Request for Quotation

An Chomhairle Pinsean
The Pensions Council

Contents

RFQ Title: Request for Quote for Technical Feasibility Assessment of Alternative Auto Enrolment Proposal

1. Introduction

The Pensions Council (An Chomhairle Pinsean) was established under section 26B of the Pensions Act, 1990. Its role is to advise the Minister for Social Protection on matters relating to policy on pensions.

The Council has been asked by the Minister to analyse a proposal for a structural basis for the proposed Auto Enrolment (AE) system including the decumulation phase (the "proposed model") and provide her with (amongst other considerations) an assessment of the technical feasibility of the proposed model, including the appropriateness of any underpinning assumptions employed and whether the modelling and evidence provided is sufficient to provide assurance of feasibility. This also includes an assessment of the structures and constraints proposed.

In this regard, the Council is seeking proposals from interested parties to carry out this assessment of technical feasibility.

2. Background information

The Council is seeking an analysis of the proposed model and to understand the sources of outperformance compared to the AE system as currently set out in the Draft Heads and General Scheme of the Automatic Enrolment Retirement Savings System Bill 2022[1].

A copy of the paper which sets out the proposed model is included in Appendix B.

3. Requirements and Specifications

This assessment should include:

a) Analysis of the proposed model, which would be expected to be sufficient to draw out the key features, drivers, risks and uncertainties. Assessment of the financial out-performance suggested by the proposed model when compared to the UK model referred to in the paper (See appendix B).

b) Modelling;
   o scenario testing of the proposed model (use of real-world ESGs (economic scenario generators) is preferred but not a requirement); and

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[1]
https://data.oireachtas.ie/ie/oireachtas/committee/dail/33/joint_committee_on_social_protection_community_and_rural_development_and_the_islands/submissions/2022/2022-11-10_draft-heads-and-general-scheme-of-the-automatic-enrolment-retirement-savings-system-bill-2022_en.pdf

- investigate the impact of changing the two key variables in the proposed model's smoothing formula on a periodic basis: expected long term return (i) and/or weighting (p).

c) Assumptions;
- A list of the key assumptions and an assessment of these assumptions underpinning the proposed model;
- Stress testing individual assumptions / scenario testing; and
  model a number of plausible adverse scenarios (e.g. 1-in-25 year stress events to market or mortality/longevity risk) at varying spot years in the future.

d) Performance: Assessing the drivers of performance in the proposed model.

e) Assessing the various assertions made in relation to the proposed model in an Irish context including the acid test of the proposed model's durability in the event the scheme is closed to new entrants at some future date and net assets fall to zero.

The Council is also interested to understand:

1. The extent of the proposed model's reliance on one or more key assumptions and the reasonableness of the proposed assumptions into the long-term future.
2. The main determinants of outperformance of the proposed model.
3. The differing levels and types of risk in the proposed model.
4. The implications if the assumptions prove to be incorrect.
5. Any relevant limitations of the stochastic modelling employed.
6. The ability of the proposed model to allocate returns in a fair manner over the long term on a steady state basis and when the fund is decreasing in size (for example due to long term demographic changes) and/or there is a long-term shift (upwards or downwards) in relevant investment markets.
7. The risks and potential rewards to different cohorts of members through the smoothing formula.
8. The effectiveness of the longevity option and its ability to provide a reliable and stable income.
9. The ability of the proposed model to adjust to a 1 in 200 year unforeseen event due to the assumptions in the proposed model (e.g. smoothing in the proposed model).
10. The performance of the proposed model in tail events including, if the smoothing formula can or should include a factor to take account of black swan events.
11. The impact of a 1 in 200-year adverse event (market or longevity/mortality or combination thereof) occurring after 20, 50 or 100 years on the sufficiency of the proposed buffer account, and hence on the potential costs to the State should it be insufficient.
12. Commentary on if/how costs could expand beyond the State i.e.. cost to participants (for example if they had to return to work to make up any shortfall).
13. The most important lessons from the review of the proposed model to incorporate into any policy recommendations.
14. Any other observations that the successful candidate considers relevant.

As part of the work and where relevant, the successful candidate should comment on the interaction between the assumptions and inputs made in the modelling and any implications for how the system will be administered and run-in practice.

The Council's preference is that this project is carried out over a concise time period to finish by early September.

4. Communications

4.1   All communication with the Department of Social Protection (the "Department") regarding this document (seeking clarification only) must be directed through the messaging facility on eTenders

Clarification Requests / Queries must be received by 12pm (GMT), 30 June 2023

5. Request for Quote (RFQ) Submission

5.1   Time Frame
RFQs must be submitted by 12:00 on 7 July 2023
Submissions must be made through the email facility on eTenders.
RFQ Title should be quoted on the subject line of your email.

5.2   Proposals will be reviewed.
Late or incomplete proposals not conforming to the requirements of this RFQ will not be considered.

5.3   Response to this RFQ will constitute an offer to develop a contract based on the terms stated in this RFQ, if the person submitting the quote is invited by the Department to do so. Responses by those submitting a quote will be assumed to be their best and final offers. All pages and sections in the quote must be clearly numbered. All quotes (and related materials), once delivered, become the property of the Department.

5.4   Those submitting a quote shall bear all costs associated with the preparation and submissions of their quotes and the Department shall not be responsible or liable for any costs or expenses associated to this quotation.

6. Quote Validity Period

To allow sufficient time for the assessment of quotes, a Quote Validity period of 2 months is required, this period commencing on the closing date by which the quotes are to be returned.

7. Currency

Quote prices may be submitted in euro only. All invoices and payments will be in euro only.

8. Methodology:

Candidates should set out a brief outline of their proposed methodology and deliverables.

9. **Resources:**

   For each team member, please provide a short biography. Candidates should confirm their ability and capacity to carry out the work. Candidates should indicate how long the analysis will take and when they can start. Preference will be given to those who can start without delay and deliver the assessment as a priority.

10. **Independence:**

    Candidates should declare if they are aware of any potential conflicts of interest.

11. **Confidentiality**

   11.1   All material provided to the Department is treated in strict confidence. Those submitting a quote are required to treat the details of all documents supplied in connection with the quotation process as private and confidential. It is required that those submitting a quote will treat all information provided by this Department in a similar way.

   11.2   The distribution of the RFQ is for the sole purpose of obtaining quotes. The distribution does not grant permission or license to use the documents for any other purpose.

12. **Tax clearance Cert**

    Those submitting a quote are required to comply with domestic and European Union law and administrative requirements

13. **Award Criteria**

    Quotes will be evaluated under Award Criteria on the basis of the Most Economically Advantageous Quote (MEAT) on the basis of the following Criteria:

Criteria	Weighting	Minimum Score required
Ultimate Cost. Please see Pricing Table below	30% (300 marks)	n/a
Methodology for the delivery of the Service.	40% (400 marks)	200
Quality and balance of resources offered for the contract.	30% (300 marks)	150
Total	100%	

   13.1   Those submitting a quote must complete Appendix A – Form of Quote - outlining their financial proposal for the delivery of the required services. The Form of Quote contains full detail regarding the manner in which a single, notional ultimate cost figure will be arrived at

for evaluation purposes. Scores will be allocated to financial proposals in accordance with the following methodology:

Points awarded = (the maximum score achievable) multiplied by (the cost of the lowest-cost valid quote) divided by (the cost of the valid quote in question).

13.2 All costs quoted must be inclusive of out of pocket expenses, travel, subsistence and ancillary expenses and costs of every description.

13.3 The value of this contract is not expected to exceed €49,999 plus VAT

14. **Minimum Qualitative Score Required**

Those submitting a quote should note that they must achieve a minimum rating of 'acceptable,' or 50% of the total marks available, for each of the individual qualitative criteria in order to avoid elimination from the competition.

This form of quote must be completed, signed and returned by the person making the quotes. Any amendment to the structure of this document, or any qualification of financial offers, may, at the sole discretion of the Contracting Authority, result in the elimination of the quote in question.

Contracting Authority: Department of Social Protection
Competition: Contract for Technical Feasibility Assessment of Alternative Auto Enrolment Proposal

From: _____

I/We, having read the full RFQ Documents and associated Appendices, do hereby offer to provide the whole of the services described all to the entire satisfaction of the Contracting Authority, for the following prices, and enter into a contract accordingly:

Note: All costs quoted must be inclusive of out of pocket expenses, travel, subsistence, ancillary expenses and costs of every description. **Fixed Cost**	
Service	**Total ex VAT**
Technical Feasibility Assessment of Alternative Auto Enrolment Proposal	

I/We confirm that I/we:

- Will keep this offer open for acceptance by the Contracting Authority for a period of two months from the date of deadline for submission of quotes;

- Agree that the Contracting Authority is not bound to accept the most economically advantageous quote or any quote that it may receive;

- Have read and thoroughly examined the RFQ document and fully understand the RFQ document and the Contracting Authority's requirements;

- Undertake to treat the details of this RFQ document, the resulting quote submission and any subsequent clarifications as private and confidential;

- Acknowledge that acceptance by the Contracting Authority of a quote will not constitute a binding and enforceable agreement and that a legally enforceable agreement will not exist until and unless the contract has been established by the Contracting Authority;

- Have availed of all offers for additional information or have otherwise satisfied myself/ourselves as to conditions that may in any manner affect the performance of the contract;
- Have included everything necessary for the performance of the services required under the contract which are either expressly stated in the RFQ document or contained in any supplementary information or which could reasonably be inferred therefrom;

- Have found no errors, omissions, conflicts or ambiguities in the RFQ document, except those which I/We have brought to the attention of the Contracting Authority before the latest date for submitting queries;

- Have included for compliance with all statutory requirements applicable in Ireland and those applicable in any country where parts of the contract may be performed that are in force seven days prior to the deadline for receipt of quotes;

- Will not, if awarded the contract, employ labour in a manner that is discriminatory in relation to gender, race, religious beliefs, age, etc., or source any part of any contract awarded under the contract in countries subject to official international trading sanctions.

SIGNATURE	(Insert)	Date	(Insert)
Name	(Insert)	Position	(Insert)
Telephone	(Insert)	Email	(Insert)

A New Approach to Auto-Enrolled Pensions

Entry for Institute and Faculty of Actuaries' Redington Pensions Prize

Version 11 May 2022

1. Introduction

The brief for the Redington prize is "*to propose a system, or reform to the current system, which would deliver a low-cost affordable pension to the majority of the population* …" This paper meets the brief by proposing a reform to the UK's current auto-enrolment (AE) system, which delivers more than 50% better value for members, and can be extended to improve outcomes for retirees under DB and non-AE DC arrangements. It will transform the world of pensions as profoundly and permanently as passive investing transformed the world of investments, raising investment returns, lowering expenses, and removing an entire swathe of advisor costs. By shifting the investment focus from short-term returns to sustainable returns over a 50-year plus investment horizon, it will ensure that investment is premised on societal needs and the green transition.[1]

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Two essential requirements for "*a low-cost affordable pension*" are low costs and high investment returns. The UK's current AE system goes some way towards achieving both goals, but it falls short in key areas:

(i)   The "low expenses" criterion is satisfied pre-retirement, but not post-retirement.   High charges are far too common in drawdown products. Also, most retirees, especially those unfamiliar with the stock market – who comprise the vast majority of AE members - need regular investment advice in retirement. The high fixed cost of advice can cause a significant drag on investment returns, particularly for the less well-off.

(ii)   High investment returns come from investing in equities[2]. Expected[3] returns from equities are approximately 4% a year[4] more than from bonds. Currently, AE default funds aim to capture the high returns by investing heavily in equities when members are young, but "lifestyling" means transferring a significant portion of members' funds to bonds and cash in the lead-in to retirement, when account values are at their highest and have the highest earnings potential[5]. Cautious investment strategies and consequently lower expected investment returns normally continue all through retirement, possibly for 30 years or more. At the extreme, annuities imply 100% in bonds. Typically, the reduction in expected returns post-retirement is most marked for the less well-off, who can least afford the volatile luxury of equity investment. As a pension consultant once remarked to the author:

     "It's fine for an affluent retired old professional like you to put your trust in equities,

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[1] Appendix 2 sets out how the proposal meets other requirements of the brief.

[2] The term "equities" is used throughout as shorthand for assets offering equity-like returns and volatility; similarly, "bonds" is shorthand for assets offering bond-like returns and volatility.

[3] The adjective "expected" is used throughout in the mathematical sense of probability-weighted outcome.

[4] The equity risk premium (ERP) is discussed on pages 16 to 20 of the paper: https://web.actuaries.ie/sites/default/files/2021-01/AE%20paper%20for%20SAI%20CFagan%206%20Jan%202021.pdf

[5] One indicator of the relative importance of investment return at different ages is that the expected investment return in a single year for an older lifelong contributor could exceed total expected returns in the first ten years for a new joiner.

but less affluent pensioners cannot afford that luxury: they must take less risk and invest a significant portion of their funds in bonds."

The smoothed equity approach to AE proposed in this paper addresses these shortcomings. Members will remain in the smoothed scheme for life. It will have just one pooled fund, for both active and retired members[6], which will be invested entirely in equities. A key innovation is that all member transactions with the scheme, without exception, will be at smoothed values rather than at market values. Smoothed values will be determined by an objective formula that averages market values over long periods, and which factors in the expected higher returns from equities. Details of how smoothing will operate are set out later in the paper.

Smoothing transforms the volatility of investment returns, as the following charts show:

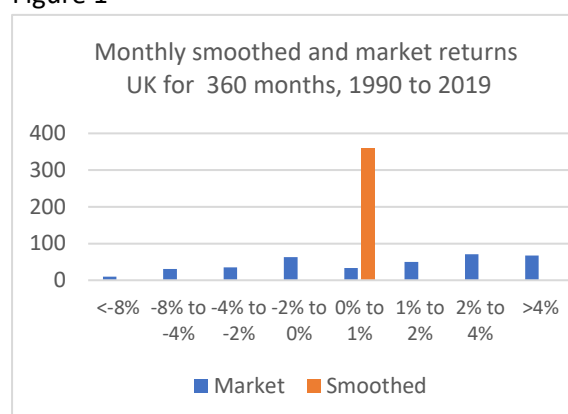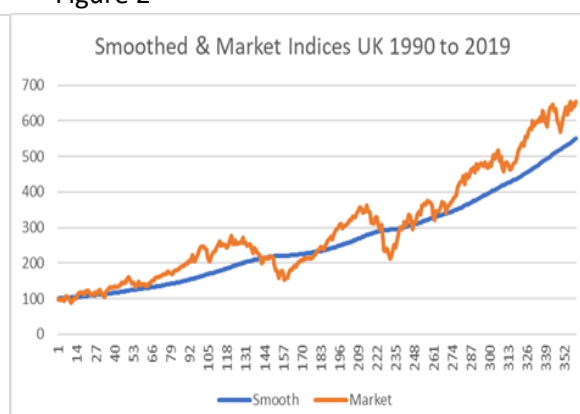Figure 1   Figure 2

Figure 1, which shows positive smoothed returns every month for the UK market for the 30 years 1990 to 2019, illustrates how smoothing reduces the volatility of returns to such an extent that members (and administrators) will be able to view pension accounts like high-interest deposit accounts. Figure 2, which graphs the cumulative market and smoothed returns of figure 1, shows that smoothing achieves that goal without departing significantly from market values in the long run.

Insisting that members transact with the scheme at smoothed rather than market values completely changes the investment challenge. At present, the aim is to meet investment objectives at individual contributor level, e.g., to de-risk in the run-in to retirement, so that assets can be sold at reasonably predictable prices when members start claiming gratuities and pensions. Under the proposed smoothed approach, trustees will look at the fund as a whole, and see that cashflows will be positive for 30 years or more, and that investments won't have to be sold for years, possibly for decades, after that (because investment income will cover the excess of outgo over income for many years after cashflows turn negative). Negative cashflows at individual contributor level will be dealt with by transferring between members at smoothed values. Accordingly, the trustees will mandate investment managers to seek assets that will deliver real returns over a 50-year plus investment horizon.

Stipulating that assets be invested entirely in equities and that members transact with the scheme at smoothed rather than market values has a number of other advantages:

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[6] The scheme will have the legal form of a public corporation, run independently for members by a board of trustees.

(i) Smoothing eliminates the lottery that market fluctuations bring to decisions on retirement date, etc. Members retiring just after a stock market crash will have almost identical entitlements to those retiring just before it.

(ii) Investing 100% in equities means significantly higher investment returns on average, particularly post-retirement. At current interest rates, retired members can expect to earn c6% a year in the smoothed fund versus c2% from an annuity (assuming a 4% ERP)[7].

(iii) The strategy of investing entirely in equities at all times eliminates the risk of having to move funds pro-cyclically from equities to bonds in falling markets, with the possibility of exacerbating the fall, as could happen in a "With-Profits" type arrangement.

(iv) A low weighting for current market value in the smoothing formula allows more investment in less liquid assets, for which reliable market values may not always be available, than would be possible with marked-to-market unit-linked funds.

(v) Much reduced volatility of returns means that members will be able to view their pension accounts like deposit accounts. This will allow much greater flexibility in dealing with life's uncertainties, e.g., early or late retirement, part-time work, long-term care, increased longevity. The details are discussed in Section 2 and Appendix 2.

(vi) Investing exclusively in "real" assets means that retired members will have better inflation protection than if funds were invested entirely or significantly in bonds.

(vii) Investment adviser costs will be eliminated, because pension accounts will remain invested in the smoothed fund post-retirement. Advisers add value by matching asset mix to individual risk appetites. Smoothing severs the link between risk and return, so no decisions will be required under this heading, and consequently no costs incurred.

Another innovation, discussed in Section 5, will allow retired members to protect against the risk of outliving their savings, without having to sacrifice any of their capital (as would be required for annuities), and without losing the benefit of high returns and low charges in the smoothed fund.

The proposal to use smoothed rather than market values poses a number of challenges, which are explored in later sections. Before considering the challenges, it is worth bearing in mind that the smoothed approach recognises a fundamental truth, namely, that a slavish belief in the pre-eminence of market values at all times is misguided, particularly for AE pensions.

(a) For most quoted companies, their underlying businesses are far less volatile than is implied by fluctuations in their share prices. To illustrate, the author is a long-standing investor in Phoenix Group Holdings. For the last ten years at least, the dividend has been maintained or increased each year[8]. Dividend increases have averaged over 4% a year, and management has indicated that the dividend is safe for the next 20 years at least. Despite the business's stability and the positive prognosis, the dividend yield is 8.3%[9], compared with 2.2% on gilts[10]. The share price also oscillates wildly: in the last three years alone, it has fluctuated between 78% and 131% of the current price, a 53% swing. It is impossible to rationalise such volatility for a stable business. To quote John Maynard Keynes, the fluctuations are no more than "*bubbles on a steady stream of enterprise*" and should be of little interest to long-term investors. The smoothed equity approach recognises this fact.

(b) An AE scheme can expect positive cash flows for decades into the future, so sharp falls in market values should be seen not as bad news but as opportunities for trustees to acquire

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[7] Both estimates are before charges.
[8] Adjusting for rights issues.
[9] Based on the closing price of 599.4p on 11 May 2022.
[10] Suggesting (but of course by no means proving) an ERP well in excess of the 4% assumed in this paper.

assets cheaply for members. The detailed proposals in this paper exploit that fact, while also recognising that assets must be sold eventually at market prices prevailing at time of sale.

The fact that smoothed values will sometimes be above, sometimes below, market values means that strict rules will be needed to prevent financially astute members from exploiting differences between smoothed and market values to their advantage - and of necessity to other members' disadvantage, since the scheme's mutual status means that gains by one group must be balanced by losses by another: there will be no government backstop or guarantee.

Section 2 (page 5) looks at the rules required to minimise this risk, and the feasibility of enforcing them.

Section 3 (page 8) sets out the proposed smoothing formula.

Section 4 (page 14) explores how the scheme's long-term stability and durability can be ensured.

Section 5 (page 17) addresses the challenge of longevity.

Section 6 (page 20) studies how the smoothing parameters will be set.

Section 7 (page 23) is the concluding section.

Appendix 1 (page 26) estimates the added value under the smoothed approach.

Appendix 2 (page 28) sets out how the proposal meets the brief from the Institute and Faculty of Actuaries.

2.   Members Transact with the Scheme at Smoothed rather than Market Values

As noted above, the proposed scheme will have just one pooled fund, which will be invested entirely in growth assets ('equities'). All member transactions with the fund will be at smoothed values rather than market values. The challenges posed by this rule, and how they will be surmounted, are analysed below for the four possibilities:

(i)   Contributions artificially increased when smoothed value is less than market value (i.e., members want to contribute more when smoothed values are below market values).

(ii)   Withdrawals artificially reduced when smoothed value is less than market value (i.e., members want to avoid selling when smoothed values are below market values).

(iii)   Withdrawals artificially increased when smoothed value is above market value (i.e., members want to accelerate exit plans when smoothed values exceed market values).

(iv)   Contributions artificially reduced, or cease entirely, when smoothed value exceeds market value (i.e., continuing and new members try to avoid buying into the fund at greater than market value). This is the most challenging scenario.

(i)   **Contributions artificially increased when smoothed value less than market value**
        Contributions to the proposed scheme (from employees and employers) will be a fixed percentage of qualifying earnings. Additional voluntary contributions (AVC's) will be prohibited: they must be effected through a separate arrangement. Also, since AE is aimed primarily at lower-paid workers, with an upper limit on qualifying earnings, the risk is minimal of earnings being artificially inflated to exploit situations where smoothed values are less than market values. There will also be a prohibition on transfers into the scheme. Thus, the risk is minimal of contributions being artificially increased when smoothed values are less than market values.

(ii)   **Withdrawals artificially reduced when smoothed value less than market value**
        Funds may only be withdrawn at or after retirement or on death. The rules will stipulate that (say) 25% must be taken as a gratuity at retirement and the other (say) 75% taken in the form of regular (monthly) instalments from retirement onwards[11]. They will also specify minimum and maximum regular withdrawal percentages in retirement[12], with strict rules on when and how the withdrawal amount can be varied, e.g., it may be increased or reduced to deal with changed personal circumstances such as cessation of part-time work, commencement of state pension, death of a spouse, changes in price levels, long-term care, but not to exploit differences between smoothed and market values. These provisions minimise the risk of withdrawals being artificially reduced when smoothed values are less than market values, while still allowing retirees considerable flexibility to deal with life's vicissitudes.
        In theory, there is a risk of workers deferring retirement in order to avoid taking the gratuity when smoothed value is less than market value, but the risk is low, especially since most members will be lower paid and will have little choice on date of retirement.

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[11] The actual percentage allowed to be taken in cash at retirement doesn't matter. What does matter is that there can be no optionality: members must take the specified percentage (with *de minimis* provisions). In practice, the retirement gratuity may be limited to a maximum of (say) 1½ times' earnings. For reasons explained in Appendix 1, this will favour the smoothed approach.

[12] Suggested minimum and maximum percentages are 3% and 8% of smoothed value respectively, with higher maxima over age 80. These percentages are not written in stone. The higher the regular withdrawal amount, the greater the risk of running out of money prematurely. This risk is discussed in detail in Section 5.

(iii) **Withdrawals artificially increased when smoothed value greater than market value**
This is the opposite risk to that outlined in (ii), and the same rules address it. Under this heading, it should be noted that members who decide to leave the smoothed scheme will not be allowed to take transfer values. Their accumulated funds must remain in the scheme, to be paid on eventual retirement or death on the same terms as continuing members. The 'no transfers out' provision may prove contentious, but any member concerns under this heading will be allayed by the assurance that expense charges will be lower and expected long-term returns higher than in a conventional DC pension[13].

(iv) **Contributions reduce or cease entirely when smoothed value exceeds market value**
As noted above, this is the most challenging of the four scenarios, because workers will always have the option of leaving the smoothed scheme. The scheme's viability will be placed at risk if significant numbers cease contributions whenever smoothed value exceeds market value.

It is reasonable to ask why new contributors should join, or existing contributors stay, if smoothed value exceeds market value (expected to be the case close to 50% of the time), given that they could buy the same assets for less through a conventional DC arrangement. The answer is that the smoothed scheme offers better value, to such an extent that it justifies paying substantially more than market value to buy into it.

The three sources of added value are:
a. Higher expected investment returns, at low volatility, from remaining fully invested in equities all through retirement and in the lead-in to retirement, when 'lifestyling' shifts a significant portion of members' savings to cash and bonds.
b. No need for investment advice, pre- or post-retirement, thus eliminating a cost that can be a severe drag on returns, particularly for members with small pension pots.
c. Lower costs, mainly from members being charged group rather than individual rates for administration and investment management post-retirement. Costs pre-retirement will also be lower under the smoothed scheme than under a conventional DC scheme.

It is estimated (Appendix 1) that young contributors will enjoy up to 70% better value in the smoothed scheme than in a conventional DC pension which employs a 'lifestyle' investment strategy pre-retirement, and is invested 50% in bonds, 50% in equities post-retirement. In other words, the smoothed AE scheme is a better option even if the smoothed value is up to 170% of market value. This estimate assumes a 4% equity risk premium. The breakeven ratio falls to approximately 150% of market value if the assumed equity risk premium is 3%. It also reduces with age, falling to 133% shortly before retirement assuming a 4% equity risk premium, and to 128% assuming a 3% equity risk premium.

The smoothed fund calculations in Section 3 show that there is a very small risk of smoothed value exceeding 150% of market value at any time, so the risk is minimal of younger workers ceasing contributions when smoothed value exceeds market value. The risk is marginally higher for older workers, but the impact on smoothed returns of older workers ceasing contributions when smoothed value exceeds market value by a significant margin will be negligible, even if they behave ultra-rationally, which is unlikely in the real world, for reasons discussed in Sections 3 and 7.

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[13] The expense charge under the smoothed AE scheme will be expressed as a flat percentage of funds under management, and no discount for large accounts. Therefore, members who have left will be charged the same percentage of AUM as continuing members. There will be no penalty for leaving the scheme.

An additional safeguard to dissuade contributors from leaving when smoothed value exceeds market value will be to insist that, if they leave the smoothed scheme, they will not be allowed to re-join for at least (say) three years.

It is important to emphasise that the above considerations do ***not*** apply for workers who are prepared to accept the volatility of stock markets or who believe that they (or their advisers) have an edge in forecasting market movements. If someone is comfortable investing close to 100% in equities pre- and post-retirement, then the advantages of smoothing don't apply, or apply to a lesser extent. Workers in this category will typically be above-average earners and will probably also be comfortable making their own allocations to different asset classes and individual shares, before and after retirement. Thus, they are unlikely to have joined the smoothed AE scheme in the first place, preferring instead a pension which allows them to make their own asset allocation decisions. Workers in this category have no relevance to this paper. The vast majority of workers, especially the lower-paid, who are the primary beneficiaries of AE, are not in this position. They are happy to have investment decisions made for them, as evidenced by the fact that close to 99% of NEST[14] members opt for the default investment strategy.

The above analysis indicates that it will be possible to insist that members transact with the scheme at smoothed rather than market values, and that the scheme's financial stability will not be placed at risk when smoothed values depart from market values, assuming that the formula for calculating smoothed values is seen to be fair to different categories and generations of members - old and young; active and retired; early and late joiners - and that smoothed values don't stray too far from market values. These challenges are addressed in the following sections.

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[14] National Employment Savings Trust

3. The Smoothing Formula

The smoothing formula in this section achieves the key objective of ensuring that smoothed value equates to market value on average, without systematically favouring or disadvantaging any particular group or cohort of members.

Assuming monthly calculations[15], the smoothed fund valuation at month t assigns a weighting (p) to that month's market value and a weighting (1-p) to the previous month's smoothed value increased by the expected long-term return, and adding cashflows in the month. The ratio p is fixed from the outset and cannot be varied subsequently.[16]

Algebraically, the calculation is as follows:

$$SV_t = CF_t + p * (MV_t - CF_t) + (1-p) * SV_{t-1} * (1+i_{t-1}),$$

where:

SV_t is smoothed value in month t.

CF_t is cashflow in month t.

p is weighting for current market value in the smoothing formula.

MV_t is market value in month t (including cashflow, CF_t).

i_t is the expected (monthly) long-term return on the scheme's assets at time t.

At the extremes:

if **p = 1**, $SV_t = CF_t + (MV_t, -CF_t) = MV_t$, as expected.

if **p = 0**, $SV_t = CF_t + SV_{t-1} * (1+i_{t-1})$, also as expected.

Trial and error indicate that an appropriate value for "p" is between 1% and 1.5%. A value for "p" of 1% is assumed in this paper. The implications of varying it are explored in Section 6. The paper also assumes that "i_t", the expected long-term return (including the Equity Risk Premium) assumed in the smoothing formula will remain constant at 4% per annum (0.33% a month). The implications of varying this assumption are also explored in Section 6.

Table 1 below shows smoothed fund calculations for the scheme's first six months, for a notional scheme start date of 1 January 2020, assuming cashflows and market returns as per the table. The market returns shown are actual returns on the FTSE All-Share Index in the period.[17] Prices fell sharply between January and March 2020 as markets reacted to the spread of COVID-19, then recovered in the next three months. The calculations also assume that the smoothing formula gives a 1% weighting to current market value and assumes a long-term return (including ERP) of 0.33% a month (4% a year).

Cashflows are assumed to grow from 10 in the first month (Jan 2020) to 20 in month 2 (Feb 2020), 30 in month 3 (Mar 2020), etc. This pattern of cashflows is broadly consistent with how cashflows might be expected to grow in the early months as the new smoothed AE scheme is rolled out.

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[15] For conventional DC pension arrangements, fund values are normally calculated daily. For the smoothed fund, monthly or even quarterly valuations will suffice because of the low weighting for current market value in the smoothing formula and consequent low volatility of quoted returns.

[16] The implications of this stipulation are discussed in Section 6.

[17] In practice, returns will be reduced by the management charge. This detail is ignored.

Table 1

Month	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20
(a).Net·cashflow·in·month·(CF_t):	10	20	30	40	50	60
Market·return·in·month	**-3.3%**	**-8.9%**	**-15.1%**	**+4.9%**	**+3.4%**	**+1.5%**
Market·value·at·month·end (MV_{t+1}·-·CF_{t+1}):	9.67	27.04	48.44	92.79	147.68	210.87
(b)·p·*·(MV_t·-·CF_t)········(p=0.01)	0	.0967	.2704	.4844	.9279	1.477
(c)·(1-p)·*·SV_{t-1}·*·(1+i_{t-1})··(i_t·=·0.33%)	0	9.9327	29.828	59.693	99.505	149.42
(d)·SV_t·=·(a)·+·(b)·+·(c)	10	30.029	60.098	100.18	150.43	210.90
Smoothed·return·in·month: ·=·(SV_{t+1}·—·CF_{t+1})/·SV_t·—·1	**0.29%**	**0.23%**	**0.13%**	**0.25%**	**0.31%**	**0.33%**

The table shows monthly market returns varying from a low of -15.1% (March 2020) to a high of +4.9% (April 2020), a range from lowest to highest of 20%. Smoothed returns for the same period vary from a low of +0.13% (March 2020) to a high of +0.33% (June 2020). The range from lowest to highest is 0.20%, or one-hundredth of the range for unsmoothed returns. The ratio of smoothed to market value ranges from a high of 124% at end March 2020 to 100% at end June.

This example shows the virtues of smoothing, especially for workers unaccustomed to the volatility of stock markets. The vast majority of AE contributors are in this category. The paper makes no attempt to quantify the psychological benefits of lower volatility; they are discussed however on pages 16-17 of the paper referenced in the footnote[18].

Another example of smoothed fund calculations, this time over a longer period, gives similar results. Table 2 below assumes a hypothetical scheme start date of 1 January 2000 and the same pattern of cashflows, i.e., increasing arithmetically in the early years as the scheme is rolled out. This assumed scheme start date is challenging: 1 January 2000 marked the end of the dotcom boom and the start of the subsequent bust. Markets fell sharply for the next three years before recovering. Smoothed and market returns for the scheme's first six years, with smoothed returns calculated in exactly the same manner as in Table 1, are as follows:

Table 2

Year	2000	2001	2002	2003	2004	2005	
Market·return	-6%	-13%	-23%	+21%	+13%	+22%	
Smoothed·Return	+4%	+2%	+1%	+2%	+5%	+7%	
Cashflow·	+780	+2,220	+3,660	+5,100	+6,540	+7,980	

Over the six-years, market returns span a 45% range (from a low of -23% in 2002 to a high of +22% in 2005) compared to a 6% range for smoothed returns (+1% in 2002; +7% in 2005). At the end of the period, the smoothed value is 83% of market value, but it was well above market value for much of the period. By end September 2002, markets had fallen more than 40% since 1 January 2000; smoothed values had increased by more than 7% over the same period, and the ratio of smoothed to market value was 140%.

The key question asked by critics is whether, in this hypothetical scenario, new and existing members would be happy to contribute to the scheme in September 2002. One critic jibed:

[18]https://web.actuaries.ie/sites/default/files/2021-01/AE%20paper%20for%20SAI%20CFagan%206%20Jan%202021.pdf

"Pensioners needn't worry if the market drops because they won't be paid by selling their investments at low prices. They will get paid by taking cash from incoming contributions and giving more of that cash to pensioners than their investments have actually earned. (No, it's not a Ponzi scheme.) Investors needn't worry that their cash isn't being used to buy investments because they are being credited with notional investments at a higher value than the fund actually holds. (No, really, it's NOT a Ponzi scheme.)"

Yet this is precisely what is happening in the above example.   Members retiring in September 2002 are being paid 140% of market value. New joiners and continuing contributors at that date are buying from them at that inflated price. The analysis of Appendix 1 indicates that, in this scenario, young to middle-aged workers will readily agree to the trade, because the ratio of smoothed to market value is well below the point at which it would be worthwhile for them to move to a market-based arrangement. As is also noted in Appendix 1, the breakeven point is lower for someone close to retirement, so older workers may be best advised in this hypothetical September 2002 scenario to transfer to a market-based arrangement, remembering of course that the rules will stipulate that their accumulated savings must remain in the smoothed fund, for eventual payment on the same terms as other members, and they will be prohibited from re-joining the smoothed scheme for three years. If this scenario were to play out in practice, there is a strong possibility that members close to retirement would prefer to remain in the smoothed scheme, seeing that it had delivered 7% growth since January 2000, and reject the option of moving to a market-based arrangement which had experienced a 40% fall over the same period, whatever the theoretical merits of such a move.

Smoothed values were calculated for the 30 years 1990 to 2019, assuming market movements as per the UK's FTSE All-Share Index, and cashflows growing arithmetically for the first 10 years, remaining constant for the next ten years, then reducing arithmetically for the final ten years, reaching zero at the end of 30 years. The trapezoid shape of assumed cashflows reflects a likely real-world pattern of cashflows as the new AE scheme is rolled out and gradually ages.

On these assumed cashflows and market movements, and with the same parameters as above for the smoothing formula (1% weighting for current market value, 4% pa assumed long-term return), smoothed and market indices (adjusted for cashflows) over the 30-year period are as follows:

Figure 2

UK: Smoothed Index v Market Index (adj) 1990 to 2019
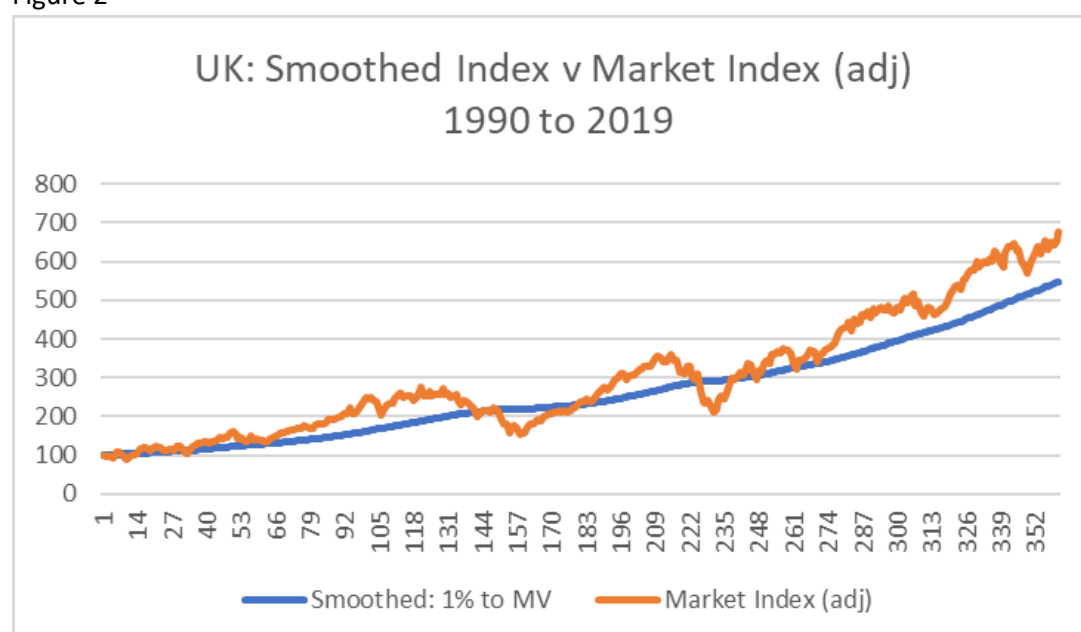
The contrast between the stability of smoothed returns and the volatility of market returns in figure 2 is illustrated starkly in figures 1, 3 and 4 below:

Figure 1

Monthly smoothed and market returns
UK for 360 months, 1990 to 2019
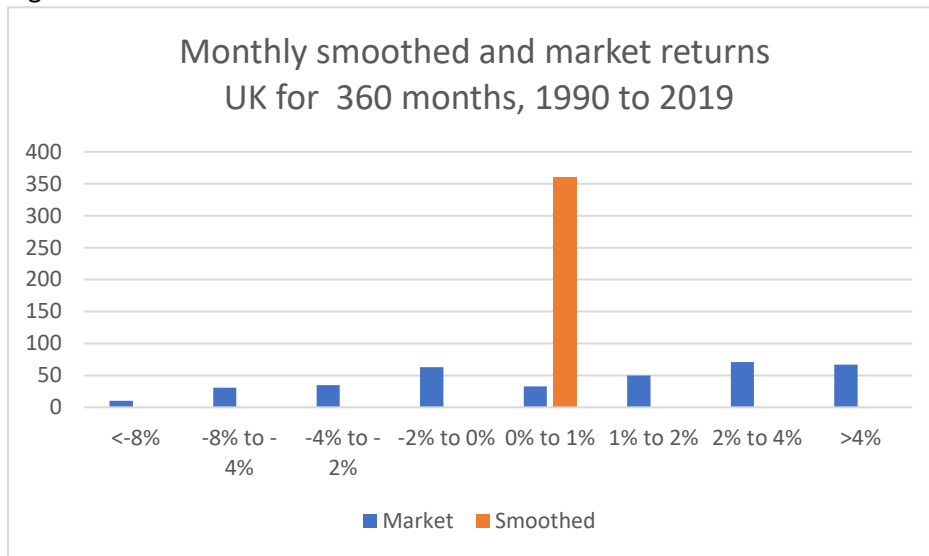
Figure 3 (another view of the market returns in figure 1)

Monthly Market Returns over 30 years
(UK 1990 - 2019)
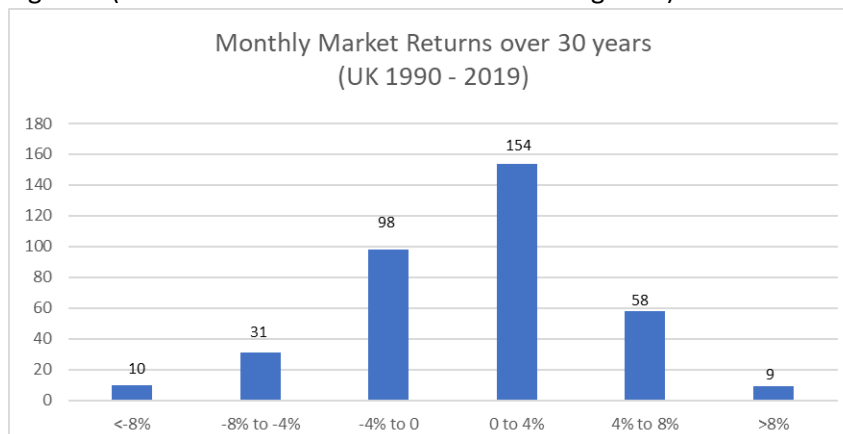
Figure 4 (an expanded view of the smoothed returns in figure 1)

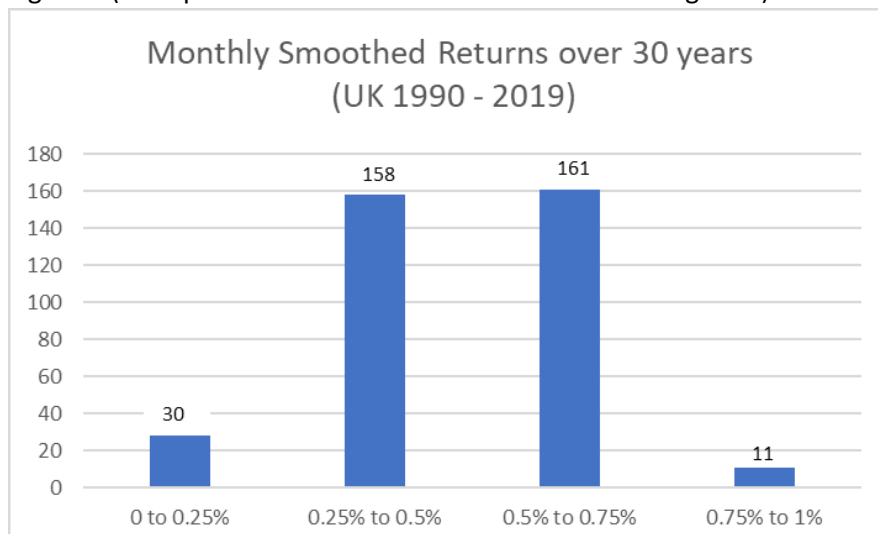Monthly Smoothed Returns over 30 years
(UK 1990 - 2019)

Figure 3 shows that, over the 30-year period (360 months), market values fell more frequently than one month in every three, falling by more than 8% in a month on 10 occasions, by more than 4% in a month on 41 occasions. In contrast, figure 4 shows positive smoothed returns every month for the entire period.

That particular 30-year period was generally good for UK equities. Markets fell sharply on occasion (e.g., after the dotcom boom and during the Global Financial Crisis of 2007-09) but the smoothed approach copes well with corrections that reverse themselves within a few years. The question is: how would it cope with a more prolonged downturn? The Japanese experience since 1990 provides such a test.

From its all-time high on 31 December 1989, the Japanese market fell precipitously – down 40% in 1990, down another 25% over the next two years. After three years, the total return index was just 45% of its starting level. It staged a partial recovery in the early 2000's, but suffered a severe relapse during the Global Financial Crisis, falling more than half between 2007 and 2009. By January 2013, twenty-three years after the initial collapse, the Japanese total return index was less than 40% of its starting level. It recovered strongly in later years but was still only 82% of its January 1990 level by 1 January 2020.

Figure 5 shows the progress of Japan's TOPIX Index with dividends reinvested in the 30 years from January 1990 to December 2019.

Figure 5

Japan TOPIX
1990 to 2019
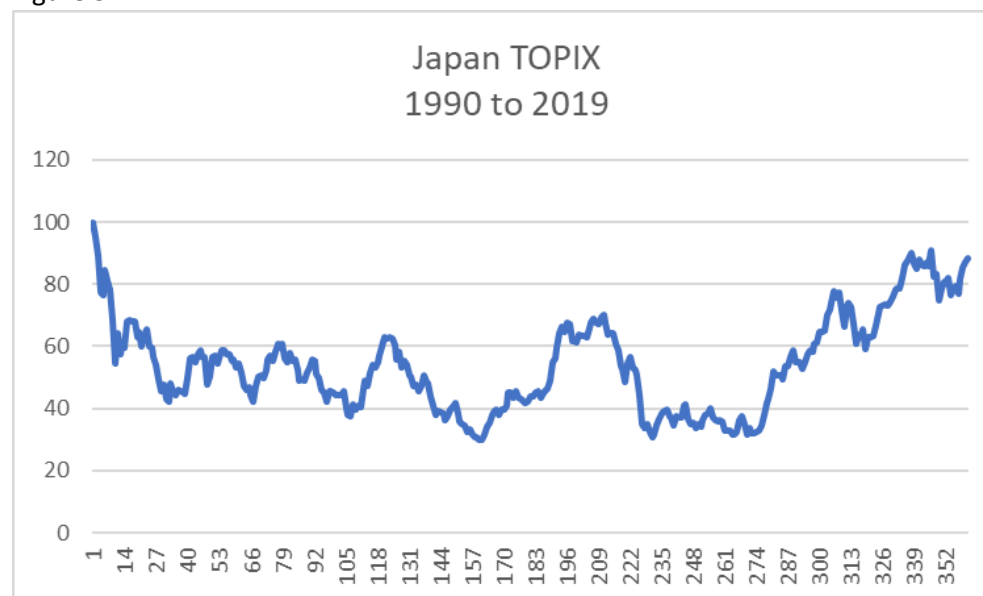
Assuming the same trapezoid pattern of cashflows as above[19] (increasing for ten years, staying constant for ten years, then declining through zero after 30 years), the progression of smoothed and market indices (adjusted for cashflows) is as follows:

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[19] The reasonableness of this assumption for both the Japanese and UK markets over that period will be explored in Section 6.

Figure 6

Smoothed & Market Indices
Adjusted for cashflows
Japan 1990 - 2019
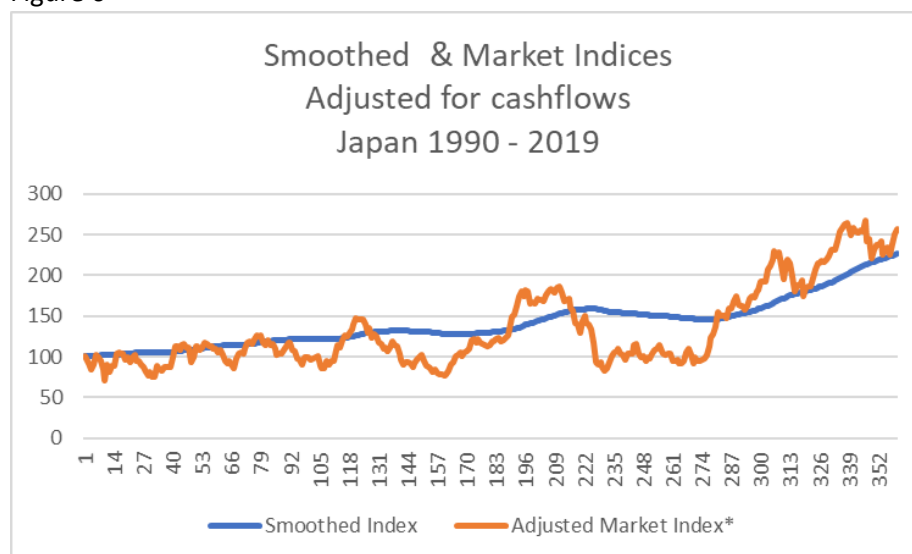
The fall in market values in the early years shown in figure 6 is not nearly as severe as that shown in figure 5. This is because new cashflows are being invested at lower prices, and the benefits of the improved terms are being shared across the membership. Smoothed returns are negative in some years (worst calendar year smoothed return is -0.7% in 2009), but the lowest smoothed ten-year return is a positive 19.4% (average +1.8% a year, between 2003 and 2012) and the average smoothed return over the entire 30-year period is +3.0% a year. These returns are surprisingly good against the backdrop of Japanese financial experience in that period, which included periods of negative returns, even for bank depositors.

Figure 2 (smoothed and market returns for the UK) shows that smoothed values can remain below market values for long periods; figure 6 (smoothed and market returns for Japan) shows that they can remain above market values for long periods. Members contribute over many years and receive an income from the fund over many years, so the risk of a systematic bias for or against any particular cohort is minimal. This conclusion rests on the assumption that, in the long-run, periods of undervaluation relative to market value will be broadly balanced by periods of overvaluation. The reasonableness of this assumption will be tested in the next section.

4. Ensuring the scheme's long-term stability and durability

Positive cashflows cause the ratio of smoothed to market value to be drawn back towards 100% whenever it strays, in either direction. Algebraically, this is because $(S+C)/(M+C)$ is closer to 100% than S/M (S signifies smoothed value, M market value and C cashflow)[20]. High cashflows relative to existing funds in the early years ensure stable smoothed returns in those years, in all market conditions. This pattern is clearly discernible in table 3 below, which shows lowest and highest smoothed returns for scheme years 1 to 5 for all hypothetical 1 January scheme start dates between 1/1/1986 and 1/1/2020 and market returns as per the UK's FTSE All-Share Index. Cashflows are assumed to follow the early-years pattern outlined earlier.

Table 3

Scheme Year	Lowest return	Return year	Scheme start year	Highest return	Return year	Scheme start year	Range lowest to highest
Year 1	3.0%	2008	2008	5.0%	2009	2009	2.0%
Year 2	2.4%	2008	2007	5.9%	1987	1986	3.5%
Year 3	2.1%	2002	2000	6.0%	1993	1991	3.9%
Year 4	1.8%	2002	1999	6.5%	1997	1994	4.7%
Year 5	1.6%	2002	1998	7.2%	1998	1994	5.6%

The final column of table 3 shows that the range from lowest to highest smoothed return increases each scheme year, from 2.0% in the first scheme year (lowest 3.0% for start date 1 January 2008, highest 5.0% for start date 1 January 2009) to 5.6% by the fifth scheme year (lowest 1.6% in 2002 for a scheme start date of 1 January 1998; highest 7.2% in 1998 for a scheme start date of 1 January 1994). Especially noteworthy is that smoothed returns are positive in each of the first five years for all hypothetical 1 January scheme start dates from 1986. This is a very desirable outcome for workers, most of whom will have little or no understanding of the stock market and for whom any fall in the value of their investments, however small, would be a cause for concern. As noted earlier, this paper steers clear of trying to quantify the psychological benefits of smoothing.

Positive cashflows are a source of stability, but negative cashflows have the opposite effect, if the smoothing approach is left unchanged. Negative cashflows would cause smoothed values to diverge from market values, in both directions. Algebraically, this is because $(S-C)/(M-C)$ is further from 100% than S/M.

Positive cashflows are expected for the scheme's first 30 years or more, but they will eventually turn negative. That eventuality must be planned for in advance.

The challenge posed by negative cashflows is surmounted by stipulating that, when cashflows do eventually turn negative, members will still receive smoothed value on exit, calculated in exactly the same manner as when cashflows are positive. However, amounts withdrawn from the fund for net exits will be calculated at market value, with the excess (if any) of smoothed value over market value coming from a separate buffer account. Similarly, the buffer account will be credited with the excess whenever market value exceeds smoothed value for net exits. Thus, negative cashflows will have no impact on the scheme's financial equilibrium: the ratio of smoothed value to market value will be exactly the same immediately before and immediately after funds have been withdrawn. This begs the question: when will the buffer account be established, and how will it be funded?

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[20] Ignoring the trivial case where S = M, when the ratio S/M is exactly the same as $(S+C)/(M+C)$, i.e., 100%.

The buffer account will only be required when cashflows turn negative, projected for some time after year 30. It will be funded from margins in the management charge. Margins will emerge because the management charge for the smoothed scheme will be approximately the same as under the current AE regime (0.5% of AUM) but the costs of managing the underlying assets and of administering members' accounts will be lower than at present. This is because there will be just one smoothed fund, compared with a multiplicity of unit-linked funds required at present for AE. For example, NEST has 46 unit-linked funds for members who choose the default investment option, one for each planned retirement year, as well as specialist funds. The smoothed fund will be valued once a month (possibly less frequently, because of the stability of smoothed returns), compared with daily valuations required under the current AE regime.

In the long run, the cost of managing assets and administering member accounts in the smoothed scheme is estimated at 0.3% of assets under management[21], so 0.2% of AUM can be transferred to the buffer account each year.

In the early years, costs will exceed 0.5%, and the shortfall will be covered by borrowings. No transfers will be possible in those years. Borrowings in the early years are expected to have been repaid by year 15, possibly sooner, and transfers of 0.2% per annum to the buffer account can start from that date. The buffer account will be well funded by the time cashflows eventually turn negative, sometime after year 30. When cashflows do turn negative, the buffer account will be deployed as above to pay any excess of smoothed value over market value or to receive any excess of market value over smoothed value for net exits.

The buffer account cannot be allowed to fall to zero. Projections indicate that this will never happen, assuming transfers as above[22]. The 2,000 60-year simulations in the paper referenced in the footnote include some extreme outcomes: one shows negative returns on cashflows over the entire 60 years, which of course also implies periods of negative smoothed returns.

An additional safeguard against the buffer account falling to zero is that scheme rules will authorise the trustees to increase the management charge (with resulting higher transfers to the buffer account) if they believe there is a risk of the buffer account being exhausted at some future date[23]. Because of the very long timescales involved and the stability of projected cashflows (due *inter alia* to the prohibition on transfers), the trustees will be able to anticipate problems years in advance and so will have ample time to take corrective action if necessary. A small increase in the management charge, of the order of 0.05% a year, should be sufficient to address potential problems well before the scheme's viability could be put at risk. Preliminary analysis indicates that, in the long-term, a reduction in the management charge is more likely because of the buffer account getting too large than of it being increased because of the buffer account getting too small.

The long-term 'steady state' is for net cashflows to be negative (i.e., claims to exceed contribution income), but investment income and capital gains will keep total fund values broadly unchanged in real terms. However, contingency plans must consider the possibility of the scheme closing to new entrants at some future date and even of it closing to new contributions from existing members. In either eventuality, net assets will eventually fall to zero. If that were to happen, equity between

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[21] Detailed analysis will be required to confirm this estimate. *A priori* considerations, which include comparing the number of transactions required with those required for unit-linked funds, indicate that, if anything, it overestimates the long-term cost of running the smoothed scheme.

[22] Details of the 2,000 simulations, each extending over 60 years, from which this conclusion were derived can be found in Section 12 of the paper to the Society of Actuaries in Ireland referenced earlier.

[23] Any increase in the management charge will of course be subject to regulatory approval.

different cohorts would still be maintained by converting entitlements for remaining members to guaranteed amounts when the end was in sight and compensating them for the loss of future equity participation by crediting them with the remaining balance in the buffer account. This is the ultimate acid test of the scheme's durability. It passes the test.

The above measures will ensure the smoothed scheme's continued durability and fairness, irrespective of whether cashflows are positive or negative, and of whether asset values are growing or declining.

5. Addressing the challenge of longevity

A major challenge for DC pensioners is deciding how much to withdraw from their pension accounts each year: take too much and risk outliving their savings; take too little and risk leaving too much for the next generation. Life annuities address the longevity risk but have two big drawbacks:

(i)   Retirees sign away the right to unused capital on death;[24] they also lose the right to make withdrawals other than through regular annuity payments. Nor can they vary the withdrawal amount to deal with changes in personal or family circumstances or changes in price levels[25].

(ii)   the implied rate of investment return for the rest of their lives is the return on bonds at time of purchase (or less, after factoring in the insurer's need for margins to cover costs, for longevity and investment risks, and to reward regulatory capital).

The longevity option under the smoothed approach as set out below eliminates these drawbacks while still guaranteeing an income for life and allowing retirees to enjoy equity returns until death. Members retain full entitlement to their pension accounts and any balance on death is paid to their dependents/ estate. They can opt out of longevity protection at any time.

Members may opt for longevity protection from age 75. Up to then, they decide what percentage of the account to withdraw each year, within specified lower and upper limits (3% and 8% respectively of smoothed value were suggested earlier). Then, on reaching 75, they may opt (but are not obliged) to transfer some or all of their account to a "Lifetime Income Fund" (LIF), which will earn a lower return than the main smoothed fund.[26] The proposed reduction in smoothed return is 2.45% a year, in exchange for which members have a right to an income for life, determined as below.

The amount transferred to the LIF at age 75 will be divided into 15 equal subaccounts. The retiree will claim one subaccount each year. On death before age 90 (i.e., before 15 years have elapsed), any remaining balances in the subaccounts will be paid to the estate.[27] For example, if a retiree dies at 85 exact, they will have claimed 10 subaccounts and the remaining 5 subaccounts will be paid to their estate.

If the retiree lives to age 90, they will have claimed all 15 subaccounts; there will be nothing left in the LIF, and longevity protection will be activated as below.

From age 90, retirees will receive an additional subaccount each year for the rest of their lives, irrespective of how long they live. These 'bonus' subaccounts will be paid from a separate "Longevity Protection Fund" (LPF), which the trustees will establish and maintain for members' benefit. The LPF will be funded by the 2.45% yearly deductions from smoothed returns from age 75.

Table 4 below models the workings of the Lifetime Income Fund (LIF) and the Longevity Protection Fund on simplified assumptions. A fixed return of 4.5% a year is assumed for the smoothed fund[28], implying a return of 2.05% a year on the LIF. Column 5 shows assumed survivors each year from

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[24] The loss of capital on death can be alleviated but not eliminated by choosing a guaranteed minimum payment period (typically five years). This choice has a cost in the form of a lower annuity.

[25] It is possible to buy inflation-linked annuities (for a price) but fixed annuities are the norm.

[26] The likelihood is that retirees will not transfer the entire account balance to the LIF; that they will leave some in the main smoothed fund, to provide for a dependent or for a 'rainy day'.

[27] The rules could include a provision allowing retired members to request that, on death, payments should continue to a named beneficiary for the remainder of the 15 years rather than be paid as a lump sum.

[28] This could be expressed as an assumed 1% pa risk-free, plus 4% equity risk premium, less 0.5% management charge.

1,000 joiners at age 75: 538 are assumed to survive to 90 and 122 to 100. These assumed survival rates are much higher than current survival rates at older ages. They allow for a high element of self-selection and for significant mortality improvements in future.

The table indicates that someone who transfers £150,000 to the LIF at age 75 can take £10,000 a year for life, increasing by 2.05% a year (column 3) if the model assumptions are realised. In year 15, the income per surviving member is £13,420. By year 30 (i.e., if the member survives to 105), the annual income is £18,200.   On death before 90, any remaining balance in the LIF is paid to the member's estate, e.g., on death at the end of year 1, £142,870 is paid to their estate.

Table 4

Progress of Longevity Protection Fund to age 107 for 1,000 pensioners joining at age 75. Each starting account value is 150 (15 sub-accounts of 10)						
		Per Contributor (150 starting balance)		Total for all contributors (1,000 starters at 75)		
Year	Age at start of year	Amount withdrawn	Account balance at year end	Survivors at year end	Additions to (+), Payments from (-) LPF	LPF at year end
0			150.00	1000		
1	75	10.10	142.87	992	3,573	3,653
2	76	10.31	135.38	980	3,361	7,253
3	77	10.52	127.53	963	3,129	10,778
4	78	10.74	119.30	942	2,879	14,206
5	79	10.96	110.68	916	2,617	17,520
6	80	11.18	101.65	888	2,346	20,706
7	81	11.41	92.21	856	2,070	23,755
8	82	11.64	82.34	823	1,795	26,658
9	83	11.88	72.02	787	1,522	29,413
10	84	12.13	61.25	750	1,254	32,019
11	85	12.37	50.00	710	995	34,476
12	86	12.63	38.27	669	745	36,790
13	87	12.89	26.04	626	510	38,966
14	88	13.15	13.29	583	291	41,017
15	89	13.42	-	538	91	42,956
16	90	13.70	-	493	- 7,057	37,676
17	91	13.98	-	447	- 6,566	32,659
18	92	14.26	-	402	- 6,051	27,943
19	93	14.56	-	357	- 5,520	23,557
20	94	14.85	-	314	- 4,980	19,526
21	95	15.16	-	271	- 4,430	15,876
22	96	15.47	-	231	- 3,879	12,625
23	97	15.79	-	192	- 3,335	9,784
24	98	16.11	-	156	- 2,799	7,363
25	99	16.44	-	122	- 2,281	5,363
26	100	16.78	-	92	- 1,791	3,773
27	101	17.12	-	65	- 1,340	2,573
28	102	17.47	-	44	- 948	1,720
29	103	17.83	-	27	- 629	1,155
30	104	18.20	-	16	- 387	812
31	105	18.57	-	8	- 218	625
32	106	18.95	-	4	- 109	542
33	107	19.34	-	2	- 53	512

The final column of table 4 shows the projected growth and decline of the LPF. In the fifteen years from age 75, the LPF grows as new contributions are added (2.45% of account balance each year is transferred for survivors from the 1,000 who joined at 75). Payments from the LPF commence from

age 90 and reduce as the number of survivors from the 538 who reach age 90 declines, until there are just 2 survivors at age 107. According to the model, there is still a positive balance in the LPF at that date.

The trustees will be charged with managing the LPF. Subject to regulatory constraints,[29] they will be allowed to vary the deduction from investment return for the cost of longevity protection if projections for life expectancy change. Increasing longevity may also cause the trustees to increase the age at which members join the LIF, to ensure fairness across generations.

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[29] One of the main ones being an obligation on trustees to ensure that members' expectations for the cost of longevity protection (e.g., a 2.45% pa deduction from returns) accord with advice from independent experts.

6. Setting parameters

Two key objectives of the smoothed approach are:

(i)   To reduce the incidence of negative smoothed returns, ideally eliminating them completely.

(ii)   To avoid smoothed value diverging so far from market value that contributors would be best advised to cease contributing to the scheme. The analysis in Appendix 1 indicates that the breakeven point for a young contributor is c170% of market value (assuming a 4% ERP) and is lower for older contributors.

Looking at the smoothing formula of Section 3:

$$SV_t = CF_t + p * (MV_t - CF_t) + (1-p) * SV_{t-1} * (1+i_{t-1}),$$

objective (i) is achieved by giving a low weighting to current market value (i.e., a low value for "p"), while objective (ii) is achieved by assigning a high value to "p".

Analysis of the UK market for a notional scheme start date of 1 January 1990, and assuming the same trapezoid pattern of cash flows as earlier, indicates that a value for "p" of 1% would have delivered positive smoothed returns each month for the entire 30-year period. The ratio of smoothed to market value peaks at 142.4% (in January 2003)[30], which is well below the point at which the analysis of Appendix 1 indicates that it would be worthwhile for young or middle-aged members to cease contributing. Thus, on the evidence of the UK market for that period, a value for "p" of 1% would have met both objectives.

A similar exercise for the Japanese market for the same 30-year period tells a different story. Using a value for "p" of 1%, negative monthly smoothed returns occur not infrequently, and the ratio of smoothed to market value peaks at 191.8%, which is well above the point at which the analysis of Appendix 1 indicates that it would be worthwhile for members to cease contributing[31]. Therefore, the pattern of cashflows for Japan would differ from that assumed earlier, so smoothed returns would be lower than those indicated in Section 3.   The weighting for current market value in the smoothing formula would have to be increased to 9% to bring the peak ratio of smoothed to market value below 160%. However, if "p" is increased to this level, many of the advantages of smoothing are lost, and negative smoothed returns would occur far too frequently, thus failing to achieve objective (i).

This paper assumes that the experience of the Japanese market from 1990 is an outlier and can be ignored in contingency planning, considering especially that investment managers will have a worldwide mandate, that investments will be chosen to deliver good returns over long investment horizons, and that the portfolio will be suitably diversified across industries, technologies, geographies, etc. Against that backdrop, a value for "p" of 1% can be expected to give reasonable results for objectives (i) and (ii). However, this conclusion must be thoroughly stress-tested.

In Section 3, it was stated that, once a decision is reached on the weighting for current market value in the smoothing formula, that weighting should remain unchanged forever. It is important for the integrity of the smoothing approach that members can trust that the formula is tamper-proof. At the same time, it is impossible to know how the world might change in future. Will the value for "p" chosen at the outset still be appropriate 50 years from now? The solution may be to specify a fixed

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[30] The ratio peaks in September 2002 for a scheme start date of January 2000. (See commentary on Table 2.)
[31] It is worth noting however that the worst month for Japan occurs almost 20 years after the initial collapse in 1990 and comes in the wake of a market fall of more than 50% between June 2007 and February 2009.

value for "p" at the outset, but to schedule a review after (say) 25 years, to confirm if the initial choice is still appropriate. Any review will need to be carefully circumscribed and accompanied by an assurance to members that no-one will be disadvantaged unreasonably by a change.
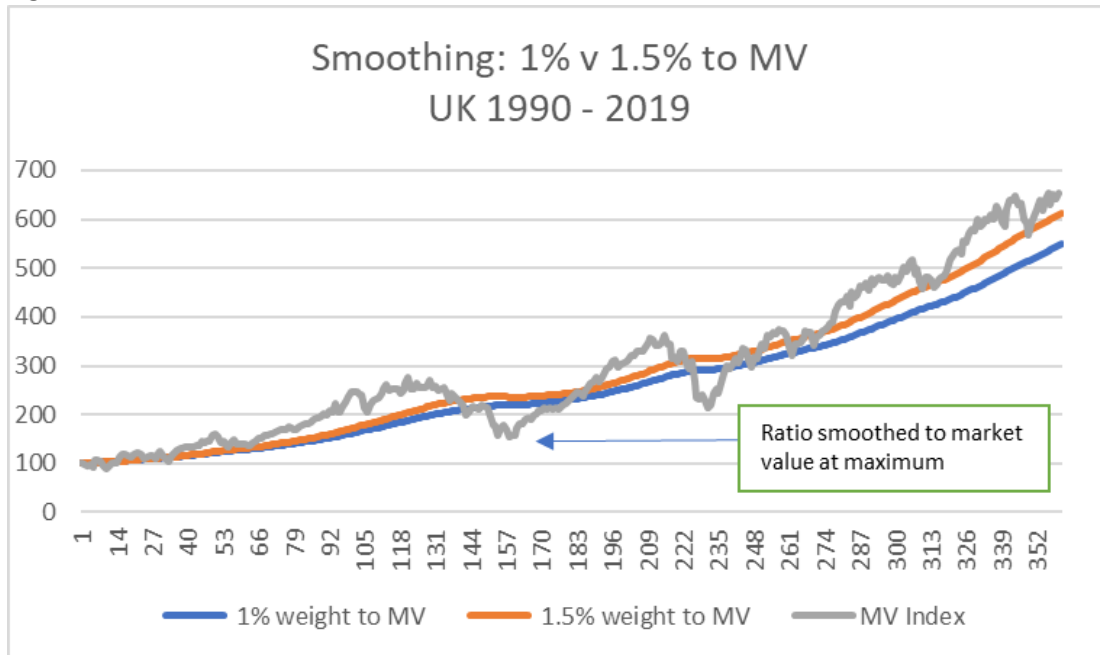
Figure 7

Figure 7 compares smoothed indices for the UK from 1990 to 2019, one with a 1% weighting for current market value in the smoothing formula, the other with a 1.5% weighting. The graph shows that, when markets grow strongly for a sustained period, the gap between the two increases. This can be seen in the period leading up to January 2000 (month 121), again in the period leading up to July 2007 (month 211), and most recently in the period leading up to December 2019 (month 360). In all cases, subsequent market falls brought the indices closer together. The same would be true in reverse if markets were to experience a prolonged fall, and can be seen in the corresponding graph for Japan.

At the point where the ratio of smoothed to market value is at a maximum (January 2003, when the ratio tops 140%), the monthly smoothed return (i.e., the rate of change of the smoothed index) is marginally negative with p = 1.5%. The slope of the smoothed index, i.e., the smoothed return, remains positive throughout with p = 1%.

Turning now to consider the impact of the long-term return "i_t" assumed in the smoothing formula:

$$SV_t = CF_t + p * (MV_t - CF_t) + (1-p) * SV_{t-1} * (1+i_{t-1}),$$

in theory, the chosen value of "i_t" should be the trustees' best estimate of the expected long-term return at time t, composed of the expected risk-free return plus the expected Equity Risk Premium (ERP).   Whilst the risk-free component is readily observable in the market, the same is not true for the ERP. Even among experts, opinions vary widely[32]. Therefore, careful governance will be required around its periodic assessment. The likelihood is that the trustees will reassess the expected long-term return only once a year, possibly less frequently. Also, to ensure continuity,

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[32] See for example https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3861152 The survey shows an average market risk premium for the US (1,756 respondents) of 5.5%, with a range from 3.1% to 8%.

constraints may be placed on the extent to which expected return will be allowed to vary from one year to the next.

This paper assumes a constant total return of 4% a year in the smoothing formula. Table 8 below shows how the charts of market and smoothed indices would have looked if the formula assumed a total return of 5% a year instead of 4% ("p" = 1% in both cases).

Figure 8
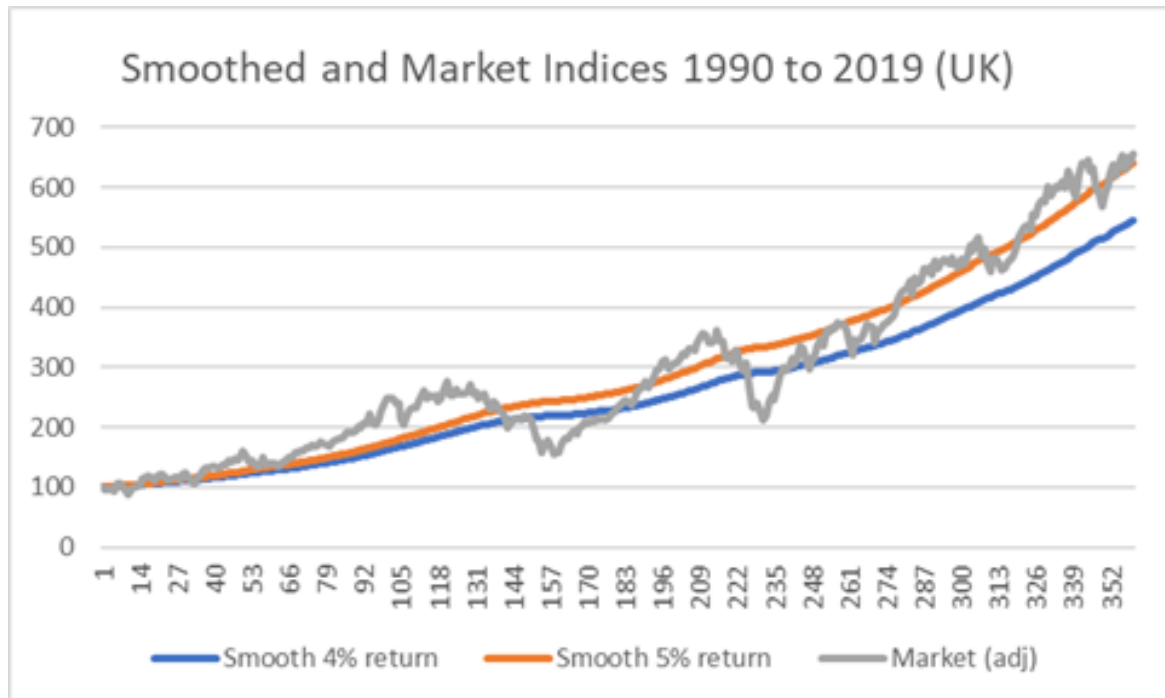
7. Conclusions

In their book "Radical Uncertainty", authors John Kay and Mervyn King stress the importance of asking "*What is going on here?*" Answering the question for AE pensions, the first observation is that scheme cashflows will be positive for decades to come, and member outcomes will be optimised by investing as much as possible in equities. That is the universal advice to young contributors and is manifested in high equity contents for AE default funds at young ages.

The response to the question would continue by observing that, from the scheme's perspective, falls in market values are good news, at least in the early decades, when cashflows are positive, because they allow trustees to acquire assets cheaply for members. Yet the conventional view is that falls in market values are bad news for older members, so much so that they are advised to reduce the equity content of their pension pots in the run-up to and after retirement, and to replace them with bonds and cash, which are expected to yield lower returns, with associated lower risk. Therefore, the scheme as a whole sacrifices return by investing a significant proportion of its assets in lower-yielding bonds and cash. A high-level estimate is that the expected value of AE assets (including for retired members) after 60 years under a "lifestyling" approach as set out in Appendix 1 is less than half the corresponding value under a smoothed equity approach.

The insight in this paper is that market values don't have to be obeyed blindly. Freed from this straitjacket, the conundrum of how to spare older and retired members from having to shift funds from equities to bonds in order to protect their value in volatile markets is resolved by stipulating that member transactions with the scheme take place at smoothed values rather than market values. At a stroke, this cuts the volatility of returns to a fraction of what it would be if transactions were at market values. Most importantly, it allows members to stay fully invested in equities for life.

The paper shows that smoothed values, calculated as per the formula in the paper, equate to market values on average. They can stray for a time, in either direction, but the formula eventually brings them back into balance. For AE members, purchases and sales are both spread over decades, so everyone can be reasonably assured of getting fair value in the long-term.

The paper also shows that, when cashflows eventually turn negative and assets must be sold at market prices prevailing at time of sale, the same smoothed approach can still be applied in a manner that is fair to all, even to the point of ensuring equitable treatment of the last survivors if the scheme is closed entirely to new contributions and assets fall to zero. This is a challenge that other approaches, most notably CDC (Collective Defined Contribution) fail adequately to address, because of the tension between the commitment to level contributions at scheme level and the inexorable rise in required contributions at individual level as members age. The only requirement under the smoothed approach is that cashflows remain positive for long enough to allow the scheme to cover its costs from management charges and to establish a modest buffer account. That point should be reached within 15 to 20 years at most. Projections indicate that cashflows will remain positive for considerably longer, so this objective will be readily achieved.

The value for money under the proposed approach is enhanced further by lower costs, particularly post-retirement, but also pre-retirement. Pre-retirement, the NEST scheme, for example, has 46 default funds, one for each planned future retirement age. Each fund must be valued and priced daily and units allocated to or cashed from members' accounts at prices prevailing on those dates. Under the smoothed equity approach, there will be just one fund, which will only need to be valued once a month, maybe even once a quarter. Returns will be quoted like interest rates rather than as

movements in unit prices, making the fund simpler for members to understand and for trustees to administer.

From retirement onwards, cost savings are greater. Retired workers will remain as members of the scheme, enjoying equity returns at deposit-like volatility. They will not have to leave at retirement, incurring frictional and out-of-market opportunity costs in transitioning from active to retired status, and without incurring higher charges for administration and asset management. Also, by remaining in the smoothed fund and making regular withdrawals from it, retired members will have no need for investment advice, the cost of which can take a large chunk from a small pension pot.

The big question is whether the smoothed approach would survive a prolonged market downturn, which could cause smoothed values to exceed market values for long periods. The paper shows that, even in a severe downturn (e.g., UK total return index falling more than 40% from peaks in 1999 and 2007), the ratio of smoothed to market value never gets close to the point at which it would be worthwhile for a young or middle-aged worker to consider moving from the smoothed to a market-based scheme. The relative insensitivity of smoothed returns to external market conditions in the scheme's early years, as shown in table 3 (page 14), provides further reassurance.

If markets keep falling over many years, smoothed returns will eventually turn negative, but the risk is mitigated by new cashflows being invested at lower prices in falling markets, and the benefits of those improved terms being shared across the membership. Even in the catastrophic Japanese market conditions after 1989, studied in Section 3, over a decade of almost uninterrupted falls is required for negative smoothed returns to make their first appearance, by which time market values (including 10 years of reinvested dividends) are down more than 60%.

The smoothed approach delivers better value for the vast majority of members even if they are being asked to contribute when smoothed value exceeds 150% of market value. The cross-over point, at which it is theoretically advisable for a contributor to consider moving to a market-based arrangement, is lower at older ages. In the hypothetical example of a scheme starting at the end of the dotcom boom, and funds invested in the UK market, a worker who was close to retirement in September 2002, when smoothed value was 140% of market value, would be theoretically best advised to move to a market-based arrangement, noting of course that they would only be allowed to move for new contributions, and they would be precluded from re-joining for three years. At that point, though, the worker would have seen steady growth in their smoothed account, up 7% from the start of 2000, compared to a loss of more than 40% if they had opted instead for a market-based arrangement from the start. In those circumstances, a behavioural psychologist might argue that the member would be more likely to stick with the smoothed approach, whatever the theoretical merits of moving.

It is important to stress that the smoothed equity approach is not for everyone. Contributors who are prepared to accept the volatility of stock markets pre- and post-retirement, or who think that they or their advisers have an edge in forecasting markets, are excluded from this general rule. Workers in these categories may do better by staying outside the smoothed scheme. Such people will generally be high earners and will probably already have alternative pensions in place. Therefore, they will not be part of the target group for auto-enrolment. Experience shows that the vast majority of workers (around 99% of NEST members) have no desire to manage their own investments.

Another question asked by critics is how the scheme's balance sheet will be presented when smoothed value exceeds market value. The answer is that the liability under the smoothed

approach is _not_ the current smoothed value of the assets, but their smoothed value in the long-term.   Provided that the trustees can satisfy themselves (and their auditors and regulator) that smoothed value will equate to market value on average when liabilities eventually crystallise (on death or at/in retirement), then it matters not whether smoothed value is above or below market value at a balance sheet date.   Analysis shows that it will be relatively straightforward for the trustees to satisfy this requirement[33].

The longevity proposals in Section 5 eliminate the risk of retirees outliving their savings, without forcing them to part with a portion of their capital and allowing them to continue to reap the rewards of equity returns at low volatility. They can have their cake and eat it. All they will be asked to sacrifice is a portion of the investment return from age 75.

Existing market-based AE schemes can continue alongside the smoothed scheme. Longer term, the better value and lower volatility of returns under the smoothed approach should see it capturing a high proportion of the overall AE market.

When the smoothed AE scheme has been in place for a number of years, it should be possible to extend it to DB retirees and to retirees from non-AE DC arrangements, resulting in gains for both sponsors and retirees. For example, at current interest rates, the cost to a DB sponsor of a level pension for a new retiree could be (say) 21 times the yearly pension. Assuming an expected return from equities of 4% a year more than from bonds, the retiree could reasonably expect a 25% higher pension from the smoothed fund at a 20% lower cost to the sponsor. In deciding which to choose, the retiree (or their adviser) would need to balance the risk of the 4% ERP not being realised against the expectation of a 25% higher pension if it is realised, with the added advantages in the smoothed fund of flexible drawdown, unused capital returned on death, etc.   Similar offers could be made to retirees from non-AE DC arrangements.

In both cases, the trustees would need to take steps to minimise the risk of anti-selection by, for example, stipulating that transfers to the smoothed scheme must be phased over (say) five years, with "interest" at (say) the risk-free rate plus 1% a year being credited on amounts yet to be transferred.   The purpose in spreading transfers over a number of years would be to minimise the risk of sponsors and retirees opting for the smoothed scheme when smoothed value is less than market value but eschewing it when smoothed value exceeds market value. This refinement introduces an element of leverage to the smoothed scheme, the implications of which will require careful consideration before implementing it.

The above musings on how the proposed approach might be extended to DB retirees and to retirees from non-AE DC arrangements are tentative and will require detailed evaluation. What the paper has demonstrated however is that the smoothed equity approach meets the brief of delivering a low-cost affordable pension to the majority of the population, and of ensuring that trustees and investment managers take a long view on investments, one conducive to investing sustainably.

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[33] See for example pages 51-52 of the paper: https://web.actuaries.ie/sites/default/files/2021-01/AE%20paper%20for%20SAI%20CFagan%206%20Jan%202021.pdf which explore the hypothetical example of a single contribution on 1 January 1990, invested in the Japanese market.

Appendix 1
Estimating the added value of the smoothed approach to auto-enrolled pensions

This appendix estimates the added value of the proposed smoothed approach compared to the current AE regime. AE contributors who are happy to embrace the volatility of equity returns pre- and post-retirement and who don't have to pay for investment advice post-retirement are excluded from the comparison. Such contributors are in the minority. Close to 99% of AE members opt for the default investment approach pre-retirement and can reasonably be expected follow a similar investment strategy post-retirement. They will be the biggest beneficiaries of the smoothed approach.

Under the approach proposed in this paper, members will remain in the smoothed scheme post-retirement (after taking the retirement gratuity), earning equity returns and benefiting from lower (Group) charges for administration and asset management. The comparison is therefore between:

(a) Under AE as it currently operates, a default investment strategy pre-retirement followed post-retirement by an annuity or a drawdown product with an asset mix as below; and

(b) Under the smoothed approach, 100% in equities pre- and post-retirement, with market values smoothed as per the formula in the paper to reduce the volatility of returns quoted to members.

The assumed default investment strategy pre-retirement under the current regime is 80% equities, 20% bonds until 10 years before retirement, with the mix changing gradually to 50% equities, 50% bonds by retirement date. At retirement, members are assumed to take a 25% gratuity and to invest the other 75% in an individual drawdown product with the same investment mix as just before retirement, i.e., 50% in equities, 50% in bonds[34]. These proportions are assumed to remain constant until death[35] (average 22 years assumed from retirement to death[36]). Retired members are assumed to make level annual withdrawals, and to aim to leave a residual balance on death of 10% of the account value at retirement.

Other assumptions required to complete the comparison are as follows:

(i) Average long-term return on equities 4% a year higher than on bonds. Alternative calculation assumes a 3% p.a. higher average return on equities[37].

(ii) Post-retirement, average charge for administration and asset management of 0.9% a year under the current regime compared to 0.5% under the smoothed approach. The difference is mainly due to different terms for individual and group buyers.

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[34] The average equity content post-retirement is probably more than 50% for affluent retirees, who can afford to take investment risk, and less than 50% for less affluent retirees. Most AE retirees are in the latter category.

[35] The likelihood is that the equity content reduces further at advanced ages. This possibility has been ignored, as has the possibility of retirees buying annuities (implying 100% in bonds) either at retirement or at an older age. The assumed equity/bond mix can be interpreted as an average during retirement.

[36] Average life expectancy from retirement is less, but retirees opting for drawdown must plan on the basis that they will outlive expectations.

[37] Calculations assume a bond yield of 1½% a year, and level contributions and withdrawals. Results would be similar if contributions and withdrawals were assumed to increase with inflation, with a corresponding increase in bond and equity yields.

(iii)   Post-retirement, average charge for investment advice of 0.6% a year. No corresponding charge under the smoothed approach.[38]

(iv)   Pre-retirement, charge of 0.5% a year for admin and asset management under both approaches, although the cost of the smoothed approach is assumed to be 0.3% a year in the longer term, with the 0.2% saving being transferred to the buffer account. Savings will result mainly from the lower cost of administering a single pooled fund. Also, fund valuations will only be required monthly or possibly even quarterly under the smoothed approach, versus daily valuations required at present under AE.

On these assumptions, the smoothed approach delivers almost 70% better value for a young contributor, falling to 50% better value for someone in mid-career, and to 33% for a contributor five years from retirement.

The relative value differs between gratuity and pension. For someone who contributes to the smoothed fund for their entire working life, the pension under the smoothed approach is 85% higher than under a lifestyle approach, while the gratuity is 32% higher. These relativities reflect the much better value of the smoothed approach post-retirement, due to a combination of higher investment returns (100% in equities versus an assumed 50% in equities under a lifestyle DC approach), lower administration costs and no charge for post-retirement investment advice (in combination, assumed to be worth another 1% a year in retirement). The estimated 70% overall better value for the smoothed approach allows for the relative weightings of cash and pension in the overall retirement package. However, the gratuity could represent a lower percentage of the fund at retirement for workers in this category if the gratuity is restricted to 1½ times' earnings. Thus, the value of the overall package under the smoothed approach for someone in this category could be more than 70% higher than under a lifestyle approach.

For a worker who joins the smoothed scheme in mid-career, the overall package under the smoothed approach is worth approximately 50% more than under a conventional lifestyle approach, approximately 33% more for someone who joins with five years to go to retirement.

The above comparative figures assume an average Equity Risk Premium of 4% a year. The corresponding figures if the long-term ERP is 3% a year rather than 4% are as follows (with similar clarifications and qualifications):

	Superior return under smoothed approach compared to a conventional approach	
	4% ERP	**3% ERP**
Contributes to smoothed scheme for full working lifetime	+70%	+52%
Contributes to smoothed scheme for 22 years	+50%	+39%
Contributes to smoothed scheme for 5 years	+33%	+28%

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[38] Charges for investment advice vary widely. The cost (as a percentage of assets under management) is higher for smaller pension pots.

Originality of ideas to address the question posed

The core idea, that all member transactions with the scheme take place at smoothed rather than market values, is original (to the best of the author's knowledge). So too is the longevity proposal, which guarantees retired members an income for life without requiring them to sacrifice a portion of their capital and allowing them to continue to benefit from equity returns at low volatility.

Practicality in how the ideas could be translated into policy and actions

Translating the ideas into policy and actions should be straightforward. The reformed auto-enrolment scheme will require less functionality than already exists for AE, so existing architecture will more than suffice. New legislation will be required, prohibiting transfers in or out of the smoothed scheme, and specifying the percentage of account value that must be taken in cash at retirement (e.g., 25%), with the remainder (e.g., 75%) being taken in the form of regular (monthly) withdrawals ("pension payments") from retirement onwards. These restrictions on members' freedom are justified by the higher benefits and by the assurance that leavers with "paid-up" entitlements will be treated exactly the same as continuing members. They will be credited with the same investment returns and will be charged the same admin and investment fees.

Existing AE schemes will be allowed to continue as at present.

A clear evidence base that has informed the thinking and conclusions in the paper

The evidence base that has informed the thinking and conclusions in the paper includes the expert consensus that equities are expected to outperform bonds by a significant margin in future; the almost universal advice to pension savers to invest heavily in equities when young but to shift to less risky/ lower expected return assets as retirement approaches; and the consensus among pension advisers that buyers of drawdown products, particularly those of modest means, should pursue cautious investment strategies in retirement. The evidence base extends to the author's use of smoothing techniques similar to those described in the paper in managing his own pension for many years; and his involvement (with another retired actuary, who also helped develop the ideas in this paper) in an ongoing campaign to prevent DC retirees and other retail investors being sold unsuitable products with high charges.

An analysis of both the risks and the opportunities if the author's ideas were adopted

The paper analyses in detail the risk that some members will try to exploit, to their advantage and to other members' disadvantage, situations where smoothed values differ significantly from market values. It focuses particularly on the risk of workers ceasing contributions if smoothed value exceeds market value. It also analyses the risks if markets experience a prolonged downturn, resulting in negative smoothed returns. The main opportunity analysed in the paper is the expectation of significantly higher benefits under the smoothed equity approach than under an alternative arrangement that involves "lifestyle" investing pre-retirement and a 50:50 mix of equities and bonds in retirement.

Investment needs to be premised on societal needs of levelling up and the green transition.

In contrast with the UK's current auto-enrolment system, which aims to meet investment objectives at the level of the individual member, the proposed approach will look at the scheme as a whole and the expectation of positive cashflows for decades into the future. The consequent lengthening of the investment horizon, which will be reinforced by the prohibition on transfers, will allow trustees to take a very long view when setting investment objectives, and will ensure that investment is premised on societal needs and the green transition. It will also allow the trustees to invest a higher proportion of cashflows in illiquid assets, including infrastructure, than is possible at present. Infrastructure and other illiquid assets can deliver enhanced value to society and excellent returns to investors.

The levelling up objective will be achieved by investing members' funds in equities for the entire duration of their membership, including in retirement. At present, this luxury is normally confined to affluent retirees, who can afford to take the risk. Less affluent retirees are generally advised to invest a high proportion of their funds in bonds, with the expectation of lower long-term returns.

The proposal should be cognisant of long-term trends such as increasing longevity, long term care and the technological landscape

The proposal is cognisant of long-term trends under a number of headings. One long-term trend is for "retirement" to be a more fluid concept than in the past. The proposal recognises this trend. Contributors may retire at any age, without actuarial adjustment for "early" or "late" retirement: they just start drawing from their pension accounts. They will also have the option of working part-time and of taking a lower pension. The proposal can address the challenge of long-term care in a similar fashion: the regular withdrawal amount can be increased to help defray the cost of long-term care, recognising of course that any increase in withdrawal amount depletes the account value (i.e., it is not an insurance solution). The flexibility outlined above is possible because the pension account can be viewed as a form of deposit account. The proposed restrictions to counter the risk of anti-selection (i.e., to prevent retired members from withdrawing more when smoothed value exceeds market value or less when smoothed value is less than market value) will not apply if withdrawal amounts are being varied for reasons of personal need or for wider demographic or economic reasons (e.g., inflation) rather than for financial reasons.

The paper's proposal for longevity protection allows for significant mortality improvements between now and when the first retirees reach age 75. The proposed deduction from account values (2.45% per annum) from age 75 for members opting for longevity protection is based on the projected survival rates of Table 4. Subject to regulatory approval, trustees may vary the deduction if mortality rates differ from those projected and they may also change the age at which members may opt for longevity protection, to ensure fairness across generations.