



Pension Mechanics

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Current Pension Options and Schemes

Scheme	Type	Mechanism
Unfunded “pay as you go”	All State Schemes	No Fund Build Up
Defined Benefit	Proportion of Final Salary	Employers Risk
Defined Contribution	Funds Invested, Annuity	Members Risk
Personal	Members Self Invest	Live of Income

- **State schemes based on National Insurance:**
 - 27m members out of a potential 47m (16-64), or 34m (25-64);
 - Pension income in a protected fund (total £107bn with £82bn for pensions);
 - Payments not protected and treated as a benefit, with a maximum cost of £80bn at £5,750 pa per person;
 - Liability is estimated at £4,600bn, a level that is larger than GDP.

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- **Public sector schemes:**
 - Voluntary contributions;
 - 8.3m members;
 - Defined benefit, final salary scheme;
 - Liability is £800bn.

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- **Private schemes:**
 - Voluntary contributions;
 - 2.9m members;
 - Both defined benefit and defined contribution
 - So payments are final salary, annuities and investment.

Pension Mechanics: a Mathematical Model

Pension provision divided into two phases;

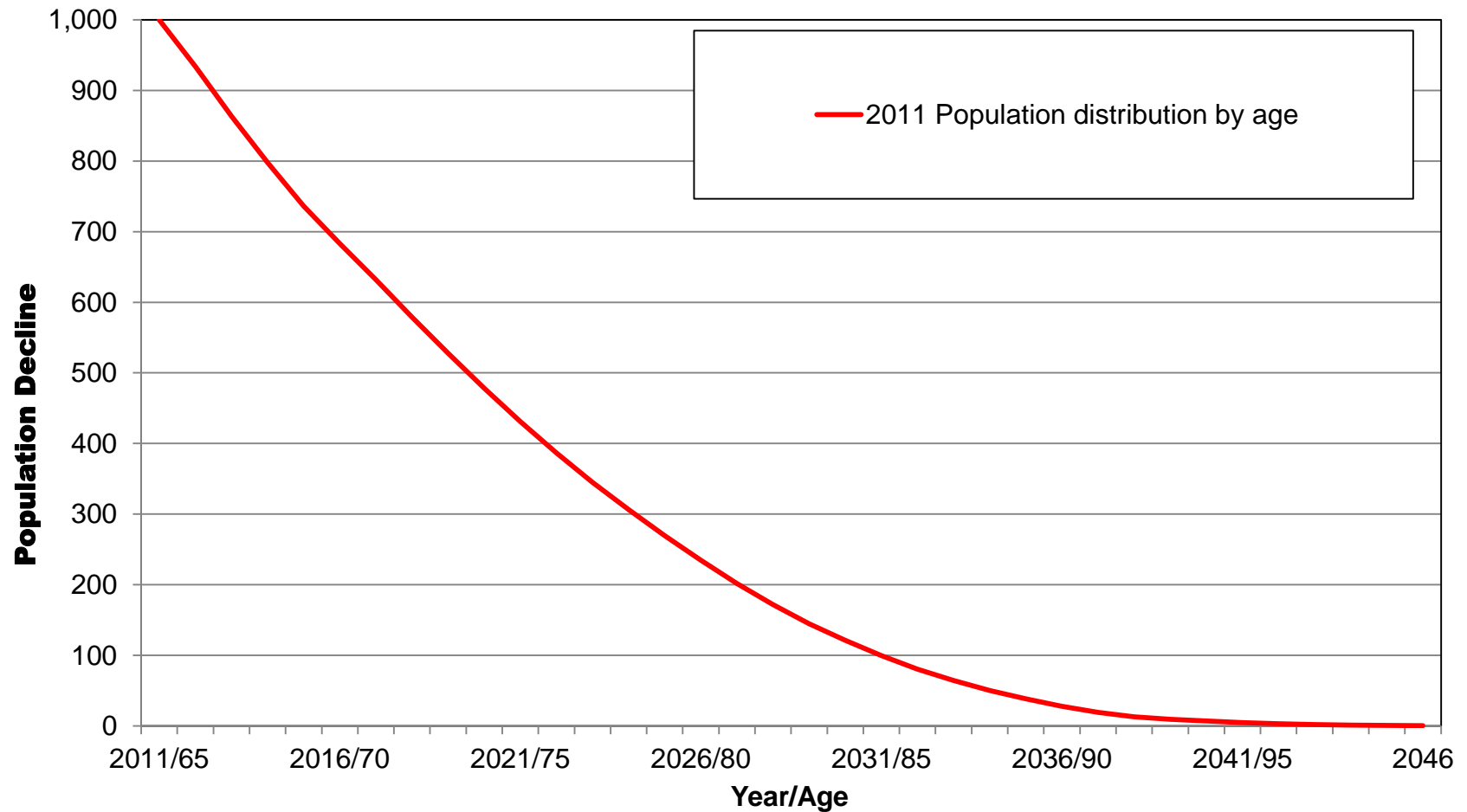
1. **Personal savings phase with contributions over 20 to 40 years:**

- Accumulated compound growth of monthly savings;
- Assume: steady wage growth, proportion of wage invested, inflation;
- Account for different growth levels.

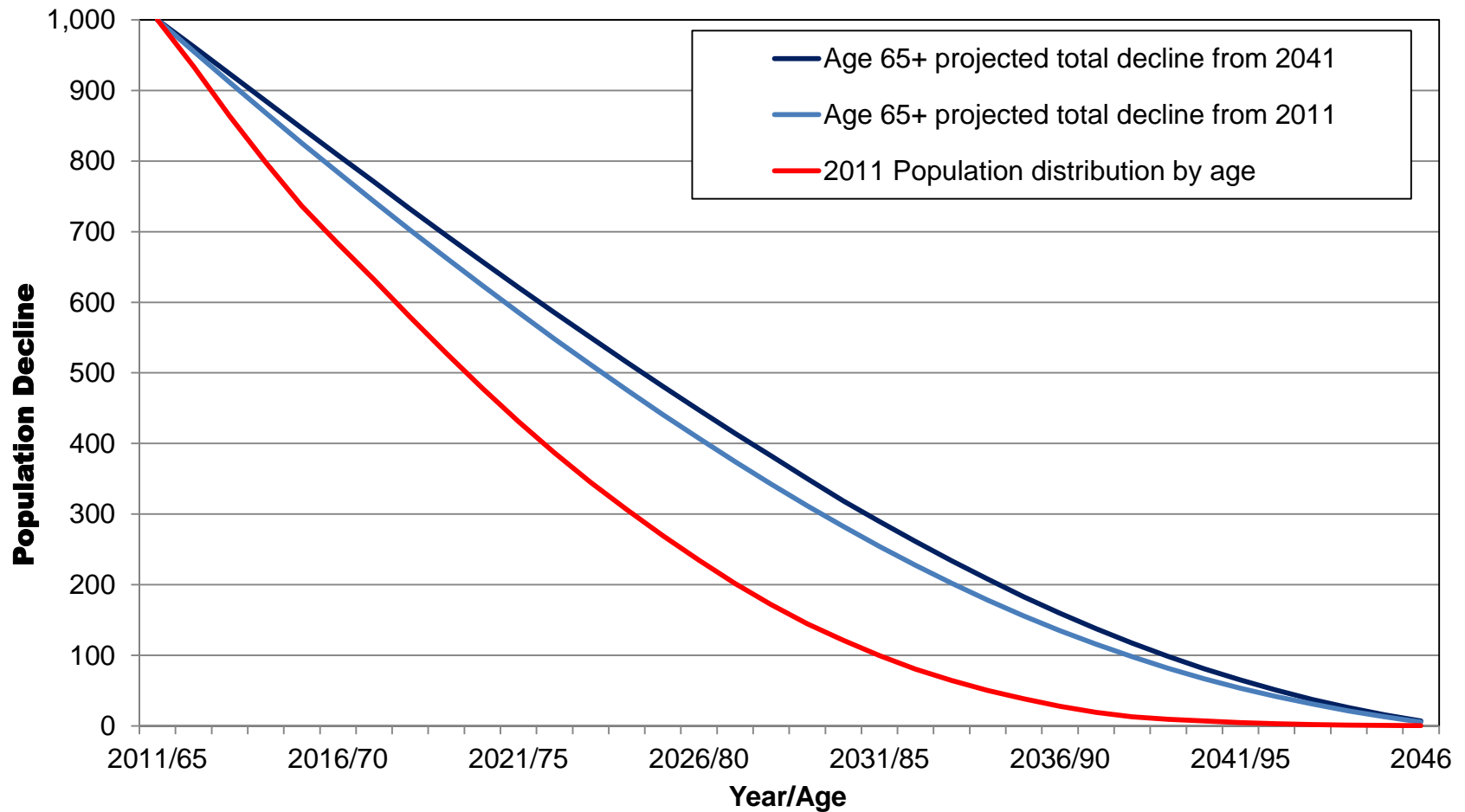
2. **Payment phase:**

- Achieve a balance between fund decline and population decline;
- A sustainable outcome is achieved when the fund and population drawing from it reach zero together;
- Note, the fund continues to earn through investment after retirement;
- Uses population decline curves;
- ONS mortality rate projections from 65 with cohort methodology.

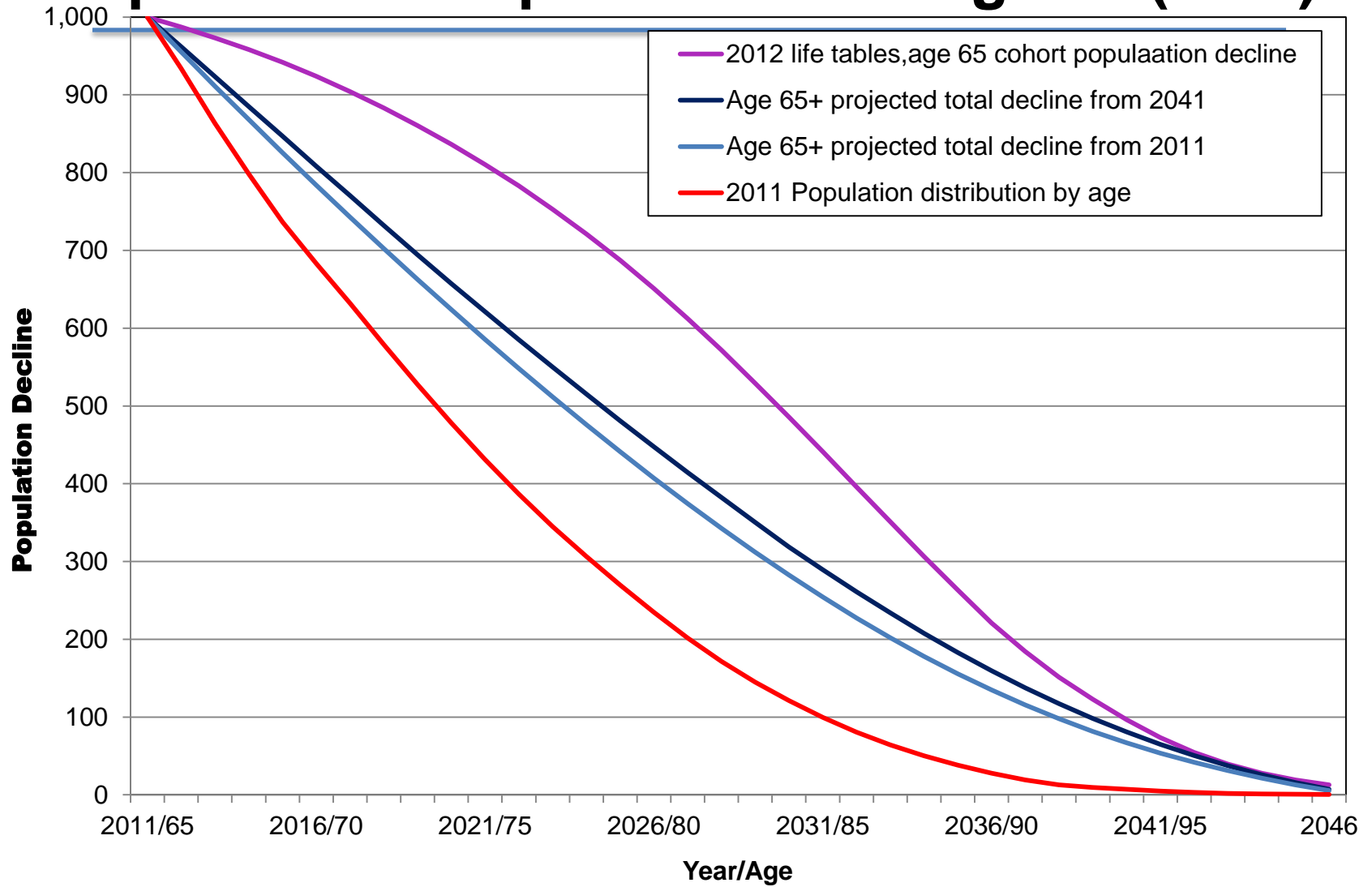
Population composition from age 65 (men)



Population composition from age 65 (men)



Population composition from age 65 (men)





Payment Phase of Pensions

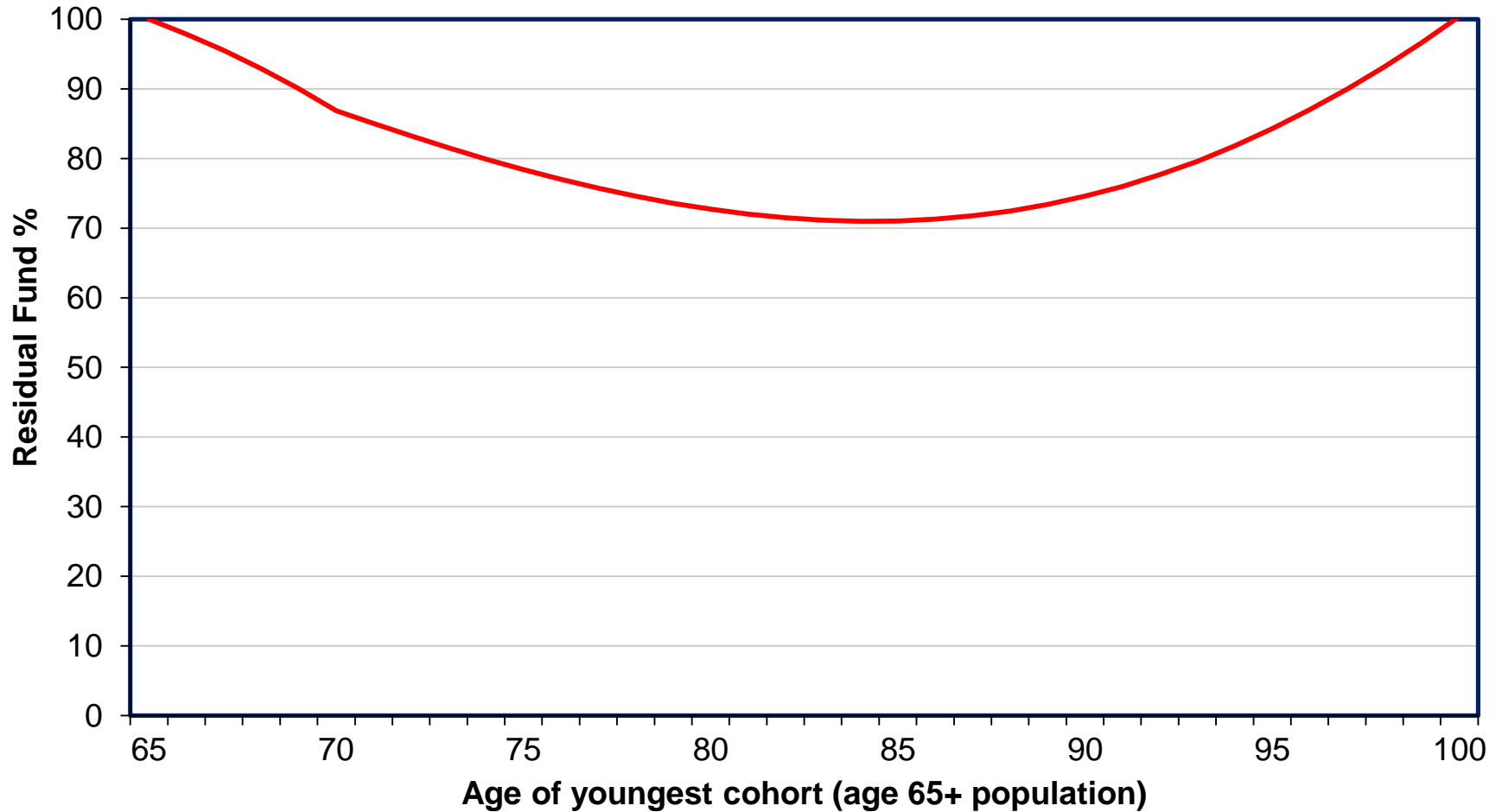


- This Applies to group funded schemes and annuities, but also to the economics of all pension schemes.
- Balances fund decline against population decline – as population declines fewer are dependant on the fund – to give a defined sustainable solution where both fund and population expire together.
- Important to note that the fund has earning power beyond retirement, creating additional income.
- Variables are:
 - Age, time and population decline data (mortality projections);
 - Investment income, payment level and inflation.
- Outcome is the sustainable payment level using simple fund and pension yield factors.



Projections of fund decline: varying income and payment levels

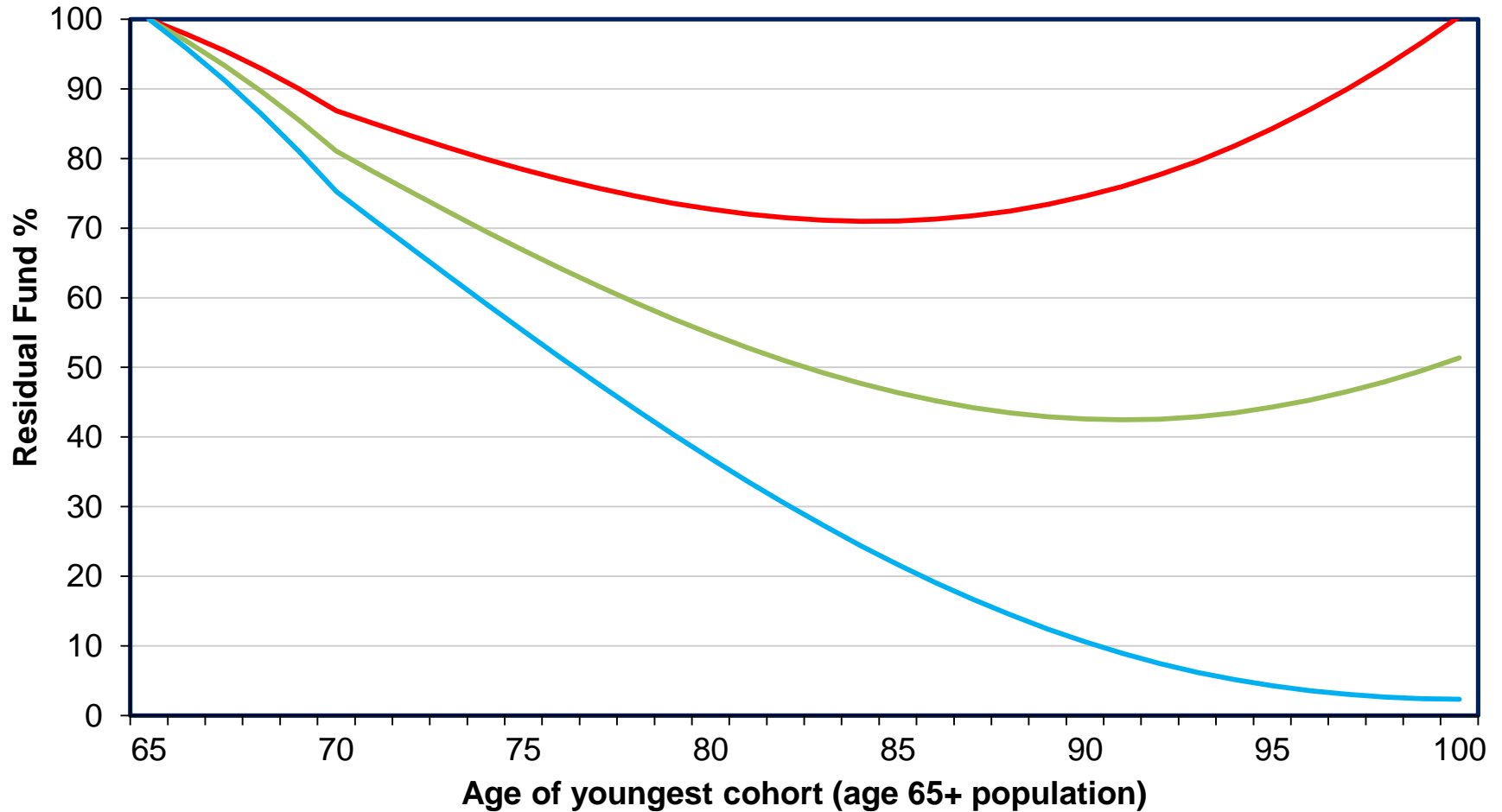
Five year guarantee with 2.5% inflation increase from age 65



— 4% income & 6% payment

Projections of fund decline: varying income and payment levels

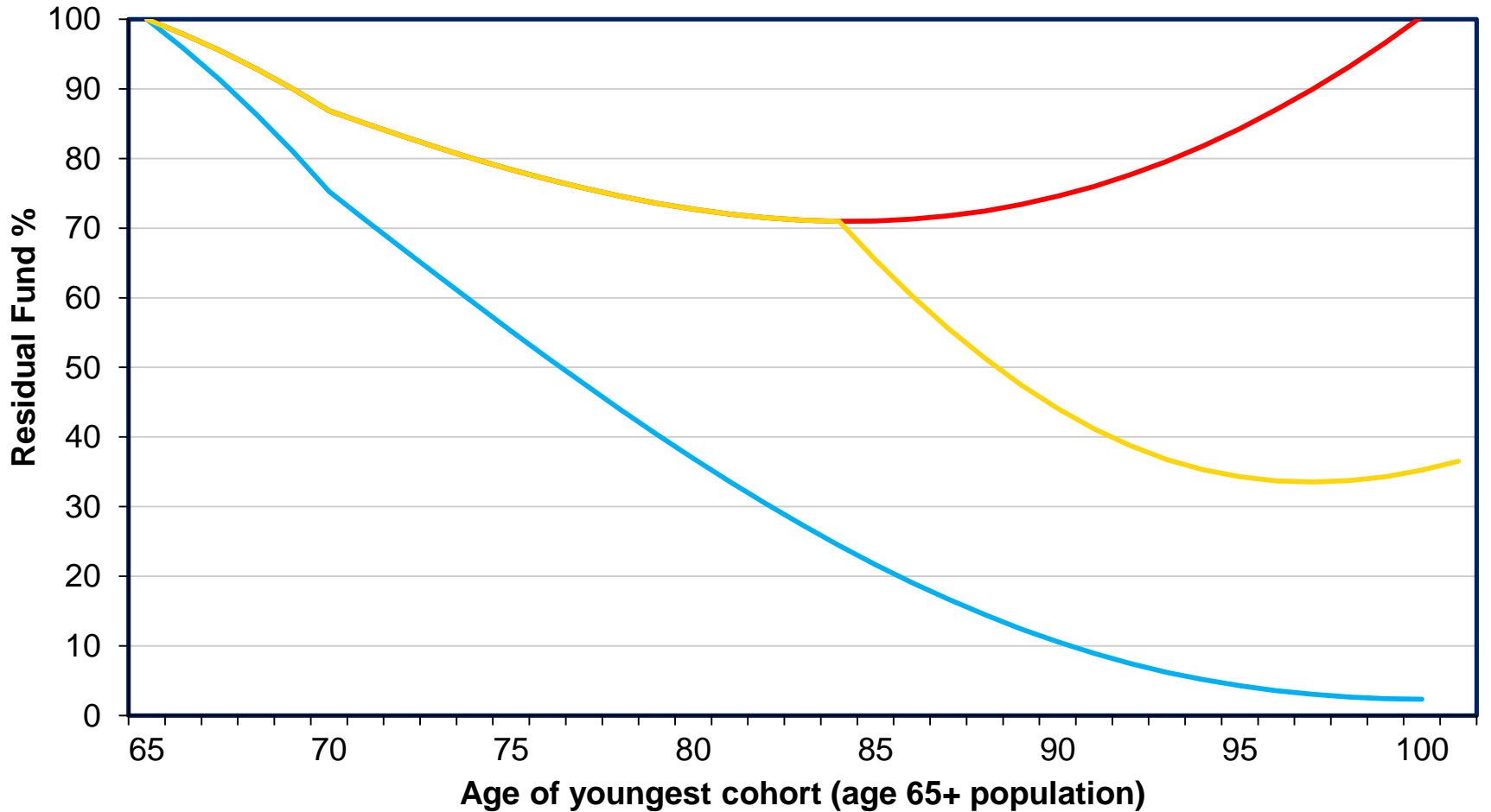
Five year guarantee with 2.5% inflation increase from age 65



— 4% income & 6% payment — 4% income & 7% payment — 4% income & 8% payment

Projections of fund decline: varying income and payment levels

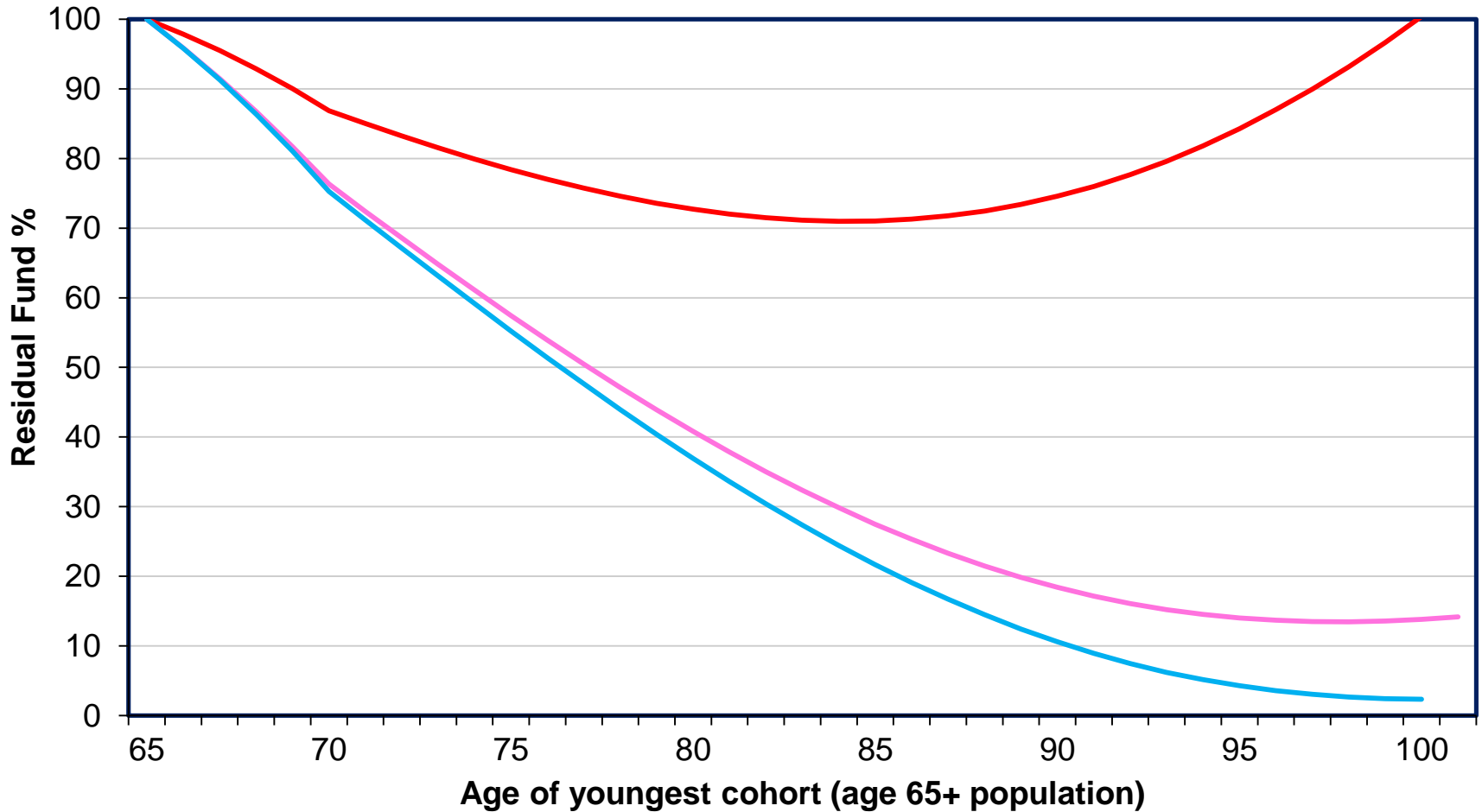
Five year guarantee with 2.5% inflation increase from age 65



— 4% income & 6% payment — 4% income & 8% payment — 4% income & 6% payment + Care

Projections of fund decline: varying income and payment levels

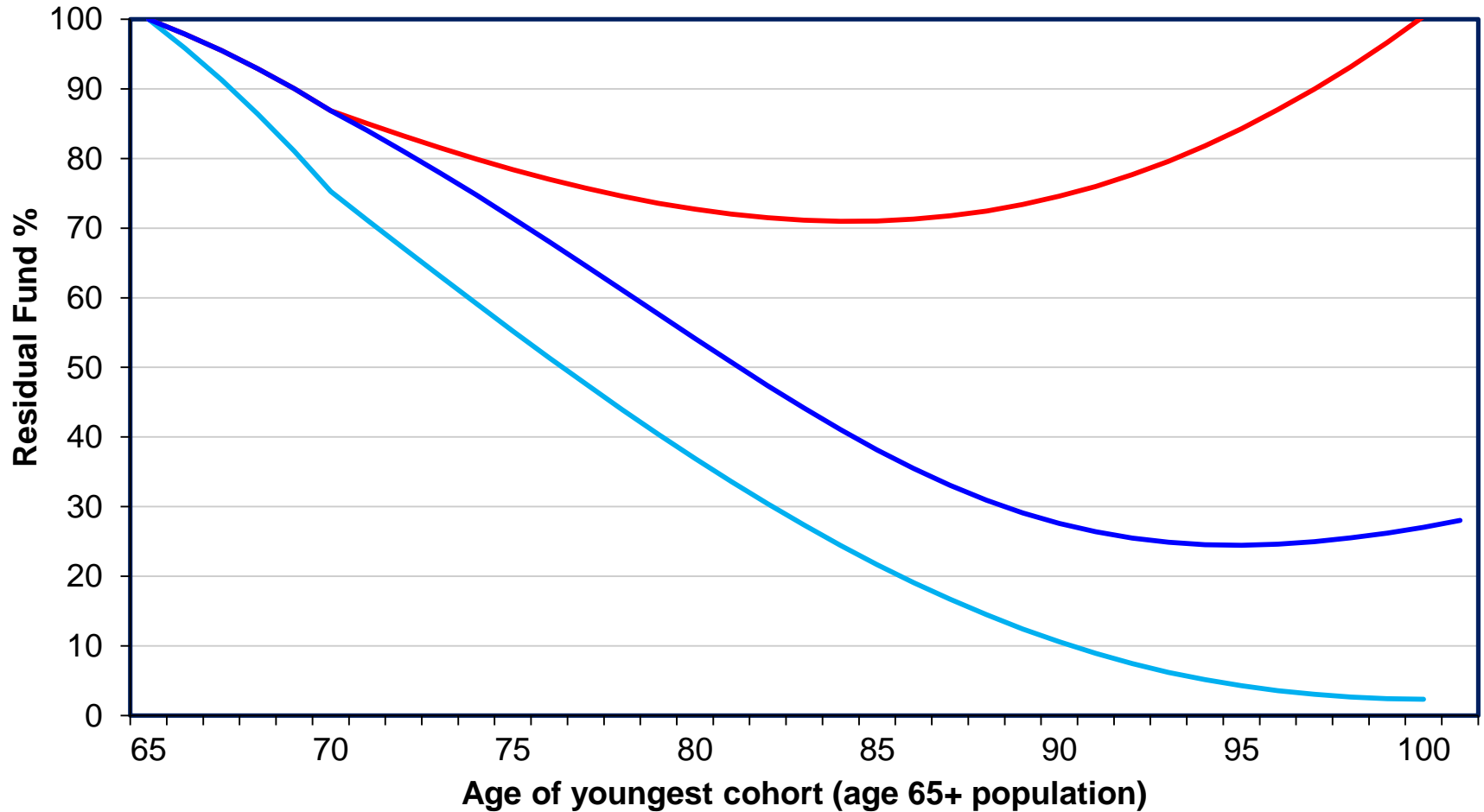
Five year guarantee with 2.5% inflation increase from age 65



— 4% income & 6% payment — 3% income and 7% payment — 4% income & 8% payment

Projections of fund decline: varying income and payment levels

Five year guarantee with 2.5% inflation increase from age 65



— 4% income & 6% payment — 4% income & 8% payment — ILT4% income & 6% payment male

Application of Pension Mechanics

Investment return	3%	4%	5%	6%	7%	8%	9%
Fund Factor	49.4	60.7	75.,7	95.,4	121.6	157.0	204.0
Yield Factor							
6% Payment	2.784	3.642	5.242	5.724	7.296	9.420	12.290
8% payment	3.952	4.856	6.056	7.632	9.728	12.560	16.380

- Table shows outcome over 40 years in real terms
- Annual contribution of £1,000 over 40 years, assuming fund keeps pace with inflation gives £40K in real terms.
- With a 4% return on investment gives a fund of £60,700.
- At 8% payment yields a pension of £4,856 pa, increasing by 2.5%.
- This is the pension per £1,000 of contributions (real terms).
- 10% contribution at 4% return gives pension of 48.56% at 8% payment.

Baseline Condition Example



- Contributions of £1,000 for 40 Years
- Contributions and fund keep pace with Inflation
- Final fund in real terms is £40,000
- Payment at:
 - 8% yields £3,200 pa
 - 6% yields £2,400 pa
- Yield factors of 3.2 and 2.4

- This is the baseline yield position
- Below which funds lose value in real terms
- Annuity at 4% would give £1,600

Pensions Scheme Comparison

Model results applied to present schemes assuming a yield factor of 4

- State and Public Sector schemes are unfunded 'pay as you go'
- No Savings, fund or growth – Income spent at receipt
- Demographic dependence on working population
- State Scheme run as contributory in Name Only
- Current spend of £80bn over 13.2 million members
- In funded Scheme would give £320bn Payment
- Or Reduced Cost of £20bn
- Single Tier Pension of £8,000pa
- Would Need Contributions of £2,000pa



Public Sector Schemes – Defined Benefit

- Blue Book gives contributions and spend of £19.7bn
- As contributions would give pension spend of £79bn
- NHS, Teachers, Police & Fire pay their way with contributions of 9% to 12% and Employer's / SERPS contributions at 12.4%
- Rest pay 2% or nothing just state contributions as employer
- NHS have Contributions of £8.2bn and Pensions of £4.5bn
- Average pension of 30% yield factor of 1.4
- Payment could be £33bn with funded scheme and yield factor 4
- Teachers break even, Police and Fire not known
- State liability is given at £800bn

Private Schemes

- **Defined Contribution** at 8% to 10% of salary, uncertain outcome being dependent on annuity with yield factor 1.8
- Would give Payment of 40% at modest yield factor 4
- New Workers Scheme at 8% yields pension of £8,320 at average wage
- **Defined Benefit** are in decline due to liability costs on employers
- Best schemes with pensions at up to 50% of final salary
- Have yield factors of 2.5 and contributions of 18% to 21%
- On average investment income meets two thirds of pension costs
- Schemes are healthy and give the most secure outcome
- Company schemes publish no fund accounts
- Available for institution and other schemes

University Superannuation Scheme Main Points

- Liabilities are given at £50.5bn, £11.5bn above assets
- Causing 3.4% surcharge on Employer contributions and move to inferior defined contribution on new members
- Income at £2.7bn exceeds expenditure at £1.5bn
- Average contribution of £21,342 yielding pension of £10,373
- Investment income meets 87% of pensions and 42% of total
- Performance over past 5 years below RPI. No growth
- Real term return on asset investments range from 2.0 to 8.25%

Members age distribution are:-

Active	16-30	10%	31-40	32%	41- 50	30%	51-56+	29%
Pensioners	51-60	9%	61-70	50%	71-80	29%	81+	12%

University Superannuation Scheme Comment

- Pension fund yield is 2.1+, does not reconcile with growth of 14%
- Pension mechanics suggest payment level at 5 to 6%
- Would need fund of £16.7bn to meet pensions at 6%

- Member's age spread is uniform suggesting no urgent demand
- No apparent increase in flow
- Liability assessment from member funds suggests £34bn not £50bn, dependent on active and deferred members
- Panic action does not appear justified
- In business terms, scheme appears strong
- Pensioner age spread appears to support decline curves
- Archive material would merit further study

Other areas of interest

- The State's target retirement period is that it should cover one third of adult life
- At 65 adult working life is 47 years giving 23.5yrs retirement
- Retirement at age 70 needs 26 Years of retirement to age 96.
- Present average life span to age 81 would indicate a target retirement age below 60.
- Delayed retirement age not justified, ideally would be by choice from a fixed age, such as 55 minimum, dependent on Fund.
- Pensioner Poverty:
 - 2011 data suggest that the median income is £18,700 pa
 - Poverty is 60% of this at £11,220
 - 24% of pensioners have an income of below £13,000, 14% below £11,200, 13% below £9,350.
 - The new single tier pension at £7,500 is well below.
 - Hence the need to expand pension provision.



The Future

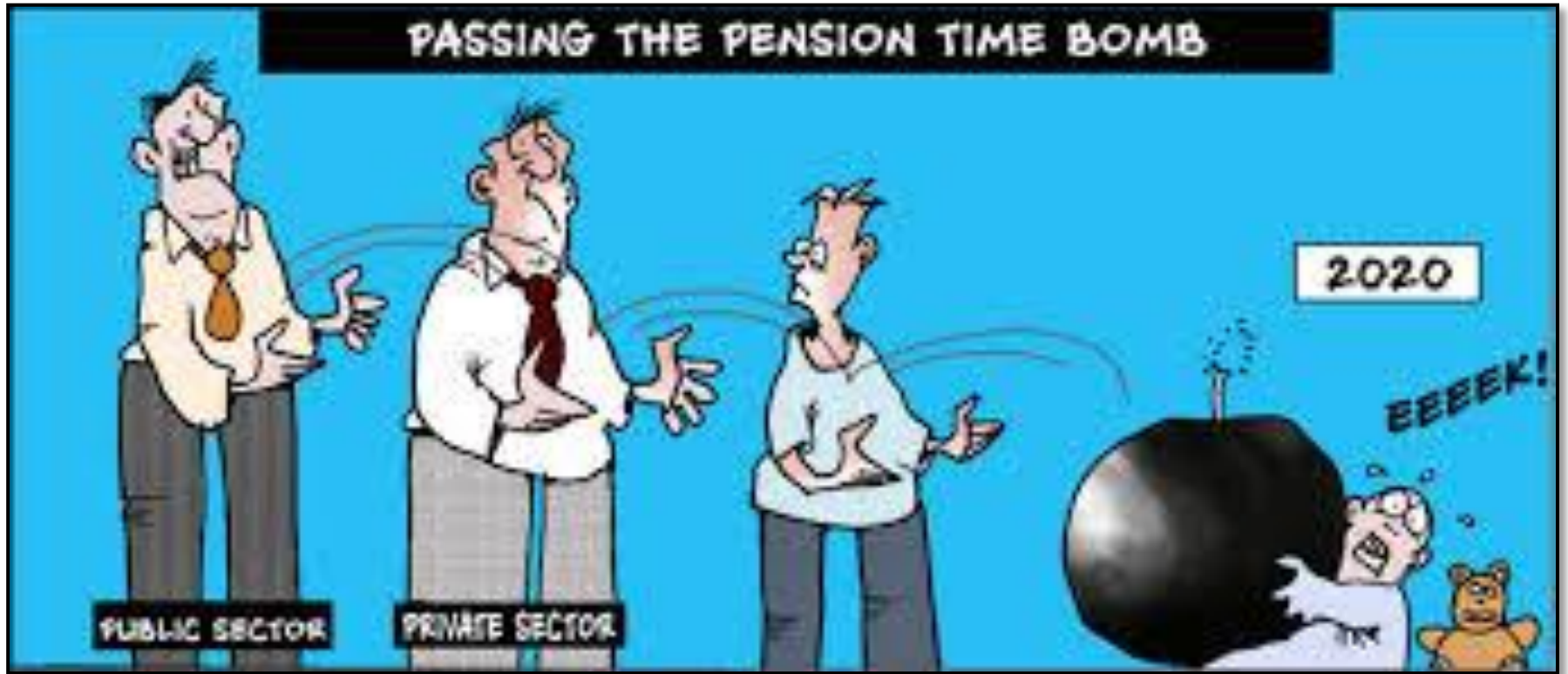
- Over 65 population will increase by 50% in 20 years while those in work will increase by only 7%.
- This demographic change is a consequence of increased flow from younger ages, more than growth at older ages.
- Only funded schemes will meet this challenge, where everyone invests into a pension pot accumulating throughout working life.
- The State seems concerned with cutting costs than in providing a sustainable solution but change here is the key.
- Single tier pension is still below welfare benefit levels.

Conclusions

- Pensions will only survive as funded schemes.
- A Universal scheme would be free of demographic dependence.
- The State Pension Schemes are not fit for purpose.
- Private pension schemes underperform by a factor two.
- They are not universal, serving only 20% of the working population.
- Adequate annual contributions exist, including NI, to form a basis for a good universal funded scheme.
- Pension contributions should be treated as personal savings.
- Elderly care costs should be part of Pension Provision.



PASSING THE PENSION TIME BOMB



Thank You