

Its All Back to Front: Critical Issues in the Design of Defined Contribution Pension Plans

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Critical Issues in the Design of DC Pension Plans

- Well-designed DC pension plan structured as:
 - single, integrated financial product
 - that delivers pension at reasonable cost to member.
- Pension must provide:
 - adequate replacement income for remaining life of plan member
 - remove risk that member outlives resources.
- Implies plan must be designed from back to front
- Appropriate incentives for those delivering key services.

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Critical Issues in the Design of DC Pension Plans

- Six critical issues in design of DC plans:
 - charges
 - lapses
 - investment strategy
 - investment performance
 - fund annuitisation
 - provider incentives

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Charges

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Charges

- Pay for key services:
 - administration, fund management and profit.
- But higher charges => lower terminal fund value and pension.
- Charging structures can be complex, disguised and provide potential source of confusion.

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Types of charges

- Charges based on contributions:
 - Entry charges, either related to or independent of contributions
 - Regular (periodic) charges, either related to or independent of contributions
- Charges based on asset values:
 - Regular charges based on interim value
 - Exit charge based on redemption (i.e., terminal, transfer or paid-up) value

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Table 1 Charges and Reduction in Yield in Personal Pension Plans
(Percentages)

	5 years	10 years	15 years	20 years	25 years
Charges as a percentage of fund value					
Best overall	3.1	4.1	7.2	8.5	9.8
Best commission - loaded fund	4.0	4.1	7.4	8.9	10.6
Industry average	11.6	13.0	14.8	17.7	19.0
Worst fund	19.2	22.0	24.6	28.2	27.8
Reduction in yield (%)					
Best overall	1.26	0.79	0.90	0.76	0.68
Best commission - loaded fund	1.63	0.79	0.92	0.80	0.73
Industry average	4.91	2.65	1.93	1.68	1.39
Worst fund	8.47	4.76	3.43	2.88	2.16

Frequently changing/disguised charging structures

- Funds regularly change charging structures:
 - difficult to compare funds over time
 - charging structures and changes used to conceal impact of costs and confuse policy holder.

Summary

- Charging structures in PPPs are generally complex and disguised and this leads to customer confusion.
- Consumers not able to compare charges across plans easily so competitive forces do not operate effectively.
- In consequence, charges can be high which reduces net terminal value of fund available for pensions.

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Lapses

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Impact of low persistency on charges

- Front-loaded charges mean members suffer substantial loss if contributions lapse prematurely.
- Regulator: *"if investors buy policies on the basis of good advice, they would not normally be expected to cancel premiums to their policies unless forced to do so by unexpected changes in their personal circumstances"*
- *"This means that persistency is a powerful indicator of the quality of the selling process"*

Table 3 Persistency Rates for Regular Premium Personal Pension Plans
(Percentages)

	<i>Company representatives: after</i>				<i>Independent financial advisers: after</i>			
	<i>1 Year</i>	<i>2 Years</i>	<i>3 Years</i>	<i>4 Years</i>	<i>1 Year</i>	<i>2 Years</i>	<i>3 Years</i>	<i>4 Years</i>
1993	84.1	72.3	63.6	56.7	91.5	83.3	76.6	70.5
1994	83.7	72.8	64.4		91.3	82.1	74.5	
1995	85.5	75.0			90.8	81.6		
1996	86.6				90.2			

Source: PIA (1998, Table 1)

Regulator regards low persistency rates as "*disturbing*"

- Members mis-sold unsuitable or expensive pensions.
- Regular premium plans unsuitable for those with irregular earnings or uncertain long-term employment.
- Change of employment may lead to a member joining an occupational plan.
- Adverse general economic conditions could worsen persistency rates.

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Adjusting for policy lapses

- Lapses have remarkable impact on charges
- Likelihood of maintaining contributions for 25 years is so low for average policy holder:
 - 16%
- that effective contribution is just 12p for every £1 of premium paid.

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Summary

- High lapses lead to pensions that are very poor value for money invested.
- Some may argue that low persistency is matter for plan member alone and clearly there are many individuals who do not have commitment to maintain contributions for full term of plan.
- But low persistency is as much an indicator of bad product that was initially missold and subsequently followed up by poor after-sales service.

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Investment strategy

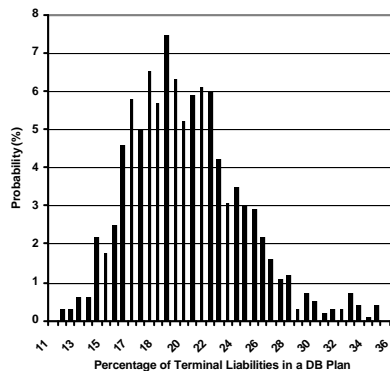
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Investment Strategy

- Tradeoff between planned level of contributions and investment strategy.
- Conservative investment strategies need higher contributions to achieve a particular pension.
- But tradeoff between investment strategy and risk.
- The less conservative the strategy the greater the asset risk and the more volatile the contribution pattern if a desired pension target is to be achieved.
- Risk is all-important in DC plans because it is borne entirely by plan members:
 - Risk of falling short of DB target.

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Figure 4 Frequency Distribution of Terminal Fund Values: A Low Risk, Low Return Asset Allocation
(Percentages of Terminal Liabilities in a Defined Benefit Plan)

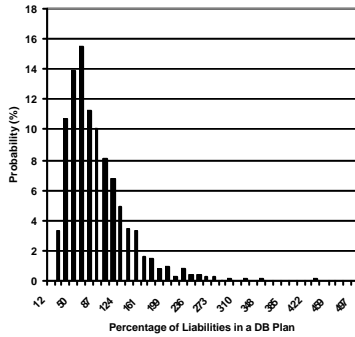


Note: For 40 years, contributions of 10% of male earnings are made into a pension plan and the portfolio is invested 92.69% in T-bills, 4.22% in bonds and 3.09% in equities and has a mean real return of 1.56% and a standard deviation of 4.04%. The properties of the distribution of terminal values (as a percentage of terminal liabilities) from 1000 monte carlo simulations are as follows:

Terminal fund value	<17%	Mode	Median	Mean	>22%
Percentage value	25	20	20	20	25

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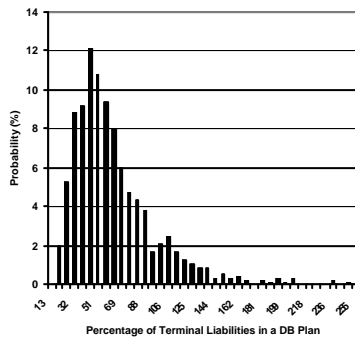
Figure 5 Frequency Distribution of Terminal Fund Values: High Risk, High Return Asset Allocation
(Percentages of Terminal Liabilities in a Defined Benefit Plan)



Note: For 40 years, contributions of 7.15% of male earnings are made into a pension plan and the portfolio is invested 45.62% in bonds and 54.38% in equities and has a mean real return of 7.2% and a standard deviation of 12.5%. The properties of the distribution of terminal values (as a percentage of terminal liabilities) from 1000 monte carlo simulations are as follows:

Terminal fund value	<25%	Mode	Median	Mean	>100%
Percentage value	44	52	66	100	23

Figure 6 Frequency Distribution of Terminal Fund Values: Deterministic Lifestyle Asset Allocation
(Percentages of Terminal Liabilities in a Defined Benefit Plan)



Note: For 40 years, contributions of 7.15% of male earnings are made into a pension plan, and for the first 35 years, the portfolio is invested 45.62% in bonds and 54.38% in equities and has a mean real return of 7.2% and a standard deviation of 12.5%; for the final 5 years, the fund is invested entirely in T-bills with a mean real return of 1.28% and a standard deviation of 4.04%. The properties of the distribution of terminal values from 1000 monte carlo simulations are as follows:

Terminal fund value	<25%	Mode	Median	Mean	>100%
Percentage value	7%	44	48	63	11

Summary

- Investment strategy involves complex trade-offs between contributions, asset allocation, and risk.
- Conservative strategies lead either to low pensions or require high compensating contribution rates.
- A heavy equity component will raise both expected return on portfolio and its risk:
 - lowers required contribution rate,
 - but raises short-fall risk unless deterministic lifestyling is used or additional contributions made if deficiency emerges.

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Summary

- These trade-offs not well explained to plan members
- Given their very high degree of risk aversion, they will typically choose conservative investment strategies unsuited to long term investment horizon.

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Summary

- None of the investment strategies specifically hedges interest rate (and annuity) risk on the retirement date
- Main purpose of deterministic lifestyling strategy, for example, is to reduce exposure to equity risk on the retirement date.
- Complete disconnect in DC plans between the investment strategies of the accumulation and decumulation stages.

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Summary

- But plan providers will be little concerned by this, since they have no contractual obligation to deliver a particular fund size on the retirement date.

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Investment performance

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Investment performance of unit-linked funds

Table 6 Distribution of Returns Generated by UK Unit-linked Funds, 1972-95

<i>Sector</i>	<i>Top quartile</i>	<i>Median</i>	<i>Bottom quartile</i>	<i>Ratio of fund sizes</i>
UK Equity Growth	16.0	13.6	11.9	3.2
UK Equity General	14.3	13.4	13.1	1.4
UK Equity Income	15.4	14.0	12.4	2.3
UK Smaller Companies	18.7	15.5	12.8	5.3

Note The first three columns are averages measured in percentages per annum for the sample period 1972 - 95; the last column gives the ratio of fund sizes after 40 years based on the top and bottom quartile returns. The formula is (assuming the same contribution stream):

$$\frac{(1+g_T)^T - 1}{g_T} \div \frac{(1+g_B)^T - 1}{g_B}$$

where $g_T = 0.160$, $g_B = 0.119$ and $T = 40$.

Source: Blake and Timmermann (1998) and Lunde, Timmermann and Blake (1999).

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Investment performance of managed funds

Table 8 Performance of UK Managed Funds in Comparison with the Market, 1986-94
(Percentages)

	<i>Average portfolio weight (%)</i>	<i>Average market return (%)</i>	<i>Average pension fund return (%)</i>	<i>Average out- performance (%)</i>	<i>Percentage outperformers</i>
UK equities	53.7	13.3	12.97	-0.33	44.8
International equities	19.5	11.11	11.23	0.12	39.8
UK bonds	7.6	10.35	10.76	0.41	77.3
International bonds	2.2	8.64	10.03	1.39	68.8
UK index bonds	2.7	8.22	8.12	-0.1	51.7
Cash/other investments	4.5	9.90	9.01	-0.89	59.5
UK property	8.9	9.00	9.52	0.52	39.1
Total		12.18	11.73	-0.45	42.8

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Investment performance of managed funds

- Median fund generated average total return of 12.06%:
 - 12 basis points short of average market return
- 80% of the funds are within 1% of average
- Despite claim to be active, vast majority of UK pension fund managers are:
 - not only herding together
 - they are also closet index matchers.

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Investment performance of managed funds

- Decomposition of total return:

<i>Component</i>	<i>Percentage</i>
SAA	99.47%
Security selection	2.68%
Market timing	-1.64%
Other	-0.51
Total	100.00

- Contribution of active fund management was 1% of total return (or 12 bp), which is *less than annual fee that active fund managers charge* (20 basis points for a £500m fund to 75 basis points for a £10m fund).

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Summary

- Little evidence that fund managers can systematically deliver superior investment performance over long investment horizons from active fund management.
- Strong evidence that they herd and closet index match.

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Fund annuitisation

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Fund annuitisation

- Weak tail in DC pension provision.
- Annuities market highly concentrated with only 10 serious providers at any one time:
 - from potential market of >200 authorised life companies in the UK.
- Cost loadings of 10-20%

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Problems faced by annuitants and annuity providers

- Interest rate risk.
- Inflation risk.
- Adverse selection bias.
- Mortality improvements:
 - mortality forecasts errors of 15-20% over 10 year horizons are common
 - some insurance companies underestimate average life expectancy of their annuitants by up to two years.
- Reinvestment risk:
 - if insufficient supply of long-maturing matching assets
 - esp. government bonds

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Summary

- Annuities involve substantial charges to cover mortality risk.
- Some key risks, such as interest rate risk, are borne directly by the annuitant himself.
- Insurance industry has been particularly unimaginative in designing products that hedge such predictable risks.

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Improving the design of DC plans

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High total charges

- Total charges on DC plans between 40-50% of total fund size:
 - 30% of fund value accounted for by charges during accumulation stage
 - 10-20% charge on annuities
- Will lead to DC plans eventually falling into disrepute if it cannot be reduced.

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Charges, investment performance & incentives

- High charges and poor investment performance can both separately and together lead to the plan member having a low fund to annuitise on the retirement date.
- However, some people have argued that some of these factors can be offsetting.
- But no empirical evidence of performance persistence.

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Charges, investment performance & incentives

- So, if no relationship between level of charges and performance, then must keep charges low.
- Best way of achieving this is to cap charges and allow penalty-free transfers between plans, thereby forcing economies of scale on plan providers:
 - Idea behind Stakeholder Pension Plans
 - 1.5% charge for 10 years
 - 1% charge after 10 years

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Charges, investment performance & incentives

- One way to provide incentives to fund managers is performance-related fees:

$$\text{Performance-related fee} = f_1(g_t - g^\#)V_t + f_2V_t$$

- This would reward good *ex post* performance and penalise poor *ex post* performance: fund would have to accept a reduced fee if $g_t < g^\#$

-

- Or:

$$\text{Performance - related fee} = f_t V_t$$

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Charges, investment performance & incentives

- So need charging structures that are simple, fully transparent, non-front-loaded, and performance-related.

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High lapse rates

- Auto-enrolment
- Government could also help to reduce lapse rates during the accumulation stage by making participation in second-pillar pensions mandatory.

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Investment management and annuitisation

- Fund management industry has a poor track record of offering products that help PPP members hedge the risks that they are forced to assume.
- Yet there are strategies and instruments capable of doing this.

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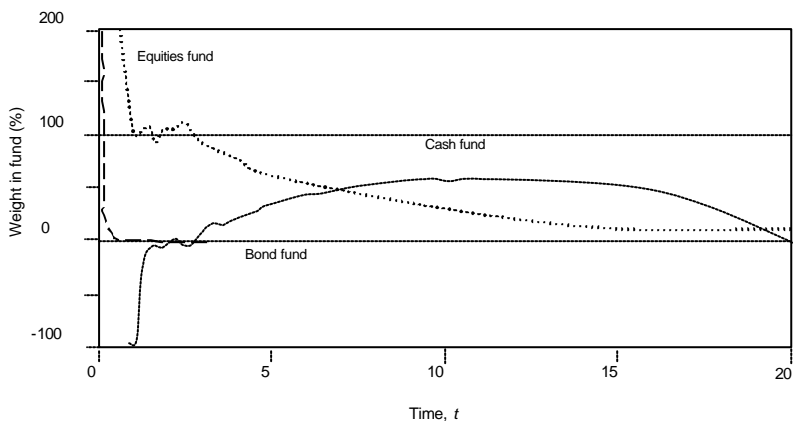
Stochastic lifestyling

Three funds used:

- Equities fund:
 - Hedges productivity risk and gains equity risk premium
- Cash fund
 - Hedges inflation risk during accumulation stage
- Bond fund
 - hedges interest rate and annuity risk at the point of retirement.

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Stochastic lifestyling



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Investment-linked decumulation programmes

- Two variations:
 - Income drawdown with bequest of residual fund
 - fund invested in equities
 - Annuity with residual fund reverting to insurer on death of annuitant
 - in return for which insurer agrees to pay survival credit at the start of each year while the plan member is still alive

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Investment-linked decumulation programmes

- *Flexible income programme* with life annuity purchased at age 75
- *Flexible income programme with a deferred annuity* purchased at retirement age and payable at age 75
- *Unit-linked programme* with life annuity purchased at age 75
- *Collared income programme* with life annuity purchased at age 75
- *Floored income programme* with life annuity purchased at age 75

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Government amelioration of market failures

- Greater innovation by private sector can only go so far and where innovations have proved too expensive to manage they have been dropped.
- Government could do more to ameliorate market failures in private provision arising from aggregate risks that are difficult for private sector to hedge.

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E.g. Inflation risk

- Deferred income government securities (DIGS), with different starting and termination dates, allowing all deferred pensions to be indexed to prices.
- Limited price index bonds allow annuities to be partially indexed to inflation up to 5% pa.

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E.g. Longevity risk

- Government could help insurance companies hedge risk of underestimating mortality improvements:
 - It could sell annuities to public
 - It could issue longevity bonds:
 - future coupon payments depend on percentage of population of retirement age on issue date of bond still alive on dates of future coupon payments
 - insurance company which buys such a security bears no aggregate mortality risk and, as a consequence, cost loadings fall.

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New market is developing in longevity risk

lifeMetricsSM

- A toolkit for measuring & managing longevity risk:
- LifeMetrics Index on current & historical mortality & longevity
- LifeMetrics Framework – tools for measuring and managing longevity & mortality risk
- LifeMetrics Software for forecasting future mortality
- www.jpmorgan.com/lifemetrics



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Conclusion

- Little evidence that DC pension plans in UK have been designed as single integrated financial product from back to front.
- Key design failures are:
 - high charges and lapse rates
 - inappropriate investment strategies
 - no outperformance from active investment management
 - Poorly designed annuity and drawdown programmes.

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Conclusion

- In addition, those delivering key services have little incentive to treat pension plan as long-term investment programme:
 - sales staff receive commission upfront and have no financial interest in ensuring plan's long-term suitability
 - investment managers take whatever contributions are available and invest these the best that they can
 - but have no particular target fund level to achieve
 - and annuity provider takes whatever fund size is available on retirement date and offers the best annuity available on that particular day.

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Conclusion

- On top of this, lifetime pension charges of between 40-50%.
- Will lead to DC plans eventually falling into disrepute if this cannot be reduced.