cost of PPF[6] benefits. These are a reduced set of benefits relative to those originally proposed by the employer sponsor. Here, the discount rate should be that which would be applied by a bulk annuity insurer offering equivalent benefits.

Financial Economics

The efficient markets hypothesis (EMH) has proved extremely popular among academics in large part because of the strength of its conclusions, and its analytical appeal in abstracting out much of the noise and complexity of the real world. In turn, this has led many actuaries and analysts to conclude that their interpretation of this approach should be adopted for DB scheme evaluation. These are advocates of a 'risk-free' discount rate – usually proxied by a government bond yield of equivalent duration.

[6] Pension Protection Fund

This is a highly imperfect proxy, though gilts are by convention default-risk free, but they are risky inasmuch as their prices and yields vary with the whims of capital markets. Contrary to the beliefs of some, discounting some liability with a particular rate, in this case 'risk-free', does not impart the properties of that rate to the object being discounted. Using a 'risk-free' discount rate does not mean that the value returned is the risk-free value of the pension, it is, perversely, simply an inflated value which remains subject to the default prospects of the sponsor.

There are in fact strong empirical indicators that capital markets do not exhibit the characteristics which follow from the EMH. These discrepancies have been known for a very long time, for example, that the prices of equities are four or five times more volatile than could be expected based upon dividend and earnings information. The EMH is also subject to theoretical challenge.

The underpinnings of the EMH are homogenous and rational expectations. But as Keynes is reputed to have observed: *"Markets can remain irrational longer than you can remain solvent"*. In a series of papers, Jouini and Napp[7] have investigated many of the arguments and processes for convergence of heterogeneous and irrational beliefs to the homogenous and rational.

The abstract of their most recent paper, "Live fast, die young", sets out the argument for the EMH: *"Irrational agents are driven out of the market. This should favour learning: Irrational agents observing that rational agents are being more successful should adopt rational beliefs."*

and then shows that:

"…the threat of elimination is not sufficient to push agents toward rationality: A shorter "life" might be more rewarding than a longer one. Even if they are eliminated in the long run, irrational agents might rationally stay irrational in the sense that their ex-ante and ex-post welfare levels over their whole life are higher than (1) the welfare level that they would reach if they adopted rational expectations, (2) the welfare level reached by the otherwise identical (same initial wealth and same risk aversion) rational agents, (3) the welfare level that they would have if they were given the optimal allocation of the rational agent.

Threat of elimination is not sufficient to push irrational agents toward rationality, and rational and surviving agents' performances are not sufficiently high to generate learning through an adaptive process based on imitation of successful behaviours."

In an earlier paper, Jouini, Malamud and Napp caution that elimination from the market does not imply that these players will not have had an impact on prices.

The EMH is sometimes expressed in terms of informational efficiency, that market prices reflect all available information but, as was shown by Grossman and Stiglitz in 1980, when information gathering is costly, markets cannot be informationally efficient.

The Pensions Regulator (TPR) is rather fond of quoting the adage: "There's no such thing as a free lunch". That, of course, is a lay description of arbitrage-free pricing, and the academic 'Fundamental Theorems of Asset Pricing' (See Box 1).

[7] Cvitanic J, Jouini E, Malamud S & Napp C 2010 *Financial Markets Equilibrium with Heterogeneous Agents* https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1568701

Box 1 Fundamental Theorems Of Asset Pricing

In a discrete (i.e. finite state) market, the following hold:

1. **The First Fundamental Theorem of Asset Pricing**: A discrete market, on a discrete probability space (Ω, *F, P*) is arbitrage-free if, and only if, there exists at least one risk neutral probability measure that is equivalent to the original probability measure, *P*.
2. **The Second Fundamental Theorem of Asset Pricing**: An arbitrage-free market (S,B) consisting of a collection of stocks *S* and a risk-free bond *B* is complete if and only if there exists a unique risk-neutral measure that is equivalent to *P* and has numeraire *B*.

In more general markets: When stock price returns follow a single Brownian motion, there is a unique risk neutral measure. When the stock price process is assumed to follow a more general sigma-martingale or semimartingale, then the concept of arbitrage is too narrow, and a stronger concept such as no free lunch with vanishing risk must be used to describe these opportunities in an infinite dimensional setting

The theory here is that by applying no-arbitrage conditions to prices that are observable in the market and adopting replication strategies, we may determine other prices that are not. This approach has driven the pricing of most derivative instruments - in complete markets, arbitrage-free pricing can be used to uniquely determine a price for any instrument. Replication is achieved through the use of gilts and cash. However, markets are far from complete, in which case this approach can only deliver bounds on those prices.

It is notable that the expression of discount rates in Gilt relative terms, Gilts +margin, which is favoured by TPR, originated in the derivatives markets, where these replication strategies dominate. It may be that we could derive a price for an untraded unobservable pension fund using gilts and cash, but that price would be a market price, and that is not the sponsor employer's cost of production of that pension. It is possibly, but only possibly, the value to a scheme member.

Notwithstanding these fundamental criticisms, much actuarial and financial analysis, and the majority of that for UK DB schemes, is still done within this framework.

Let us be clear, using a government bond yield as the discount rate will simply produce a counterfactual valuation – one which is biased towards inflated liability values and which will volatile over time.

Risk and Funding Levels

When the pension fund serves as collateral security for the accrued liabilities of the sponsoring employer, valuation of the assets of the fund at market prices is appropriate. This is an instantaneous snapshot of the status of the scheme. Full funding of the scheme would consist of the assets equalling the accrued liabilities. This may or may not be sufficient to buy-out those liabilities in the marketplace.

Somehow, the idea that the fund should be sufficient to buy-out liabilities at their replacement cost has taken hold. It is given a specific presence in the claim made in insolvency (the Section 75 value) which is based upon the replacement cost net of the fund's assets. This is again entirely misconceived. The sponsoring employer did not offer or contract for a 'pension or its replacement cost at all times during its life', merely a pension.

TPR has very strong incentives to demand over funding of the scheme; in particular since this would benefit the Pension Protection Fund. As the statutory duty of TPR is to minimize recourse to the PPF, the accelerated over-funding of DB schemes minimises the political risk of TPR. This can be done by inflating the level of liabilities and requiring funding to these levels, or by requiring funding in excess of the employer's accrued liabilities at CAR. This idea has found substance in the Regulator's proposed DB Funding Code as the concept of low dependency on the sponsor, which would be little more than funding at close to a market replacement cost.

The interdependence of the funding level and the riskiness of the assets making up that funding warrant illustration. Consider a scheme whose projected benefits, with a discount rate of CPI +2.4%, have a present value of £53.27 billion, and £99.92 billion with a discount rate of CPI -0.69%. Note first the huge relative cost of this low dependency portfolio. With these valuations 38.74% and 72.67% respectively of the ultimate liabilities payable over the next 80 years, which total £137 billion, are covered.

Suppose then that an asset portfolio of £53.27 billion has an estimated annual volatility of 12%. We can then observe that any volatility of assets greater than 6.4% in the low dependency £99.92 billion case will result in an increase in dependency on the sponsor from this source. If we then consider the decline in annual accrual arising under the two discount rates, which falls from £1.97 billion to £0.57 billion in the low dependency case, we see that any portfolio volatility in excess of 7.8% will result in an overall increase in dependency on the sponsor. And this "de-risking" has been achieved at a cost of £46.65 billion, a near doubling of the sponsor employer's cost of producing these pensions.

The Contractual Accrual Rate

This is the rate of return required on the contribution made necessary to achieve the projected benefit ultimately payable. We preface this description of the CAR method, with the comments made by the actuary, Derek Benstead.

"As discount rates have been progressively reduced over the past 20 years, the funding target set in actuarial valuations has been set progressively higher. Pension schemes don't have a problem of persistent deficits. The improvement in funding achieved over the years has been hidden because the funding goalposts have been moved further away at each valuation.

The major advantage of the [CAR method] advocated here is the fixing of the goalposts. The contribution to benefit accrual implies a discount rate which values the benefit awarded at the contribution paid. The premise is a simple one. These are the terms on which the benefit was awarded and contributed to, so these are the terms on which we should judge progress since then.

Had we used this method down the years, we would have a better understanding of how pension schemes have actually fared down the years since the original funding plans were made."

In this and various other documents we have described the contractual accrual rate (CAR) of a DB pension award as that rate of return required to equate the contribution made with the projected benefits payable under that award. The contractual accrual rate of a scheme is the weighted average over time and members of these rates. This is the rate implicitly guaranteed by the sponsoring employer.

As pensions are paid, the contributions which they reflected must be amortised. This means that to estimate the CAR of a scheme using the historic records of contributions and awards could be a

complex and tedious exercise, and for many schemes would not be feasible given the quality of their records.

However, we may exploit the required return on assets property to establish the current CAR of a scheme. If we take the current market value of assets and the associated projected benefits, we may establish the rate of return on those assets now needed to discharge the liabilities, and use this proxy, at the current time and going forward, as a substitute for the historic CAR of the scheme. Given the secular decline in interest rates and return expectations over the past forty years, the CAR estimated in this way would be lower than the historic CAR. This would mean that scheme members were advantaged in the sense that they would have higher collateral security values than would have been the historic case. It would also satisfy one of the Pensions Regulator's current desires, lower dependency on the sponsoring employer. As this proxy CAR is lower than the historic CAR, so too is the dependency on the sponsoring employer.

Appendix A contains an illustration of the calculation and use of the contractual accrual rate.

Collective Defined Contribution (CDC) Schemes

With no explicit guarantees, CDC schemes are not an obvious situation where application of the CAR is appropriate. However, the contribution and the target benefits promised determine the evolution over time of a member's equitable interest in the scheme. A member's equitable interest defines their claim on scheme assets (as a proportion of all equitable interests) and with that transfer values. Moreover risk-sharing among members operates on the basis of variation among members in their equitable interests.

As newly created schemes, CDC arrangements will not encounter the difficulties of historic legacy records faced by seasoned DB schemes and can calculate and report their true CAR from inception. Using the CAR would mean that the volatility of the funding ratio of CDC schemes is close to that of their asset portfolios. By contrast, using an exogenous rate, such as the expected return on assets, is certain to create inequities among, and costs to, members over time. These are the costs borne by the sponsor employer in traditional DB.

Conclusion

This note has shown that the demise of DB pension provision over the past three decades is a self-inflicted wound. Misguided regulation has transformed misperceptions into reality. We have offered an approach, the use of the contractual accrual rate, which holds the prospect of halting further declines in DB provision. We have touched on a number of other ancillary contributory issues.

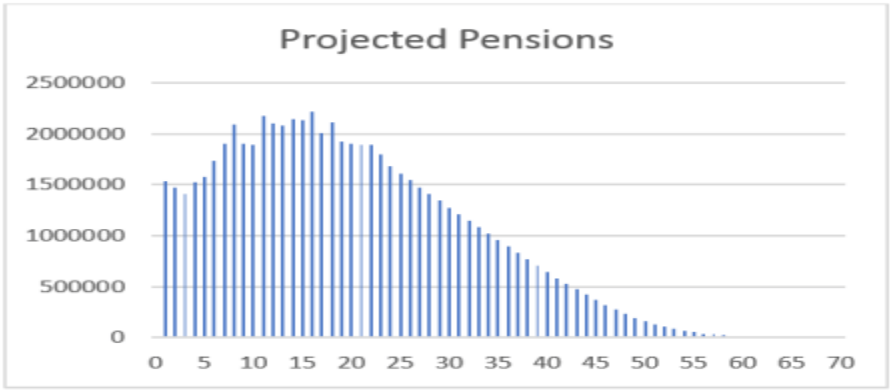
The environment in which this decline took place, and which enabled it, has changed from the neo-liberal shareholder capitalism of the 1990s and 2000s to today's stakeholder capitalism where environmental, social and governance issues are becoming paramount. The benign demographics of those earlier decades are giving way to the much more problematic demographics of an aged society. The integration of the labour forces of China and Eastern Europe into the global labour force is now largely complete, and with that we may expect less downward pressure on the returns to labour. Against this background, and given the deficiencies of individual DC as a retirement income, we expect demand to grow for collective DC schemes. It is important that we do not inflict the same misperceptions on these that we inflicted on DB. The Dutch experience in this regard is an almost perfect guide as to what not to do.

Appendix A

Illustration Of The Calculation And Use Of The Contractual Accrual Rate

We shall take an illustrative open scheme as our pedagogic example. This has assets of £25,853,771, which we shall consider as our contribution proxy and projected liabilities totalling £67,181,556, which are distributed over the ensuing 70 years as illustrated in figure1. The CAR is 6.1%.

Figure 1



Although this scheme is open, we consider first the situation with no new awards in the first year. We show, first, the development of scheme liabilities at Table 1. There are no revisions to the projected benefits in this illustration. The accrual shown is the increase in the present value of liabilities, at the CAR rate, due to the passage of time.

Table 1		
	Amount (£s)	Note
Opening Liabilities	25,853,771	
Accrual	1,577,080	at 6.1%
Pensions Paid	1,537,896	
Closing Liabilities	25,892,955	

Next, we consider the income and expense position and the evolution of assets as Table 2. We introduce the asset portfolio income (3.4%), from dividends and bond coupons received, as well as the mark to market gain in asset prices. We see that the scheme is cash flow negative, relying on the sale of assets to pay pensions. This would be the position if the scheme were closed.

Table 2		
	Amount (£s)	Note
Investment Income	879,028	at 3.4%
Pensions Paid	–1,537,896	
Net Operating	–658,868	
Opening Assets	25,853,771	
Gain / Loss	491,222	1.9% Mark To Market
Net Operating	–658,868	
Closing Assets	25,686,124	

The solvency position is shown in Table 3. Unsurprisingly, there is a deficit as the asset performance (3.4%+1.9% = 5.3%) is less than the contractual accrual rate of 6.1%.

Table 3	
	Amount (£s)
Assets	25,686,124
Liabilities	-25,892,955
Solvency	99.20%

The scheme was, in fact, open to new members and future accrual. The stand-alone characteristics of the new awards are shown in Table 4. The assumptions driving the projected values for benefits are the same as those used for the historic scheme.

Table 4	
	Amount (£s)
Contributions	733,296
CAR	4.20%
Benefits Added	2,706,706

The lower than historic CAR (4.2% vs 6.1%) on the new contributions and liabilities added will reduce the scheme CAR marginally. Table 5 presents the asset position.

Table 5	
	Amount (£s)
Investment Income	879,028
Pensions Paid	–1,537,896
Contributions	733,296
Net Operating	74,428
Opening Assets	25,853,771
Gain/Loss	491,222
Net Operating	74,428
Closing Assets	26,419,420

Next, we consider the liabilities scheme as a whole, including the new awards in Table 6, and Table 7 shows the solvency position of the scheme.

Table 6		
	Amount	Note
Opening Liabilities	25,853,771	
Accrual	1,577,080	at 6.1%
Pensions Paid	–1,537,896	
New Liabilities	733,296	
Closing Liabilities	26,626,250	
New CAR	6.03%	

Table 7	
	Amount (£s)
Assets	26,419,420
Liabilities	-26,626,250
Solvency	99.22%

We now consider a further year in which contributions were made and new liabilities added. The contributions and liabilities added are shown in Table 8.

Table 8	
	Amount
Contributions	782,182
CAR	4.19%
Benefits Added	2,873,610

Comparison of these statistics with the earlier Table 4 shows a substantial increase in both liabilities and contributions, though the new awards CAR is almost unchanged. The cause of this was higher than expected salaries for new recruits and greater than predicted increases for existing actives. This led to a decision to revise the assumptions for the existing benefits to be consistent with those applying to the new awards. We shall return to this later, but first will address the income, expense and asset position, as Table 9.

Table 9		
	Amount (£s)	Notes
Investment Income	924,680	at 3.5%
Pensions Paid	–1,475,281	
Contributions	782,182	
Net Operating	231,581	
Opening Assets	26,419,420	
Gain/Loss	1,400,229	5.3% MTM
Net Operating	231,581	
Closing Assets	28,051,230	

The revaluation of projected benefits shows these to have a total extra cost of £ 861,694 and the CAR of the scheme rises to 6.13%. Table 10 shows the liability position of the scheme and the solvency position of the scheme is shown in Table 11.

Table 10		
	Amount	Note
Opening Liabilities	26,587,066	At 6.13%
Accrual	1,629,787	at 6.13%
Pensions Paid	–1,475,281	
New Liabilities	782,182	
Closing Liabilities	27,523,754	
New CAR	6.08%	

Table 11	
	Amount
Assets	28,051,230
Liabilities	-27,523,754
Solvency	101.90%

These illustrations have shown how the contributions-based CAR may be proxied by the required return on assets and shown it in practice for a closed scheme, an open scheme, and an open scheme with revisions to the projected benefits.

They also demonstrate the low natural variability of the correct discount or accrual rate. The changes which do occur all arise from real-world changes to the benefits offered by the scheme. They are not changes in liability present values arising from arbitrary changes in the discount rate.

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