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SESSIONAL PAPER

Collective Defined Contribution (CDC): the route to effective pension scheme design

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Abstract
This paper has been prepared by the IFoA's Collective Defined Contribution (CDC) working party. The purpose is to raise awareness within the actuarial community and pensions industry on the wide range of design options and considerations for CDC solutions, together with a set of principles for the design work, which we believe should apply in most cases. This should also aid understanding of why different designs are better in different circumstances, and why some designs might have certain features that others would avoid.

1. Introduction

TPR has authorisation criteria for assessing applications for new Collective Defined Contribution (CDC) schemes (The Pensions Regulator (TPR), 2022). One of these is "sound scheme design", which must be demonstrated in a trustee viability report.

There is no widely accepted blueprint for the optimal CDC design. There are many options, and the design ultimately chosen by a provider should depend on the specific objectives the solution is seeking to meet. In this paper, we first consider a set of principles for the design work that are likely to apply in most cases. In Section 3, we then consider each key design aspect, the options and high-level implications.

Unless specified, the contents apply to both whole-life and in-decumulation CDC solutions. We have focused on actuarial design features that have direct and significant impacts on members' benefits. We have not considered broader areas of scheme design such as the detailed investment strategy, communication strategy and governance.

1.1. What is CDC?

This paper is not an introduction to CDC. For readers new to the topic, the following links provide more information:

https://commonslibrary.parliament.uk/research-briefings/cbp-8674/–
https://www.wtwco.com/en-gb/solutions/services/collective-defined-contribution
https://www.aon.com/unitedkingdom/retirement-investment/defined-contribution/collective-defined-contribution.jsp
https://www.abrdn.com/en-gb/institutional/insights-and-research/is-cdc-the-future-of-uk-pensions

CDC can be defined in different ways. For this paper, we consider CDC solutions to be any pension solution that meets the following minimum criteria:

- Defined contributions (i.e. no potential additional liability on the employer or any other party in relation to past service). Future service contributions can be of any form and may vary over time, for example, to reflect changes in the expected value of new accrual.
- Benefits that will vary over time due to scheme experience and changes to estimates of future experience.
- Pooling of longevity risk across the membership.

CDC schemes may also pool investment risk, but we see this as an option rather than a condition of CDC.

2. CDC Design Principles

There are many design options for a CDC solution, and the design ultimately chosen by a provider should depend on the specific objectives that the solution is seeking to meet. There are, however, some principles for the design work that are likely to apply in most cases.

(a) Ensure there are clear design objectives from the start
   - The design objectives will be your main guide for choosing between design features.
   - A desire for defined contributions (i.e. stability of cost for the employer/purchaser) and provision of an income for life (other than through individual insured annuity purchase) points to consideration of CDC options.

(b) Keep it simple
   - Keep the design as simple as possible, for ease of operation, understanding and communication.
   - Weigh up the pros and cons of potential complicating factors and include them in the design only if the scheme materially better meets its objectives as a result.

(c) Compare the design with existing pension options
   - The new offering would be worthwhile only if it meets the design objectives better than existing options.
   - Depending on the route to market, the bar may be higher than this, for example, a new open market in-decumulation solution needs to be materially better than existing options to successfully build scale.

(d) You will have to make compromises
   - No design will perfectly meet all the objectives without some downsides.
   - The chosen design should instead strike a balance between different trade-offs, while ensuring there are no unacceptable consequences of the design.
   - If there is no design that achieves this, the objectives will need to be revisited.

(e) Be deliberate when "designing in" cross-subsidies
   - The design must be "fair", based on a sensible definition of fairness.
   - Designs should feature only those cross-subsidies that are required to meet the objectives of the scheme and clearly justifiable as fair to all stakeholders.
   - Based on our definition above, all CDC schemes would have longevity cross-subsidies (i.e. those who live longer would be paid income for longer), which makes them distinct from individual defined contribution (DC) pension schemes, but only some would have significant cross-subsidies in investment experience or actuarial values of accruing/purchased pensions.
   - Careful consideration should be given to how best to communicate any designed cross-subsidy to stakeholders.

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(f) Analyse the reaction of benefits under the design to changes in circumstances (i.e. via modelling)
- The scheme's reaction to changes in circumstances must be analysed through scenario testing and other modelling such as stochastic as appropriate, to check the design meets the objectives, reacts sensibly to change and meets the other design principles.
- This should include assessing the effect of change on individual members with different characteristics such as age and therefore also assessing the level of risk borne by individual members in relation to the cross-subsidies in the scheme.
- Modelling should, however, be used with care, noting its limitations.

(g) Consider the sustainability of the design
- Assessment should be made of the sustainability of the design and the circumstances in which it might no longer be sustainable, particularly the scale required to keep costs per member low.
- CDC designs are all intended for use in the long term, and so the design should be such that there are no significant risks to short-term sustainability.

CDC legislation in the UK is still evolving, and at the time of writing, only single-employer whole-life CDC scheme legislation exists (Pension Schemes Act, 2021). Clearly, any new CDC trust-based scheme will need to be facilitated by legislation.

3. Design Options and Implications

In this section, we consider the key design aspects of CDC solutions and discuss the trade-offs. Although there is some overlap, we have divided the design elements into 10 areas as shown in Figure 1 below. The wide range of options shows there is a lot to consider and illustrates the opportunity for CDC to meet a range of different objectives. In most cases, we have not commented on how these design features fit with current UK legislation, as this is still evolving. And so, many of the design options would require new/expanded legislation before being included within UK CDC schemes.

Given the depth and breadth of the topic, we provide only a summary in this paper. Most of these design aspects relate to actuarial themes. It will be important for an employer or provider choosing a design to engage with an actuary for advice in all these areas and any others of relevance, in order to make an informed choice.

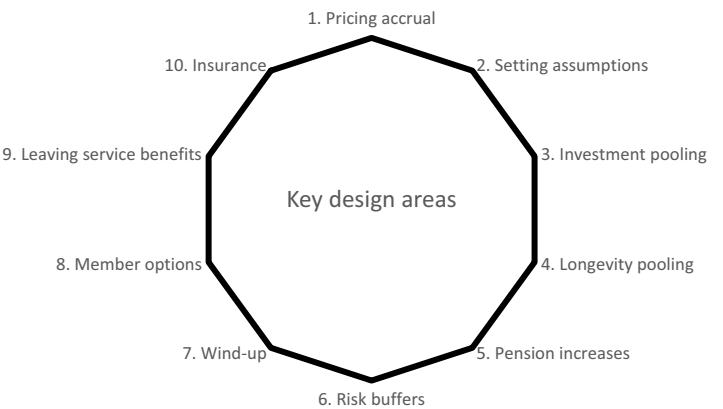

Figure 1. 10 key design areas for CDC.

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3.1. Pricing New Accrual (Converting Contributions to Pension)

The scheme will need to have an approach for pricing the CDC pension to convert either ongoing contributions (in a whole-life scheme) or DC savings at retirement (in an in-decumulation solution) to an income for life.

The simplest option (operationally and for member understanding) is fixed accrual rates linked to salary, for example, $1/80^{th}$ accrued each year irrespective of age. This can help members to understand the expected level of income they will receive at retirement.

Although the accrual rate can be initially calibrated so that the overall value of the pension benefits (using a set of assumptions) is equal to the contributions being paid across the membership, there will be cross-subsidies between ages. This is because the value of a $1/80^{th}$ accrual is worth more to an older employee than a younger employee, due to discounting. This may be appropriate for whole-life single-employer schemes, where an employer chooses this design (and pays a sufficiently large proportion of contributions to support it). However, in other circumstances, especially for multi-employer schemes, this may not be palatable.

The frequency with which the accrual rate should be reviewed will need to be considered, again balancing simplicity and level of certainty for members with cross-subsidies and fairness. A key input will be the current level of pension increases. If the scheme has performed poorly over time and the level of pension increases has reduced, this reduces the value of the new accrual. If not reflected in the accrual rate, this creates further cross-subsidies, where new accrual would improve the position of the overall scheme, benefiting existing members. If those cross-subsidies are excessive, the scheme would not be able to continue at that rate of accrual (and there are provisions in the current legislation for this). These cross-subsidies should only be funded by contributions from the employer. The value of the benefits being accrued by each member should be greater than or equal to their own contributions.

At the other end of the spectrum, and how we envisage most multi-employer schemes working, the scheme could have variable accrual rates that reflect the current expected cost of the target benefits. This set of factors could be split by age to avoid the cross-subsidies explained above but also by other factors that influence the expected cost, for example, gender, health and wealth (which all impact life expectancy). At the extreme, the factors could be updated very frequently to ensure they reflect current expectations on investment returns, longevity and the pension increase level. However, this will need to be balanced against cost, operational risk and uncertainty for members. This approach ensures that the value of the benefits being accrued by each member is equal to the contributions being paid to the scheme on their behalf (after expenses are deducted).

There is a range of options between the two above, for example, offering different accrual rates to different groups of ages.

In-decumulation solutions are likely to need to operate on the principle of actuarial equivalence to premiums, ensuring no cross-subsidy at the point of purchase. Otherwise, they risk being unfair and unattractive to new joiners. However, cost and operational risk are again likely to influence the details of the approach taken.

3.2. Setting Assumptions for Pricing and Valuations

The scheme will need an approach to setting assumptions for both pricing accrual and ongoing valuations, which impact the pension increase award.

The first consideration is whether to use best-estimate or prudent assumptions. Prudent assumptions will, all else being equal, result in lower benefits (at least for the first generation) as implicit buffers are built up. However, the more prudent the assumptions, the smaller the likelihood of benefits being lower than expected (such as through pension cuts). Best-estimate assumptions provide members with greater initial target benefits but a 50% chance of benefits being lower than expected. In the UK, most parties agree that best-estimate assumptions should be used to avoid cross-subsidies between different generations of joiners, and this forms part of

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legislative requirements. This may create challenges to ensure members understand this risk, and so the target benefits must be communicated with great care.

The other main consideration is to what extent to use market-based versus model-based assumptions. Using readily available market data, for example, for inflation and asset returns, can create transparency, reduced subjectivity and more limited scope for conflicts of interest. However, finding appropriate market data is not straightforward. A good example is market expectations for future inflation. Gilt-implied inflation is measurable but has shortcomings including being driven by demand versus supply and also introducing other subjective assumptions such as the inflation risk premium inherent in those market prices. Further, there is no such market index for expectations of future asset returns, and the past provides only a limited guide. This is also true for mortality assumptions, which will need to be based on the most relevant available data (noting that a new scheme does not yet have its own mortality data). Assumption setting cannot be completely formulaic, but a clear audit trail with justification for each assumption can help with transparency.

There will always be the ability to make the assumption-setting process more complex in the desire for greater accuracy. However, more complexity risks an overengineered approach that may create challenges in explaining clearly the rationale for a pension adjustment in future years.

Where accrual rates are designed to vary over time, using consistent assumptions with annual valuations of the scheme will ensure consistency and mean any new accrual does not immediately impact the overall funding position of the scheme.

3.3. Investment Pooling

CDC solutions may not involve pooling investment returns. Individuals could retain allocation of individual pots throughout their lives, where returns over time fully reflect the investment returns on the underlying assets. Longevity pooling could still exist within this framework together with various options for restricted drawdown paths. "Mortality credits" would be credited to members who remain alive, with the quid pro quo that on their death their pot would be shared as credits among the survivors.

However, other CDC solutions could pool investment returns across the membership. Here, the total assets of the scheme will achieve a return, and this will then be reflected in benefit levels for all members. It does not have to be shared actuarially equally and would often bear some reflection of the level of risk taken in the assets held to provide benefits for that member. The distribution of changes to benefit levels should be set out in the design of the scheme.

One mechanism for implementing this approach is through an annual variable pension increase award, which is the same for all members irrespective of age. The pension increase award is calibrated, so the scheme remains fully funded. One aspect of this calibration is the time horizon assumed for the pension increase. A long time horizon could mean that the calibration assumes the pension increase award is paid each year for the remaining life of the membership. A shorter time horizon could be used with a fixed term, for example, 5 or 10 years. A longer time horizon results in smaller changes to the pension increase award as changes over a longer period have a larger impact on the value of future benefits. At an individual member level, older members have shorter time horizons and hence less exposure to the change.

Applying a consistent pension increase change, irrespective of age, effectively shares the overall investment return (versus the target) unevenly across the membership, with younger members receiving higher changes in value and older members receiving lower changes in value. This works both ways, as younger members will see a bigger impact from both investment outperformance and underperformance. Younger members have higher volatility in the value of their target benefits versus older members. This can partly reflect the investment strategy of the scheme, if the scheme chooses lower return investment strategies as members age.

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Smoothing in this way can provide more stable and predictable income levels from year to year for the members, with consistent variability in the income level throughout retirement. However, pooling investment returns can lead to intergenerational cross-subsidies, which, with the benefit of hindsight, may be perceived negatively by the cohort that would have been better off in an alternative arrangement. The design must therefore be chosen to strike a balance between desired levels of potential cross-subsidy and what might be considered as excessive or unfair.

Pooling investment returns also removes the choice for the member over the level of investment risk to take, unless there are different sections or schemes to choose from with different risk tolerances. Even if investment risk is not pooled, the longevity pooling element of CDC will result in a need to limit the investment choices for members.

3.4. Longevity Pooling and Mortality Underwriting

Longevity risk sharing is a key element of a CDC scheme. A member's individual longevity risk is removed, but the members as a whole share the risk of the membership living on average longer than expected. With longevity pooling, there will always be cross-subsidies: those who die earlier are helping to fund the retirement of those who live longer. This is required to provide a more stable income for life.

The simplest arrangement would involve members receiving no benefits on death. However, CDC solutions could offer spouses' pensions and other death benefits. This would increase the value of the target benefits and hence would need to be reflected in higher prices/lower accrual rates, reducing the level of target pension for the member.

Similarly, any guarantee periods or value protection (return of contributions) in the event of a member's death shortly after retirement would increase the price/lower the accrual rate offered by the scheme. However, it may help the attractiveness of the scheme to new members, particularly for in-decumulation solutions where there are similar protections offered for annuities. Any CDC solution may have to fully ensure any guarantees that are provided due to the DC nature of the arrangement.

The CDC scheme could offer mortality underwriting to enhance the target pensions for members in poor health. Offering detailed medical underwriting will come at a cost for the scheme, with costs rising as the assessment process becomes more detailed, and possibly becoming off-putting for potential new members. Not providing any mortality underwriting could lead to the "anti-Robin Hood" effect, where the wealthier (and as a result on average healthier) receive the same terms as the less wealthy, although this may be offset by sharing expenses equally (as a percentage of assets) between those with low and high value pensions. Further, no mortality underwriting could lead to selection risk, where the scheme ends up with, on average, healthier members with longer life expectancies, although this can be mitigated through assuming relatively light mortality.

Mortality improvements can cause a trend in the scheme results, such as a downward trend in pension increases in a fixed accrual rate scheme or a downward trend in accrual rates in a variable accrual rate scheme (unless countered by a gradual increase in contribution rates). The former can give rise to a further cross-subsidy in actuarial value terms, which must be considered.

3.5. Variable Pension Increases

Where an annual pension adjustment is used to ensure the scheme remains in balance, with assets equal to target liabilities, there are several options for the target level of increases. The scheme could have an explicit inflationary increase target, for example, Consumer Price Index (CPI) at outset. If actual experience is in line with expectations, members will receive CPI increases to their benefits. At the time of writing (May 2024), single-employer CDC legislation requires schemes to

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calculate the cost of funding an increase on the basis that the increase will be applied each year including the projected change in inflation.

However, in the annuity market, customers can select from a range of pension increases including flat pensions (i.e. non-increasing). To ensure consistency, particularly for in-decumulation solutions, the CDC solution could offer a range of target pension increases including flat pensions and fixed increase targets, for example, 2% or index-linked (to CPI, for instance).

The lower the target increases, the higher the starting pension that can be offered by the scheme (or the higher the accrual rate). However, the lower the initial target increases, the higher the probability of a pension cut in nominal terms in future years, all else being equal. This may be appropriate, but communication will be important to ensure members understand this risk. A CDC solution could offer a range of options for members, in terms of target increases, while still grouping all members together for the purpose of pooling investment and longevity risk.

Another aspect of the pension increase is how to adjust the price of the new CDC pension/new accrual to reflect the current level of increases in the scheme. In addition to the comments under design aspect 1, the scheme could choose to tranche benefits to ensure new accrual always has a consistent target increase at the point of purchase. For example, the initial target could be 3% p.a. (call this the "original rate") when the first member starts accruing pension. Over time the pension increase (call this the "reference rate") falls to 2%. Different designs have been discussed where new accrual of pension each year could either be at the reference rate or the original rate. If all accrual is at the reference rate, then all members will have the same pension increases on all their pensions. If new accrual is at the original rate, then each member can end up with pensions increasing at many different rates – these pensions could be combined to give an average rate, but this would be more complicated to communicate in anything other than a decumulation-only scheme.

Caps and collars could be built into the pension increase adjustment. For example, if the pension adjustment is negative, then there could be a collar of 0%, resulting in a one-off pension cut to bring the scheme into balance. This effectively removes the smoothing aspect of CDC below the collar and would result in more volatile pensions (in nominal terms). Similarly, a cap could be set, for example, 5%, such that there is a one-off uplift to pensions if the theoretical pension increase exceeds 5%. A one-off adjustment could be quite substantial and so could be spread over several future years.

Adding any additional options for members can help to increase the attractiveness of the scheme to new members and allow the scheme to meet the needs of a wider range of members. Particularly for in-decumulation solutions, some of these options would ensure comparability with other products for a fair market. However, the trade-off considerations for all these aspects will focus on operational risk, member understanding and cost.

3.6. Risk Buffers

Overlapping with design aspect 2 is the decision on a risk buffer, explicitly or implicitly (through prudent assumptions). This is where some of the scheme assets are held back to protect members in the event of adverse experience in the future. This can help provide more stable income for members and reduce the risk of a pension cut in future years. It can also provide protection for members in the event that the scheme must close in the future – where the remaining risk buffer can be used to enhance benefits.

A risk buffer will smooth experience across generations and, depending on this experience, may be perceived as unfair for the generation that has subsidised another generation. The scheme may provide poor value for the first generation if they must pay for the build-up of the buffer. A risk buffer also introduces the challenge of determining an appropriate size for the buffer and how this should evolve over time. Further, if the risk buffer runs out, leading to benefit cuts, that can be seen as unfair to the affected generation. If buffers work for a number of years, they can lead to stable

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outcomes for members, but members can then (wrongly) start assuming that their benefits are guaranteed.

A CDC scheme does not need to have a risk buffer. Having no risk buffer reduces intergenerational cross-subsidies and the risks associated with this; it also avoids reducing the benefits purchased by the first generation of members. However, it does increase the uncertainty in future benefit levels and increases the probability of potential pension cuts.

The ideal situation could be where the employer provides a risk buffer to seed the scheme; this would often not be feasible, but could be possible if, for example, an existing defined benefit pension scheme has a surplus that is not expected to be needed for past service benefits.

3.7. Wind-up Triggers and Protection Mechanisms

Any CDC solution will need to have a plan in the event that the scheme has to wind up in the future. One option is to continue running as a closed scheme. This would provide continuity for members but introduces new risks associated with an ageing membership, and eventually, the scheme might become too small to be cost-effective.

Members' benefits could be converted to individual pots upon wind-up. This could provide a fair value to each member for their target benefits but removes the longevity protection and any investment pooling.

Transferring to another CDC arrangement may be a compelling option to maintain members' CDC pensions. However, this relies on another CDC arrangement being available to accept a transfer at the time of wind-up, such as a government-supported "provider of last resort".

There may be potential for a third party to provide protection for members, for example, a company-supported reserve, a government-led arrangement or a capital provider that seeks a return for providing additional capital in the event of wind-up – to pay for the expenses involved in a wind-up. The required capital should be ring-fenced to ensure that it is available when necessary. However, the required capital will fluctuate over time, so there should be a mechanism for some of the wind-up reserve to be returned to the capital provider over time.

Another related issue for multi-employer schemes is whether the solution provides the option for one employer to move existing employee benefits out of a CDC arrangement and under what terms.

Providing clarity on the plan and implications for members in a scheme wind-up scenario can help provide confidence to members, increasing the attractiveness of the scheme to potential joiners.

3.8. Member Options

A key design aspect will be the range of options for members. It will be simplest to offer no choice, where the scheme provides a predefined set of benefits for all members. This may be suitable for a single-employer whole-life scheme and can help create efficiencies and reduce costs. However, even within a prescribed set of benefits, there is still likely to be the choice to transfer out pre-retirement, as well as early/late retirement options. Current CDC law requires a transfer-out option up to retirement.

For multi-employer schemes including in-decumulation solutions, more options would allow the scheme to cater for a wider range of employers/members with different preferences.

One option, which we have already discussed, is the pension increase target. The scheme could offer members a choice between flat, fixed increases and index-linked target pensions.

Also, as noted above, the scheme could offer death benefit options such as lump sums or spouses' pensions, and guarantee periods, cooling off periods and value protections could also be made available. Offering additional options will have higher ongoing costs and will increase operational risk.

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Members could have the option to commute some of the target pension for cash at retirement. There may also be options for members in serious ill-heath to apply for a lump sum.

For in-decumulation solutions, an age range for joining could be agreed, for example, 55–75. Allowing much older members to join could create selection risk where only those in very good health join the scheme. Further, any risk of the member being too vulnerable to make the decision would need to be managed.

A key decision for the scheme will be the level of investment risk to target. This will impact the volatility of the pension increase over time. Taking more risk can allow the scheme to offer higher starting pensions if this justifies a higher expected return assumption (higher discount rate). To accommodate different risk tolerances, a scheme could offer different sections with different investment risk levels. It is unlikely that pooling would be done across sections, and so this increases the risk of not achieving the required scale in each individual section.

3.9. Leaving Service Benefits

Whole-life CDC schemes will need to determine benefits on leaving service. These would normally be a deferred pension, which behaves the same way as active members' existing accrued pensions, for example, receiving the same increases.

Some members would leave service with small benefits, particularly if an employer has high turnover and the scheme is not industry wide. Members with very short service could instead receive a refund of contributions, rather than the scheme administering very small pensions that will not meaningfully contribute to a member's retirement wellbeing.

3.10. Insured Elements

Finally, part of the scheme design will involve deciding which elements of the benefits to insure, if any. Some elements of the benefits could be insured either through investments or a specific contract. Risks not insured are then borne by all members collectively.

Cost and availability will be a key factor in deciding what elements to insure. However, insurance could help provide more stability to the benefit levels. The more elements that are insured, the greater the similarity between CDC and existing annuity products, and so there would be little logic to support a CDC scheme with high levels of insurance.

4. Disclaimer

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