“Reinventing Annuities”

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Summary

Traditional guaranteed annuities have suffered from some or all of the following problems in many markets around the world:* customer perceptions: poor value, loaded bet which the insurance company usually wins, declining value where offered in a market subject to falling bond yields* life companies: improvements in life expectancy greater than assumed in pricing, uncertainty as to future rates of improvement, exposure to radical improvement through improvement in healthcare, genetic and other scientific advance * government and corporate bond issuers: sufficient bonds may not be issued by volume and duration and structure to meet demand.The paper proposes an annuity structure which: * presents the annuity as an investment product * unbundles investment and insurance components * allows for variations in the structure of each component through time: - for investment, to optimise risk/reward according to individual preferences - for insurance, to allow for transition to greater protection against longevity through time and for variations in the extent of guarantees of the cost of this insurance between providers * sets maximum and minimum limits for drawing income from the fund at outset and at regular intervals thereafter. The levels at subsequent reviews will depend on the actual investment and longevity experience versus that assumed at the last review. Income taken between reviews can vary between the maximum and the minimum. The proposed structure accommodates customer requirements for flexibility and choice in the 21st century and is able to use the communication technologies of that century to deliver these benefits.

“Réinventer les rentes viagères”

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Résumé

Les rentes viagères traditionnelles garanties ont souffert d'un certain nombre de problèmes dans divers pays à travers le monde: * Une mauvaise perception du grand public: mauvaise valorisation des produits, options tournant généralement à l'avantage des assureurs et, en cas de tendance baissière des taux d'intérêt, valorisation déclinante * Compagnies d'assurance-vie: amélioration de l'espérance de vie supérieure à celle prise en compte dans le calcul des primes, incertitudes quant aux perspectives futures à cet égard et risque de changement radical de perspective en cas d'avancée majeure dans les domaines médical ou génétique, ou dans tout autre domaine scientifique lié * Emetteurs d'obligations souveraines ou privées: les obligations émises peuvent s'avérer insuffisantes - en termes de volume, de duration et de structure – par rapport à la demande. Cette publication présente une structure de rentes viagères offrant les caractéristiques suivantes: * les rentes viagères sont présentées comme un produit d'investissement * les composantes d'investissement et d'assurance sont clairement identifiées * des variations ultérieures sont possibles pour chaque composante, avec: - Pour la composante investissement, optimisation de la relation risk/rendement en fonction des préférences individuelles des assurés - Pour la composante assurance, possibilité de transition vers une meilleure protection de l'assureur contre un accroissement de longévité potentiel et possibilité de faire varier l'étendue de la garantie de l'assureur et donc le coût correspondant * Mise en place de limites maximum et minimum pour les assurés en matière de prélèvement de revenus au titre du versement de leurs rentes, ces limites étant fixées au début du paiement des rentes puis revues ultérieurement à intervalles réguliers. Les modifications de ces limites sont fonction du rendement des investissements réalisés ainsi que des variations de longévité constatées par rapport aux hypothèses. Le revenu pouvant être prélevé entre deux révisions de seuils peut varier entre les minima et maxima prévus. La structure de rentes ainsi proposée répond à la demande des assurés du XXIe siècle en matière de rentes, sous forme de plus grande flexibilité et de faculté de choix, et peut s'appuyer sur les technologies de communication de ce siècle, tel que l'internet aujourd'hui, pour sa diffusion.

Reinventing Annuities by Mike Wadsworth & Alec Findlater

"By providing financial protection against the major 18th and 19th century risk of dying too soon, life insurance became the biggest financial industry of that century …….. Providing financial protection against the new risk of not dying soon enough may well become the next century's major and most profitable financial industry"

Peter Drucker
"Innovate or die"
The Economist Newspaper
25 September 1999

"People will soon live twice as long as today, and have the potential to live for 1200 years"

John Harris, Scientist
Member of UK Human Genetics Commission
as reported Sunday Times, 25 June 2000

Section 1 – Introduction

The quotes shown above indicate the dilemma for the insurance industry in offering annuities. We know that there will be many more retirees in the future (see Table 1). We also know that there are enormous risks in guaranteeing longevity over long periods into the future given the pace of scientific and medical advance. It is also true that conventional annuities, by which I mean a guaranteed income payable for life are rather unpopular in many markets. From the customers perspective they are often seen as poor value, particularly as interest rates have declined. They are also regarded as:

- inflexible
- requiring a permanent lock-in to current interest rates.

Customers seem to attach little value to the guarantee of payment for life seeing the contract as a bet against the life office which is loaded in favour of the latter. Ironically, many life offices now see

these products as offering the prospect of a poor, even negative return to shareholders and as lifespans increase, there are difficulties in finding assets of suitable duration and liquidity. Various products offering links to a wider range of investment options have emerged, but these in turn have brought their own problems. With profits or participating contracts can be seen as lacking transparency and difficult to explain when bonus rates are declining. Unit-linked annuities where income payments vary directly with market performance are seen as unsatisfactory given that retirees' needs for income are not correlated with such market performance.

Section 2 – Options for Retirement Income

It is useful to consider potential structures for generating retirement income against the simple two-dimensional model shown in Table 2. This separates the investment component of an annuity from the survival element and considers separately the variation in the guarantees offered for each of these two dimensions. Traditional annuity products where income is guaranteed for life are positioned in the bottom left-hand corner. The provider both guarantees in full the investment return and underwrites the survival risk for life. Retirement income solutions based on payment of a lump sum at retirement or alternatively a drawdown of income out of a investment fund that is not annuitised can be represented in the top right-hand corner – the pensioner carries all of the survival and investment risk in these solutions. However, presenting the options in this way encourages us to ask the question as to whether if we unbundle investment and survival elements, we can offer a range of solutions that are intermediate between these two extremes and perhaps therefore overcome some of the objections of both annuitants and providers set out above. Providing more options should generate more efficient pricing of guarantees and avoid a situation where individuals are faced with a choice between extreme solutions.

Section 3 – Annuity Design

We consider that there are really 5 key issues for the design of annuities. These are:

- choice (investment)
- flexibility (income)
- protection (survival)
- communication (trade-offs)
- fail-safe.

Once we open up the full permutations implied by Table 2, we are able to provide a wide range of choices, flexibilities and protections. However, for these to work well we also need to communicate the trade-offs clearly and in some circumstances to provide guarantees or fallback positions. More will be said on these issues later in the paper.

Section 4 – Investment

The focus of most pension systems seem to be on encouraging individuals to build up more capital to provide income in later life. Relatively little emphasis has been placed on using assets efficiently during the process of converting capital to income. However, optimising investment returns after retirement does matter substantially for the levels of post-retirement income that can be enjoyed. Table 3 shows, based on UK annuity tables, the incremental retirement income that can be achieved through earning additional returns on assets in retirement. The conversion rate for retirement at age 60 is approximately 10 for 1, ie 1% pa of extra return generates an income 10% higher. Of course earning additional returns may involve taking extra risks and there will not be one right answer for all annuitants. However, we can model risk/reward patterns for alternative strategies and allow people to find the right trade-offs not only at the point of retirement but also subsequently as their risk/reward preferences change.

Section 5 – Longevity

The major practical problem for conversion of capital to income is that lifespan is a distribution and not an expectation (see Tables 4 to 6). Policy makers often talk about life expectation and indeed build legislation round this concept, but this is unhelpful unless there is a device for averaging experience across the distribution by pooling risk. Indeed, uncertainty as measured by the relationship of one standard deviation to life expectation arises with age so planning the use of financial resources becomes more and not less difficult with age.

We can view this problem in another way by seeing the effect of following a strategy of respreading assets over lifespan as we get older. The results achieved depend on the investment return anticipated versus that actually earned. If we assume the same return is achieved as is earned, then a gradual decline in lifetime income is experienced. This is because for each year of life survived, life expectation falls less than a year. For example, if life expectation at the start of the year were say 5, might be 4.75 at the end of the year. If we started the year with a 100,000 dollars and took out 20,000 dollars, ie 100,000 over 5, we would have to achieve an investment return of 19% to justify keeping the investment at the same level at the year end, ie 80,000 x 1.19/4.75 to produce 20,000 dollars per year. This result emerged without anticipating any investment return at all – we would of course have had to earn an even higher return if an investment return had been assumed.

Graphs illustrating some possible outcomes are shown in Tables 7 and 8. It can be seen in Table 7 that without annuitising individuals are faced with the prospect of a sharp fall in future income even if a cautious spreading rule is adopted, ie one which turns out to assume a much lower rate of investment return than that actually achieved. If however we invest in the same pool of assets and annuitise, the achievable result is as shown by the dotted line in Table 8. The gap between the dotted line and the declining red curve is the benefit of annuitising. An important point of theory is

that it is always possible to maximise the expected lifetime income by annuitising given a comparable pool of assets.

From a provider perspective, life companies considering offering traditional annuities are faced with an acute problem – how to estimate improvements in future longevity. Improvements around the world seem to run as high as 3% pa but small variations through time could make large differences to the outcome. There are also substantial differences by characteristics such as generation, socio-economic group and gender.

We illustrate the impact of longevity drift in the UK in Tables 9 and 10. The drift shown occurred over just 12 years, well within a generation of annuitants and there is of course a high degree of uncertainty in the future given medical and scientific developments. It is a reasonable question as to whether life companies can guarantee longevity risk throughout life at a price that annuitants are willing to pay and one suspects that traditional annuities offered by at least some companies are perhaps currently being under-priced relative to the uncertainty of future outcomes.

Section 6 – New Model

Our proposed model following the analysis in Table 2 unbundles the investment and longevity components into:

- investment fund
- insurance against survival.

Each of these components may be guaranteed to a greater or lesser extent and in the case of insurance against survival, this may be present, wholly or just in part, ie only part of the fund may be annuitised. The concept is of an investment fund with the following features:

- assets available for lifetime use but forfeited on death

- income taken by cashing in assets at a rate between a maximum and minimum. The maximum is intended to provide income for life on a "realistic" basis to reflect anticipated investment returns and longevity; the minimum to reflect a cautious basis (it may also be subject to regulatory constraint). The annuitant is then able to choose a level of income required between these limits

- during lifetime survival "credits" or "bonuses" are added to the fund to reflect (by age) the expected transfer of assets from those that die to those that survive. These credits or bonuses are proportionate to the fund as the fund defines the exposure to longevity. The principles for the calculation are set out in Table 11.

- the maximum and minimum levels of income are reviewed at intervals (typically we have modelled 3 years)

- the rates for survival credits may also be reviewed at intervals (rather than guaranteed for life). This enables annuitants not to pay for guarantees that they may or may not want and allows life companies to offer longevity based products without taking on unreasonable or unquantifiable exposures to long term longevity. Given the large number of deaths at older ages establishing the significance for experience rating of longevity is relatively easier than for life assurance at younger ages. There could under this model be scope for multi-variate rate of longevity following methodologies similar to those used for car or household insurance.

The review cycle is summarised in Table 12 and the review calculation in Table 13.

For the customer, a simplified version of how the results may be presented is given in Table 14. This table is somewhat similar in presentation to the information that customers, for example who had been members of defined contribution pension schemes, will have received during the build up

phase for their plans. The survival credit shown can never be zero and hence this is a simple demonstration that the expected lifetime income will always be higher than for a pure investment portfolio.

For the customer, the additional return from annuitising will have to be attractive compared with the prospect of losing the fund on death. Table 15 shows a graph of additional returns and Table 16 gives some corresponding data. This data indicates that returns reach levels that are large compared with likely investment performance and hence should be influential in a customer's decision as to whether or not annuitising is worthwhile. The curve in Table 15 explains why we get the effects shown in Tables 7 and 8. Those who choose not to annuitise in old age are likely sooner or later depending on the spreading rule used to find their income turning down sharply. Of course not annuitising assets means that they are available for bequest, ie passing on to survivors. However, an optimum solution for bequest will usually involve annuitising at least a portion of the funds to provide income to the annuitant or pensioner at the lowest cost thereby maximising the assets left for bequest.

Clearly, as the annuitant may be carrying both investment and longevity risk to some extent, the level of sustainable income cannot be guaranteed and a review mechanism is essential for such a structure. It is important to be able to communicate the consequences of complex decisions in a form that can be understood even by those who are not particularly numerate or financially sophisticated. We think that visual material of the sort illustrated in Tables 17 to 19 can be of value in such a process.

Section 7 – Risk Reduction Strategies

We can also design investment strategies for individuals so that volatility of income declines with age. In the UK we would refer to this as post-retirement lifestyling or lifecycling. At older ages longevity guarantees can be provided at much lower risk to the provider than at younger ages as the

duration is shorter and the weight of money is smaller. We can use stochastic modelling to test the range of possible outcomes for given investment strategies (see Table 20). Finally, we can also allow switching into traditional guaranteed annuities if this is acceptable to the provider.

Section 8 – Profitability

By sharing the investment and longevity risks with the annuitant, it is possible to reduce capital costs and increase profitability – see the example in Table 21 which is based on capital requirements applicable in the European Union and which assumes bonds of suitable duration can be found to match the conventional annuity. In many countries there are no bonds of suitable duration and therefore substantial additional reserves for mismatching may be required.

Section 9 – Conclusions

In summary, we think the retirement income market presents huge opportunities and annuitisation has a substantial role to play in effective retirement income provision. The sort of model we have described can be adapted to a wide range of structures and regulatory frameworks.

For customers it offers a natural extension to defined contribution pension vehicles effectively allowing continuation of an investment strategy that can be managed and adapted with circumstances and attitudes after as well as before retirement. It offers the possibility for flexibility of income to fit in with lifestyles that differentiate much less acutely between work and retirement than has been the case in the past and allows individuals to optimise their own risk/reward preferences for income.

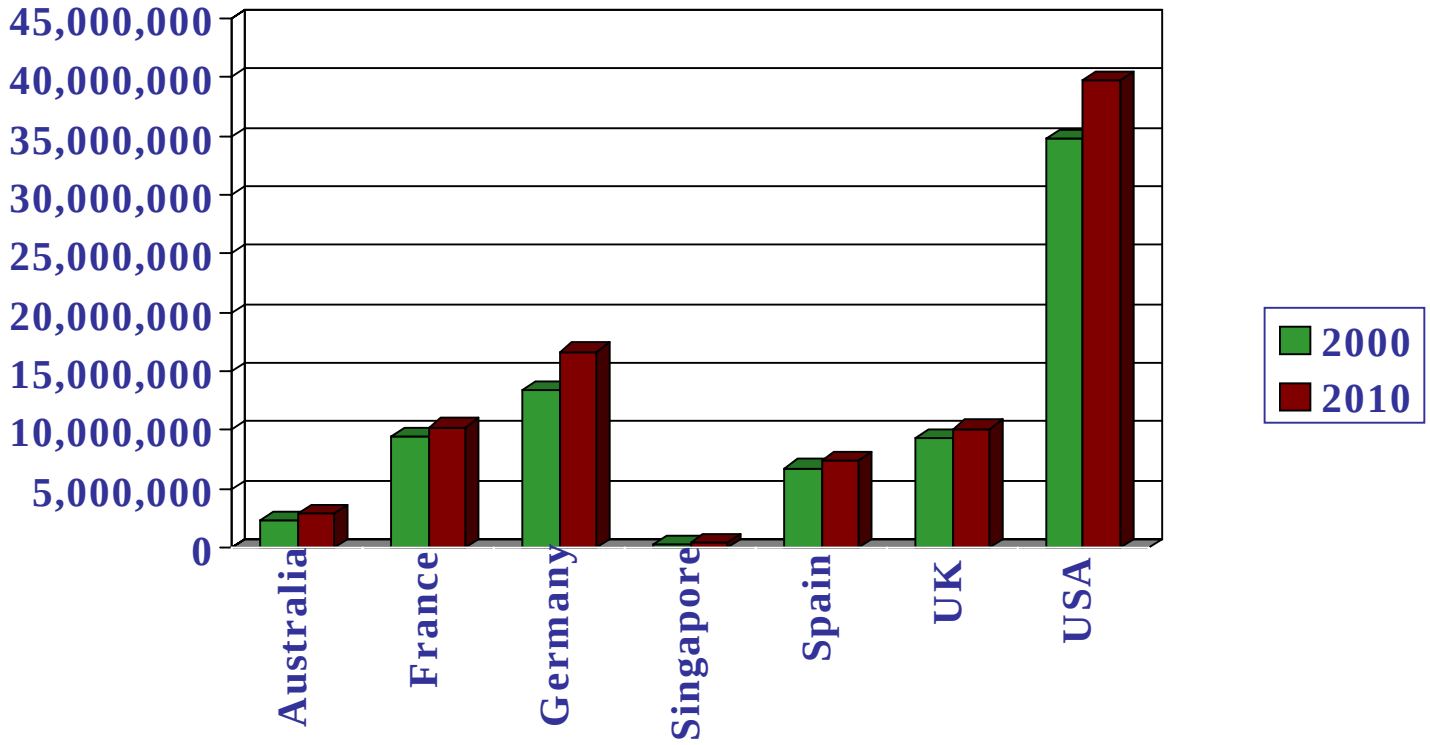
For insurers and fund managers, the structure we have described means that longevity protection can be offered to customers on a manageable basis, that a more substantial market for reinsurance may well emerge, that higher margins can be achieved from the post-retirement population and that provision will not be restricted by available bond investments. Governments and corporates will

not welcome pressures to issue bonds of ever longer duration to cope with growing longevity and will have other financial objectives. Finally, there is great potential for valuable financial advisory and planning services to be made available to those at older ages for whom such services may well be particularly useful.

Mike Wadsworth and Alec Findlater of Watson Wyatt are co-authors of an award winning paper 'Reinventing Annuities' published in January 2001. Copies of the paper which generated the ideas in this submission can be obtained from sue.morgan@eu.watsonwyatt.com.

Table 1

Scale of opportunities: people over 65



Source: US Bureau of the Census

Table 2

Options for retirement income

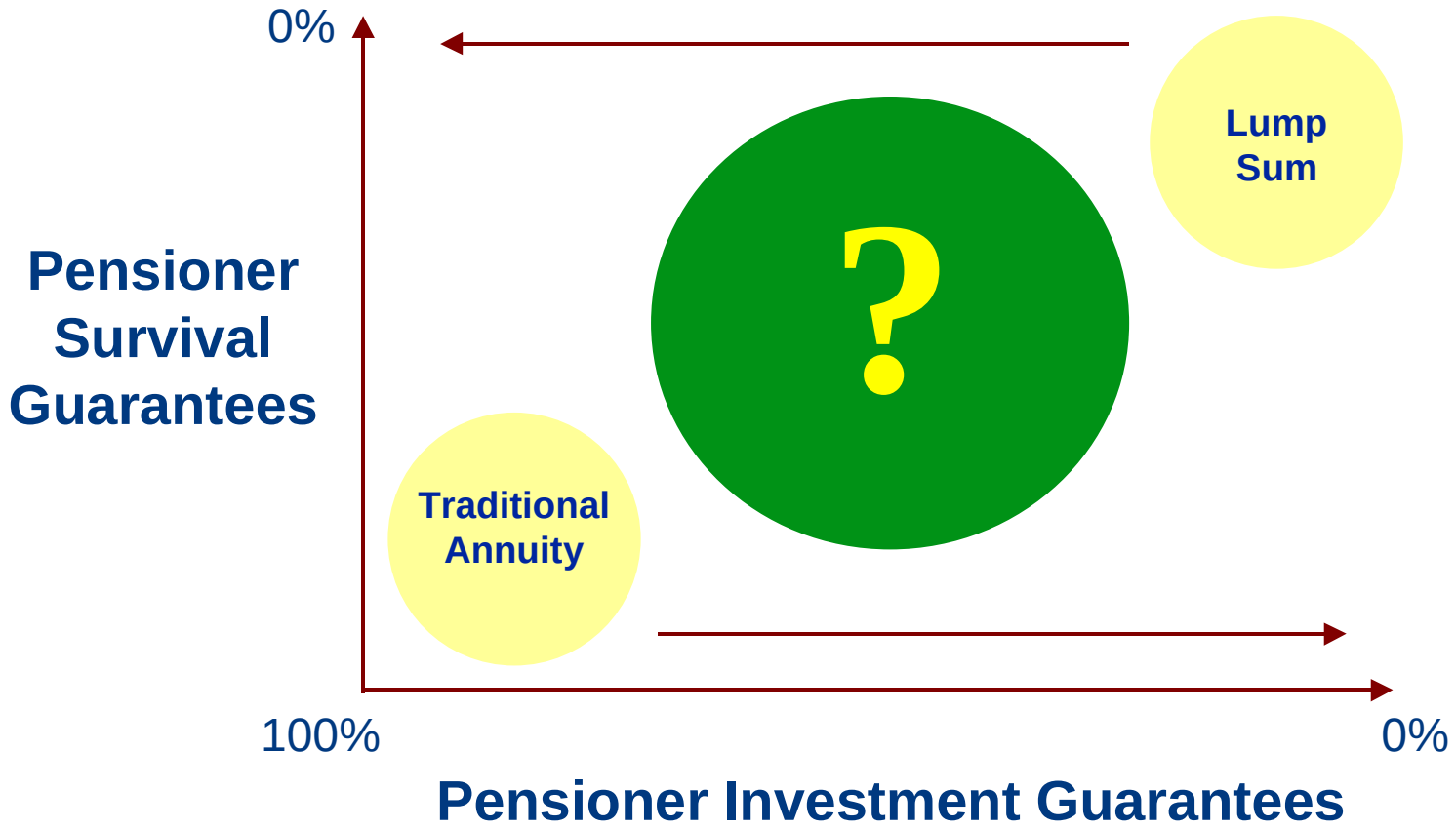
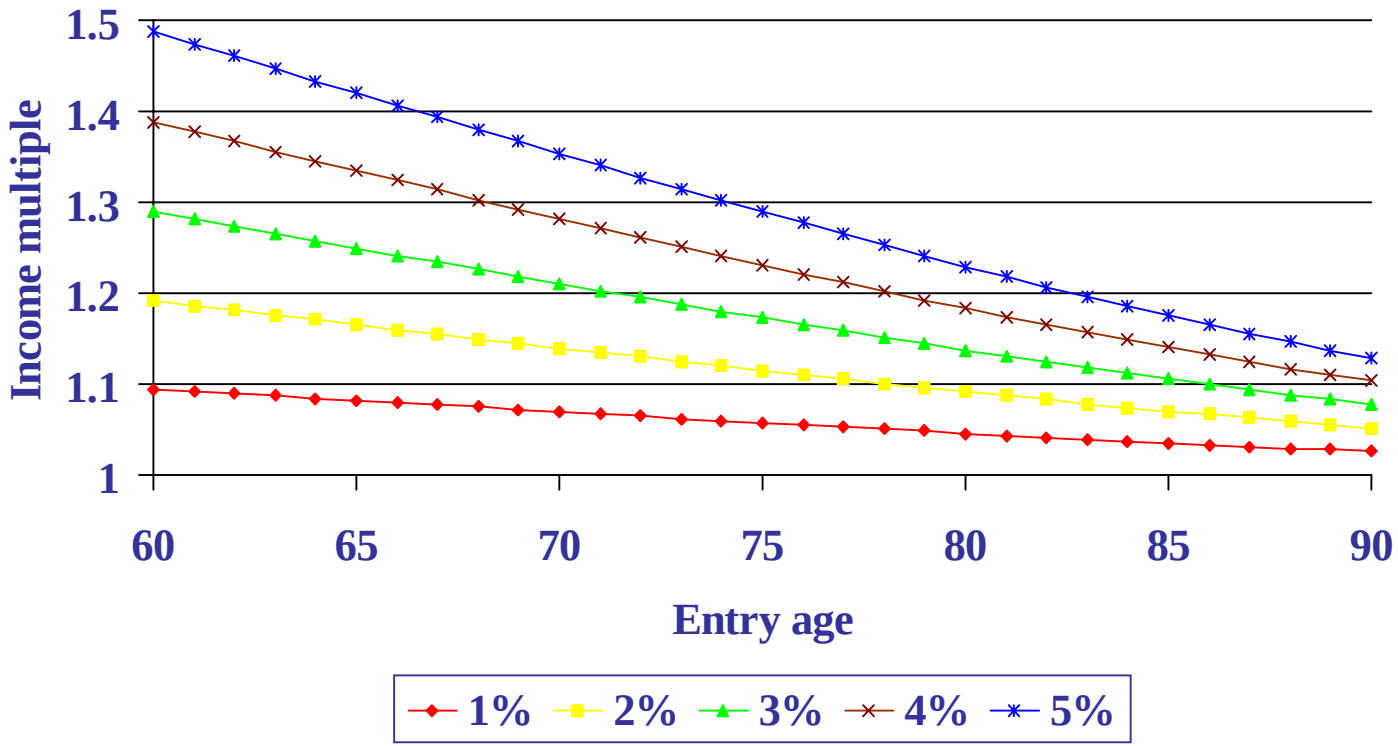


Table 3

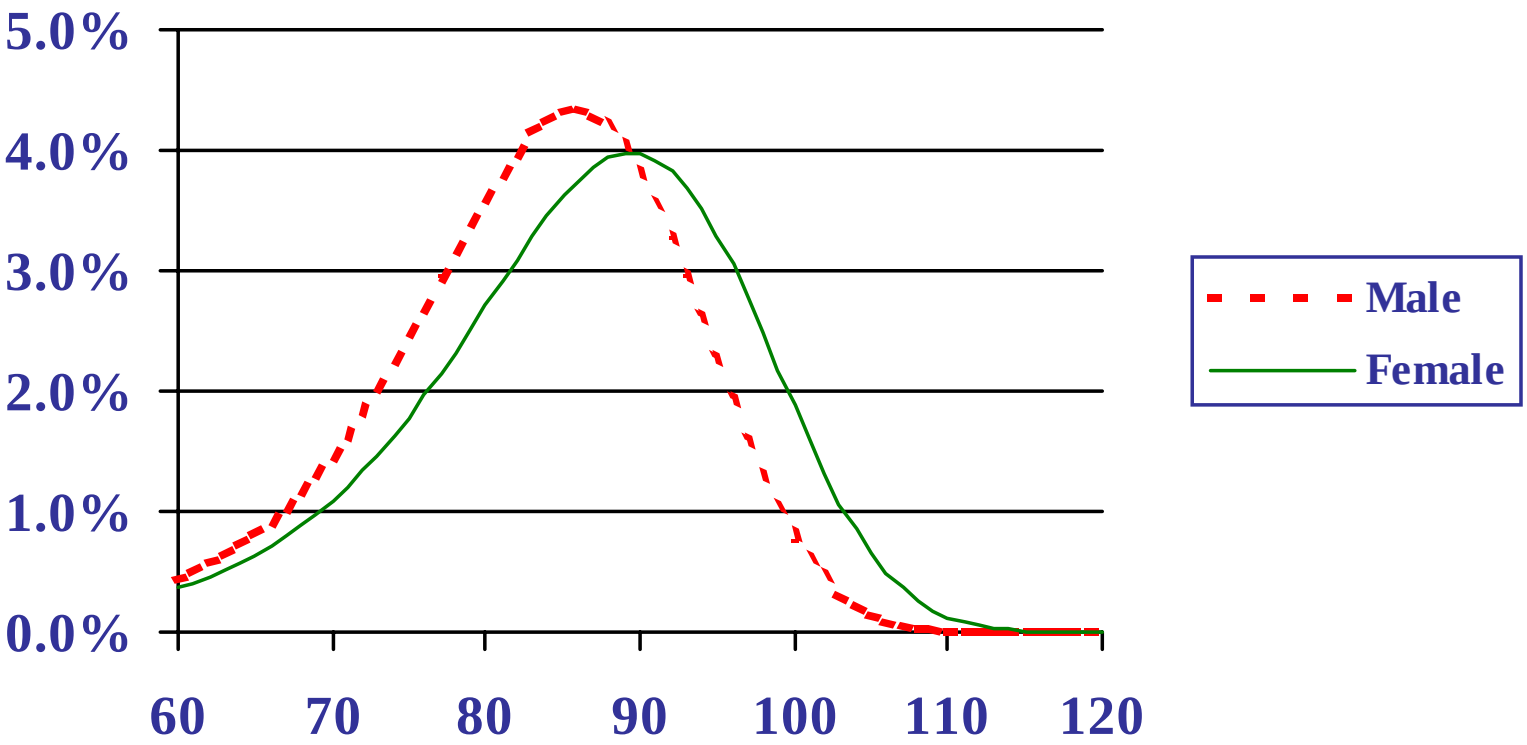
Effect of investment growth on supportable income: males



Base income supportable calculated at 5%.
Income multiple = income supportable assuming extra investment return resulting from equity investment of 1, 2, 3, 4 or 5% pa after charges, divided by base income. Mortality: PMA/PFA92 Year of Use 2001

Table 4

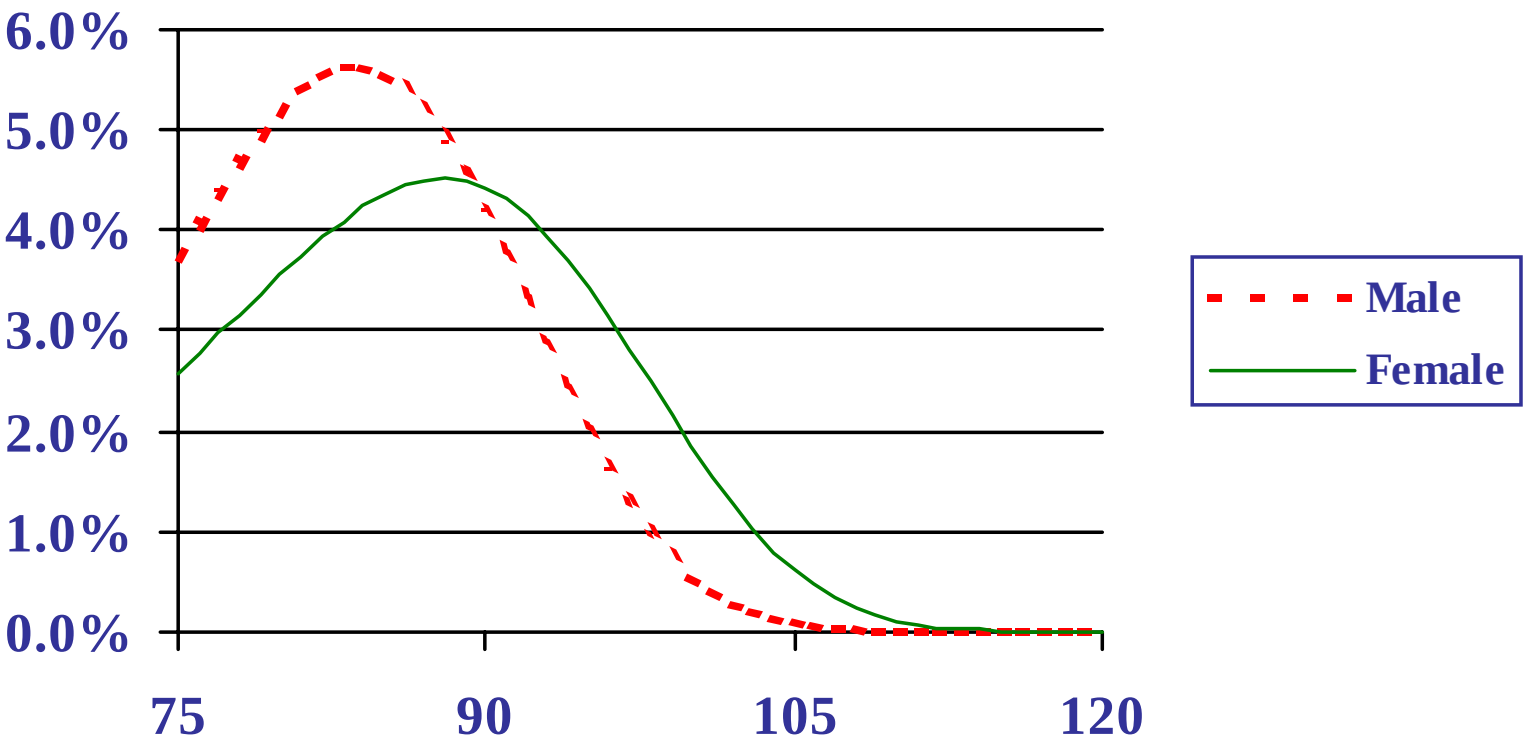
Distribution of deaths by age now: age 60 now



Mortality: PMA92/PFA92 Year of use 2001

Table 5

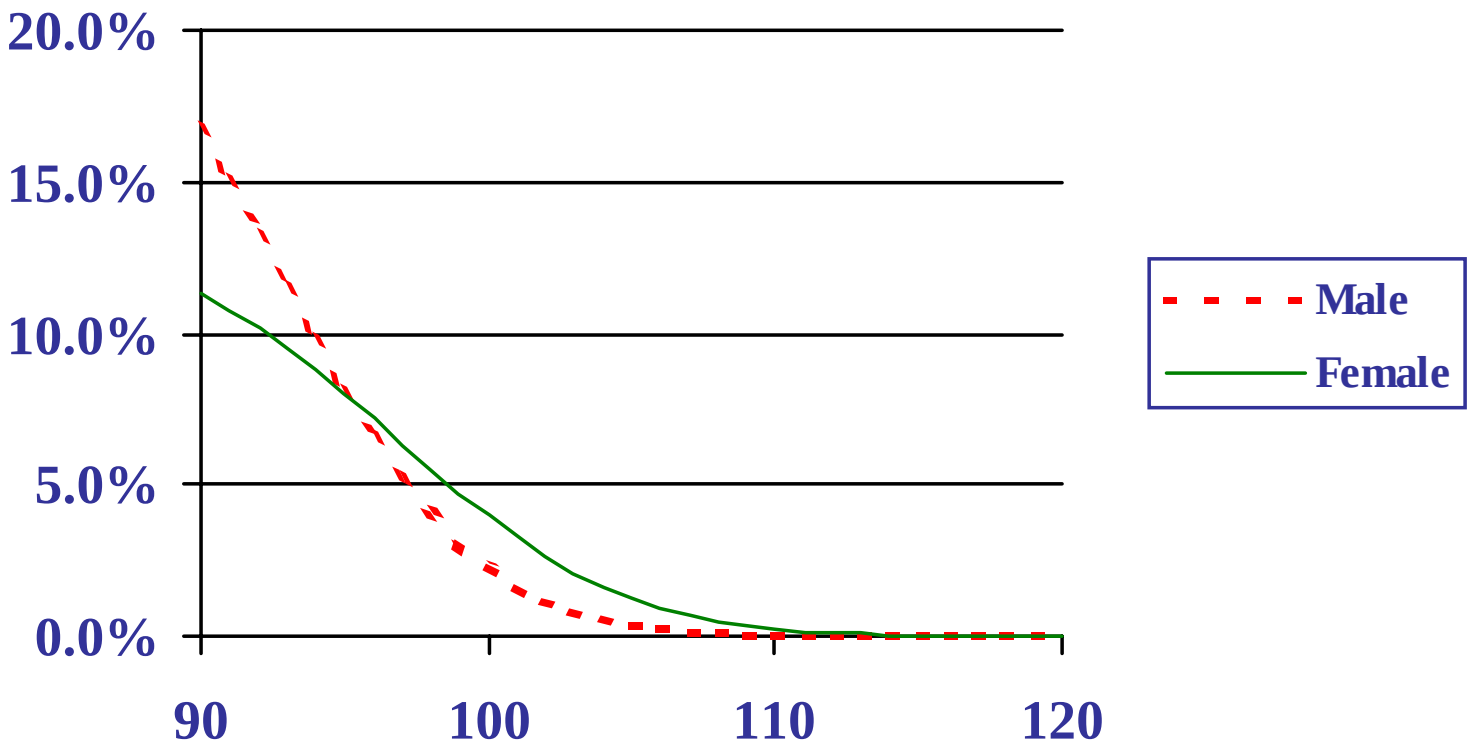
Distribution of deaths by age now: age 75 now



Mortality: PMA92/PFA92 Year of use 2001

Table 6

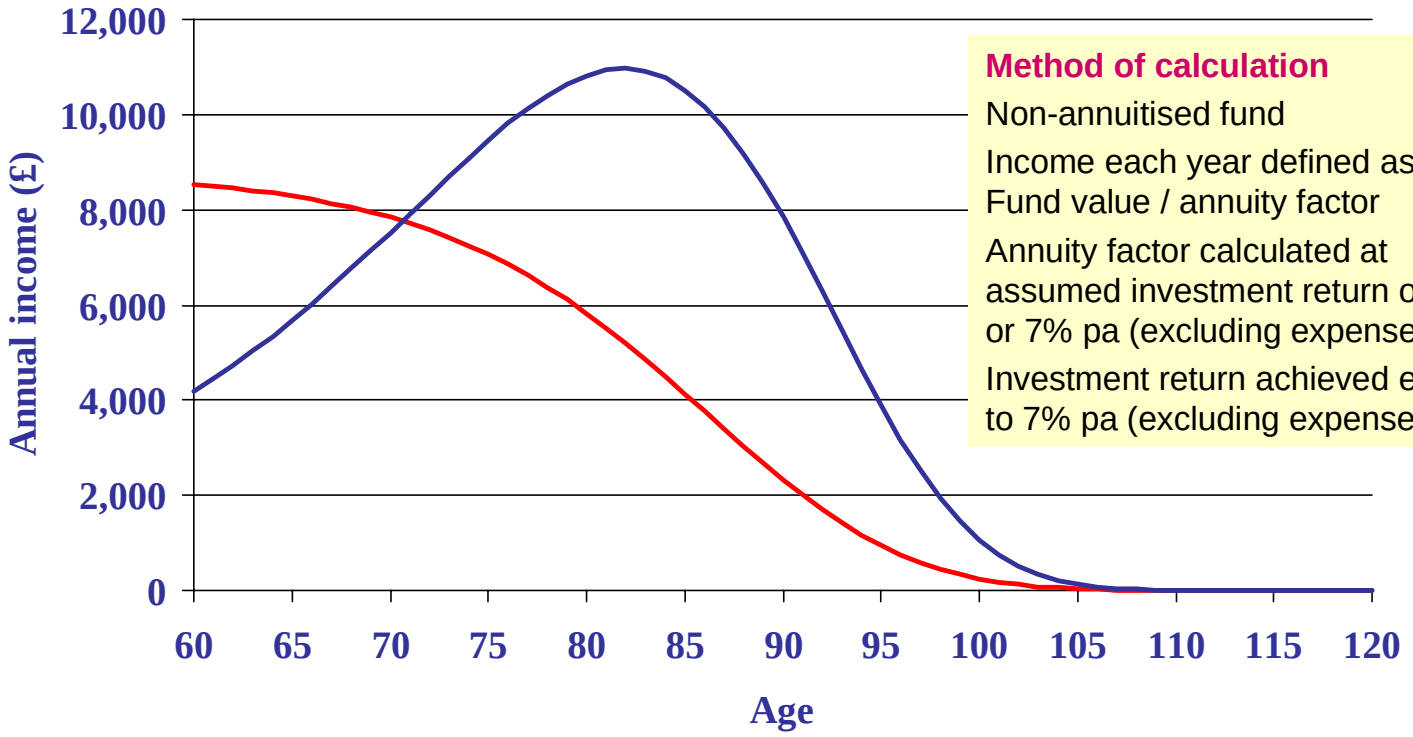
Distribution of deaths by age now: age 90 now



Mortality: PMA92/PFA92 Year of use 2001

Table 7

Progression of income:
spreading fund over future life expectation



Method of calculation

Non-annuitised fund

Income each year defined as: Fund value / annuity factor

Annuity factor calculated at assumed investment return of 0% or 7% pa (excluding expenses)

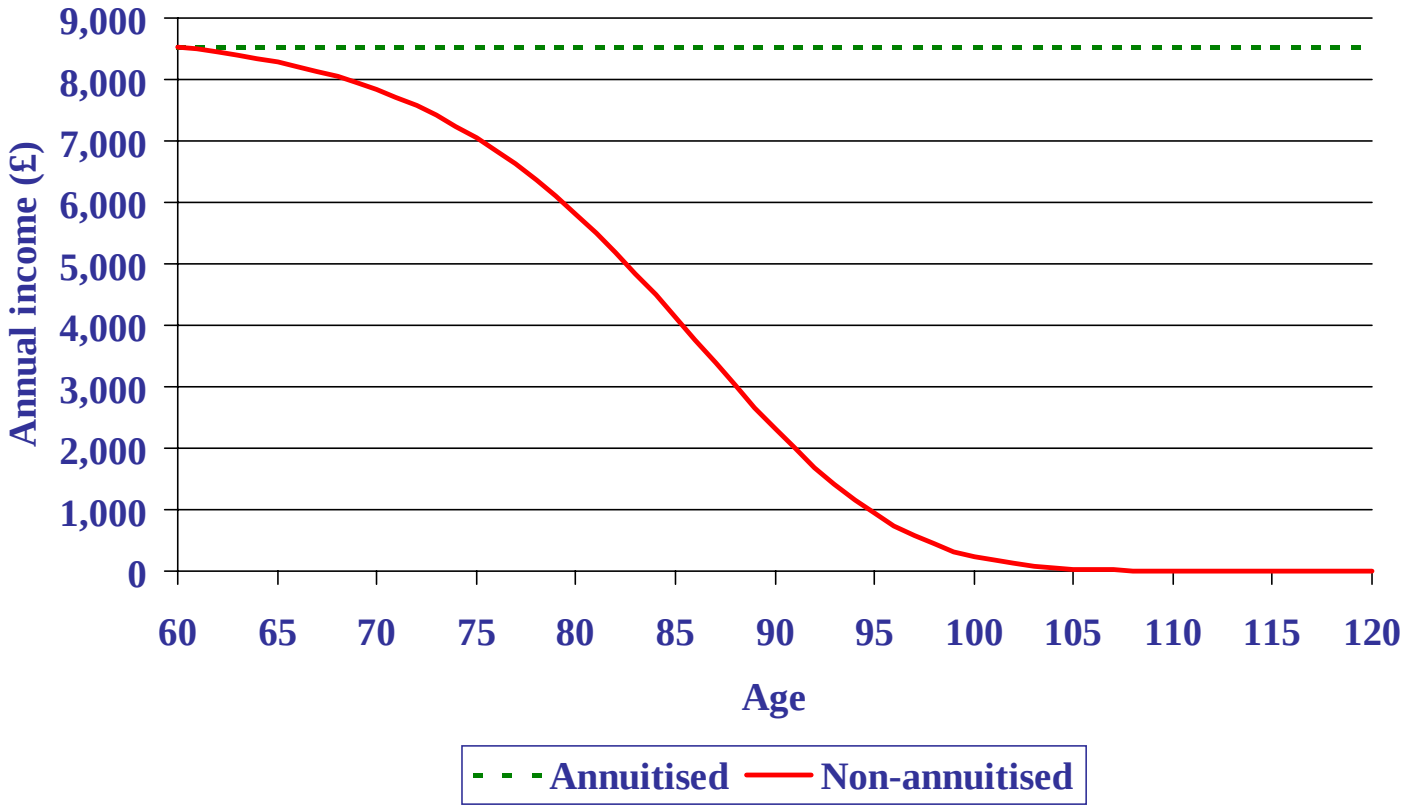
Investment return achieved equal to 7% pa (excluding expenses)

Investment return assumed: 7% pa 0% pa (excl expenses)
Investment return achieved: 7% pa (excl expenses)

Initial fund £100,000 Male aged 60 at outset
Mortality: PMA92 Year of use 2001

Table 8

Progression of income:
annuitised versus non-annuitised fund

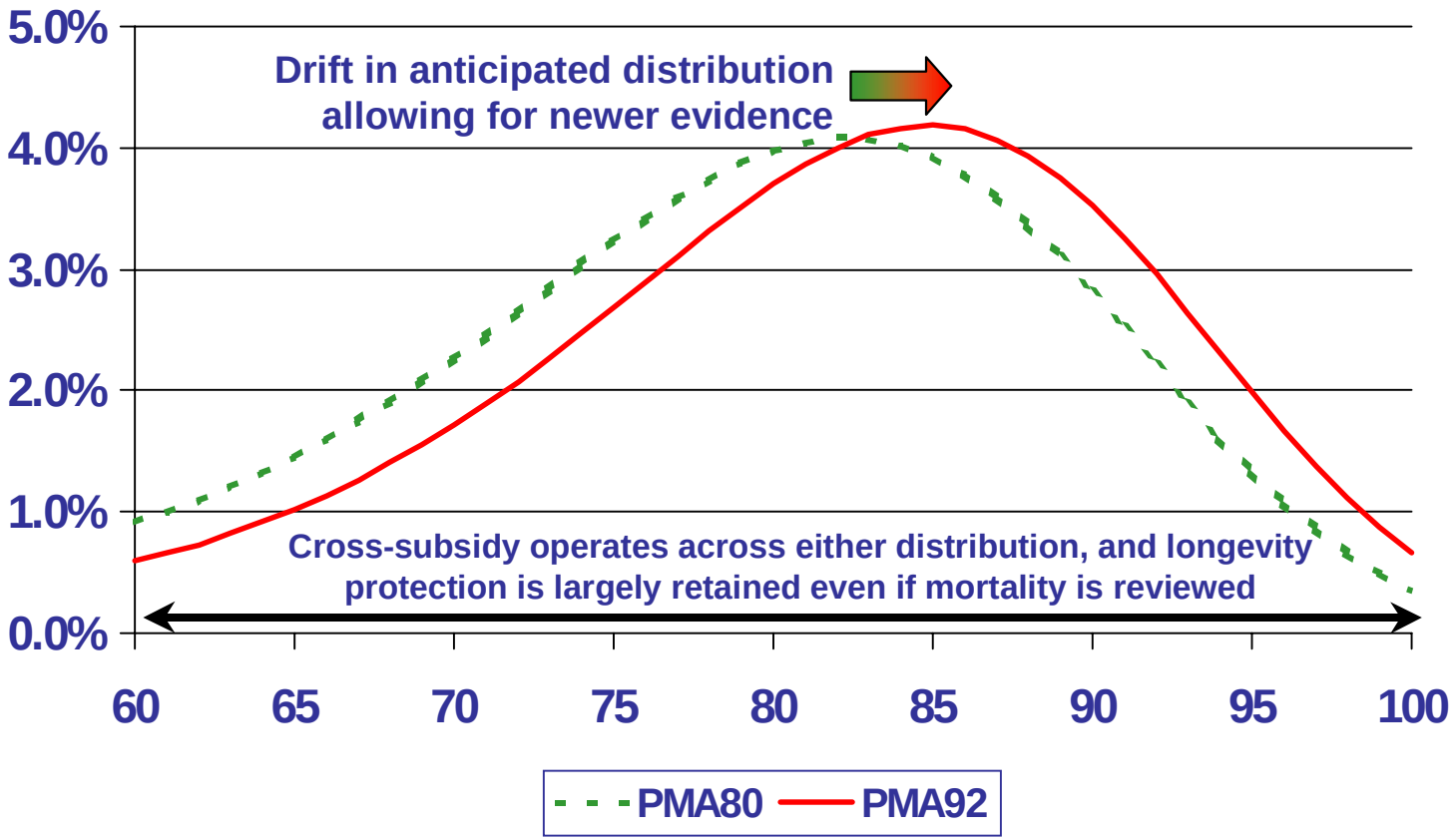


Male aged 60 at outset

Mortality: PMA92 Year of use 2001

Table 9

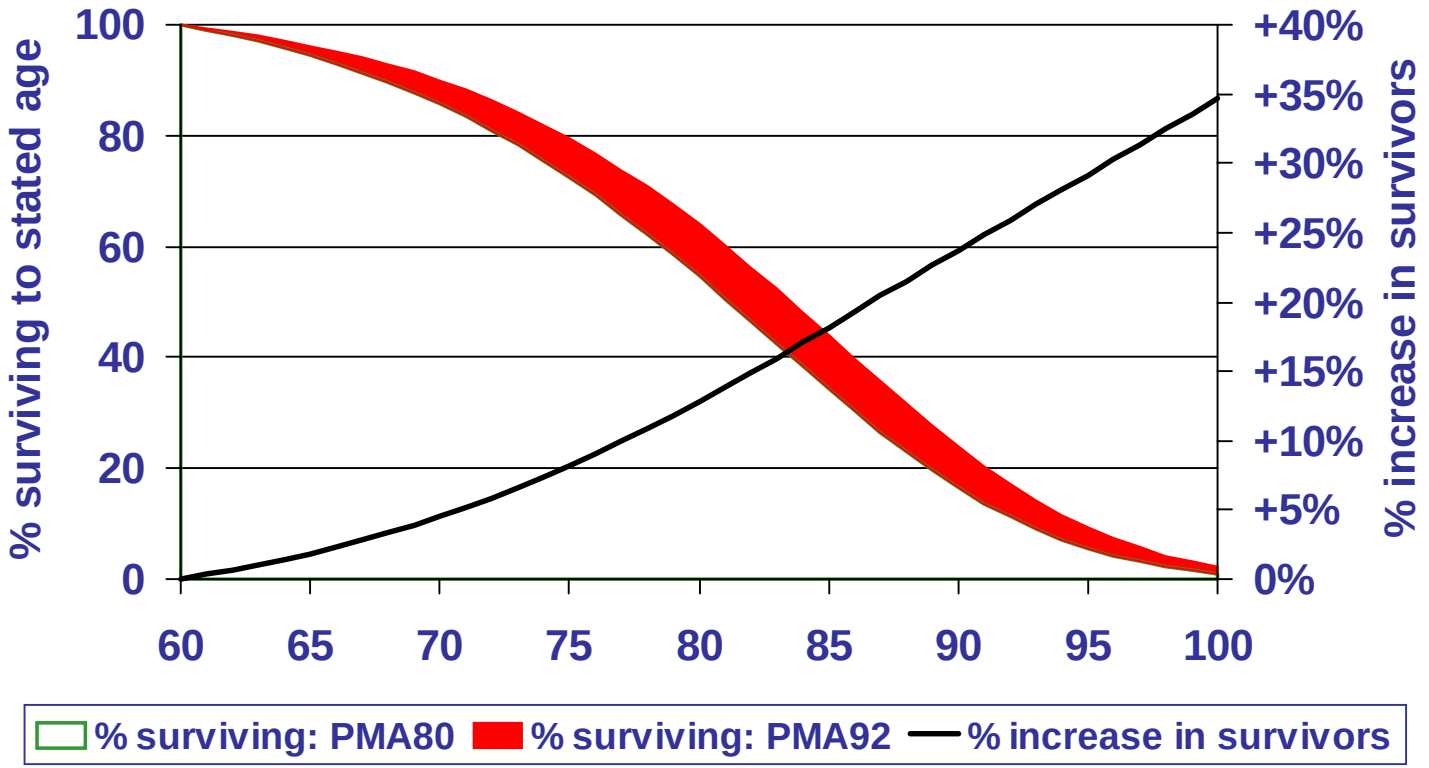
Mortality drift:
uncertain future improvements



Both charts show expected distribution of deaths for male aged 60 in 1992, allowing for future improvements. PMA92 represents the more recent estimate

Table 10

Excess survivors:
PMA92 compared with PMA80



Cost to annuity provider of not reviewing mortality relates to payments made to those survivors who were not expected to live so long - the red zone

Table 11

Operation of an annuitised fund

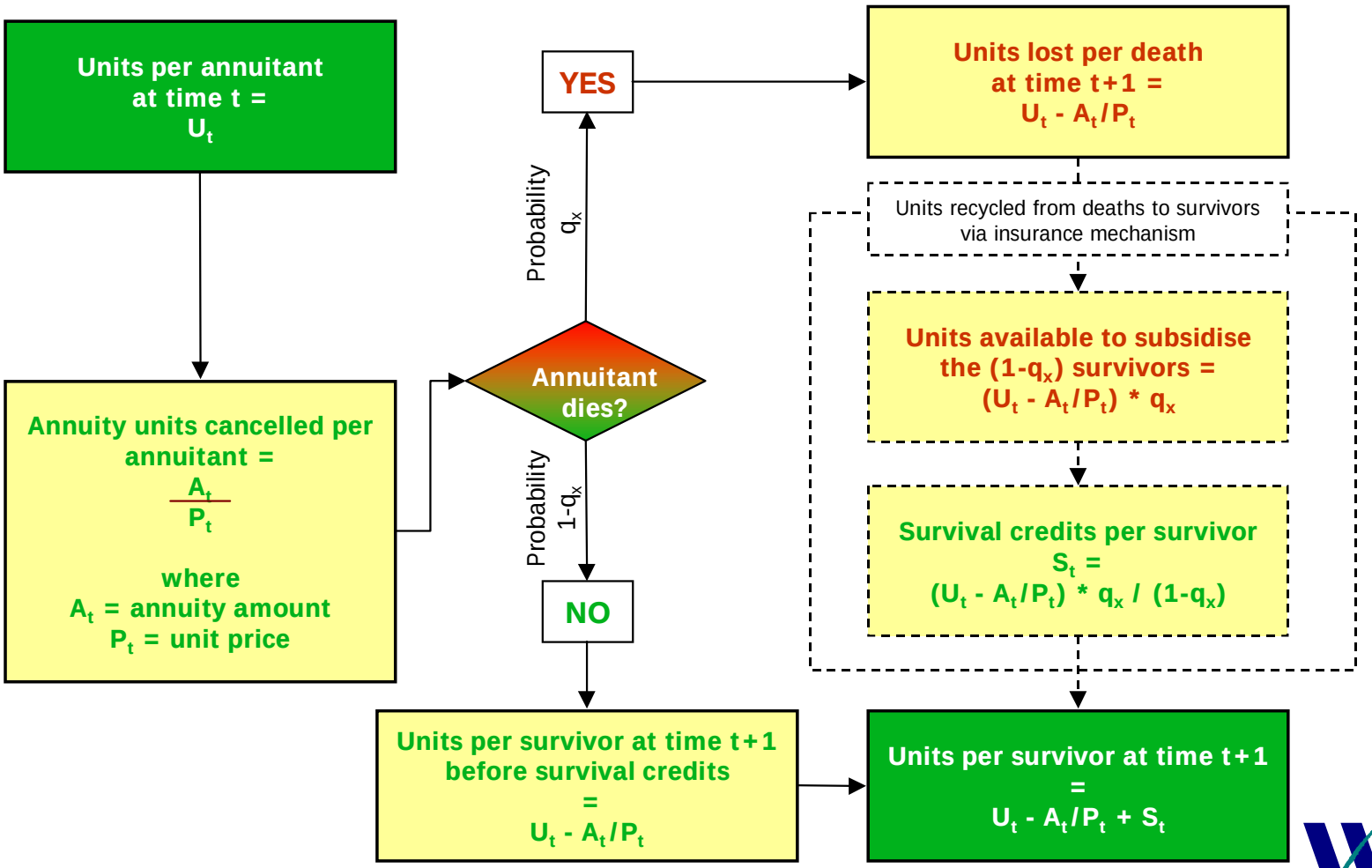


Table 12

Flexible annuity review cycle

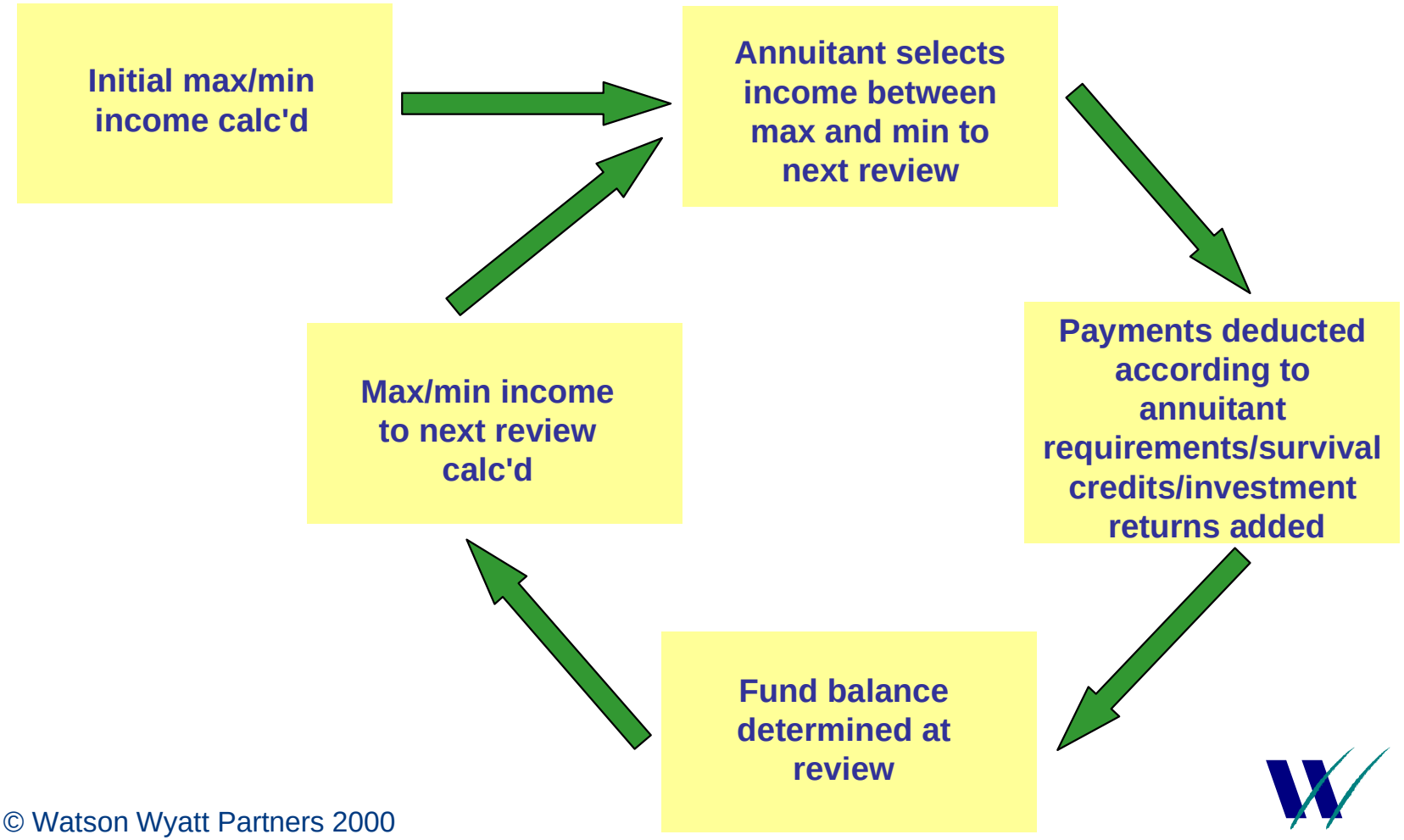


Table 13

Maximum income at review

$$\text{Annuity at Review Time (At)} = \frac{Ut \times Pt}{\bar{a}x}$$

where $\bar{a}x$ = cost of annuity purchase on current market terms at review time, but permitting an interest rate higher than that implied by current annuity rates to allow for asset mix of units over life expectancy of annuity

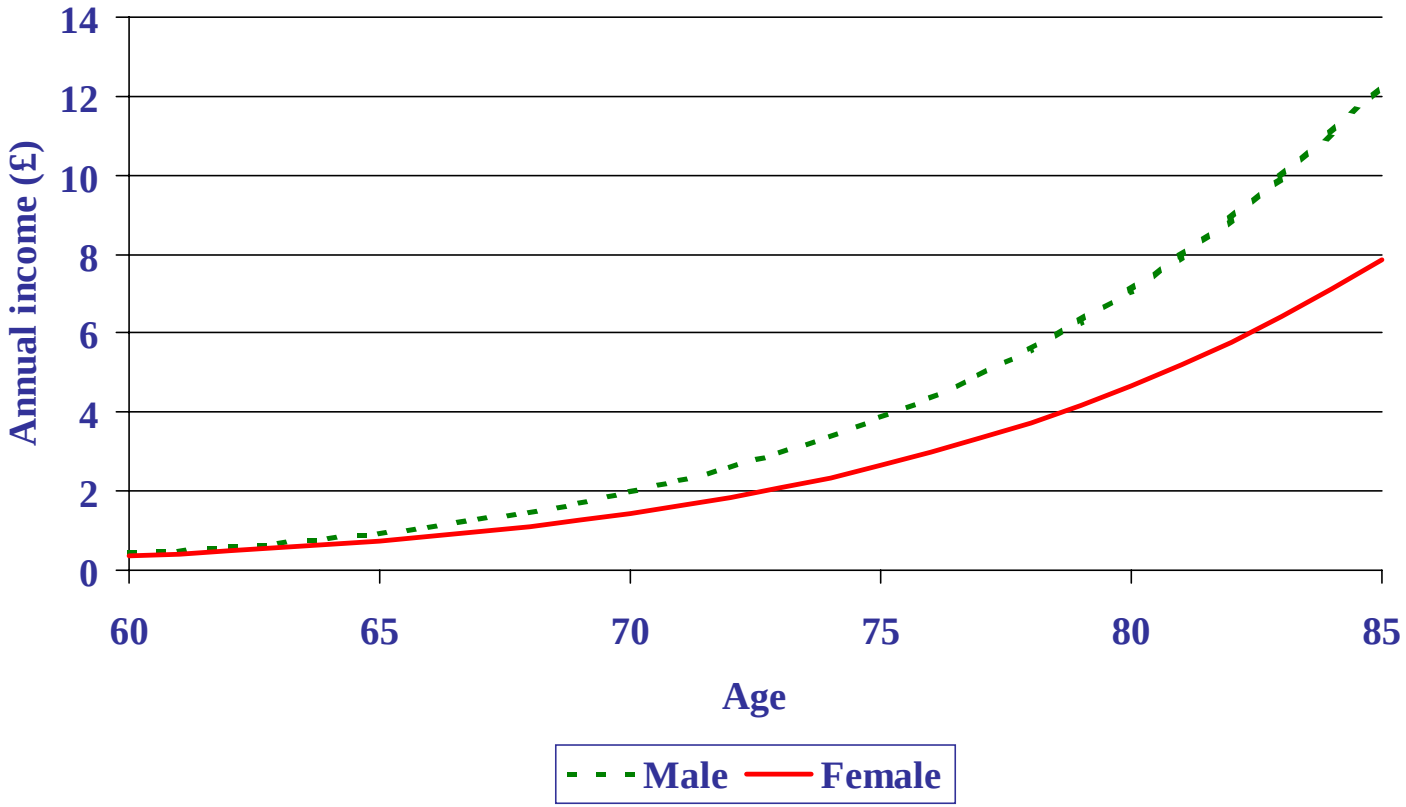
Table 14

Lifetime income model: benefit statement

	Units	Unit Price £	Value £
Start of Year	10,000	10.00	100,000
Annuity Payments	**(975)**		**(10,000)**
Survival Bonus	295		3,000
Effect of Changes in Unit Price			4,860
End of Year	9,320	10.50	97,860
Target Income for Next Year			10,000

Table 15

Equivalent additional fund growth from mortality cross-subsidy



Mortality: PMA92/PFA92 Year of use 2001

Table 16

Equivalent additional fund growth

	M % pa	F % pa
75	4.1	2.8
85	13.1	8.4
95	33.2	21.2

NB: Partial survival protection possible

Table 17

Communication of benefits:
income taken initially = income supportable at 7% pa

Income projections at assumed asset growth rates: 5%, 7%, 9% pa

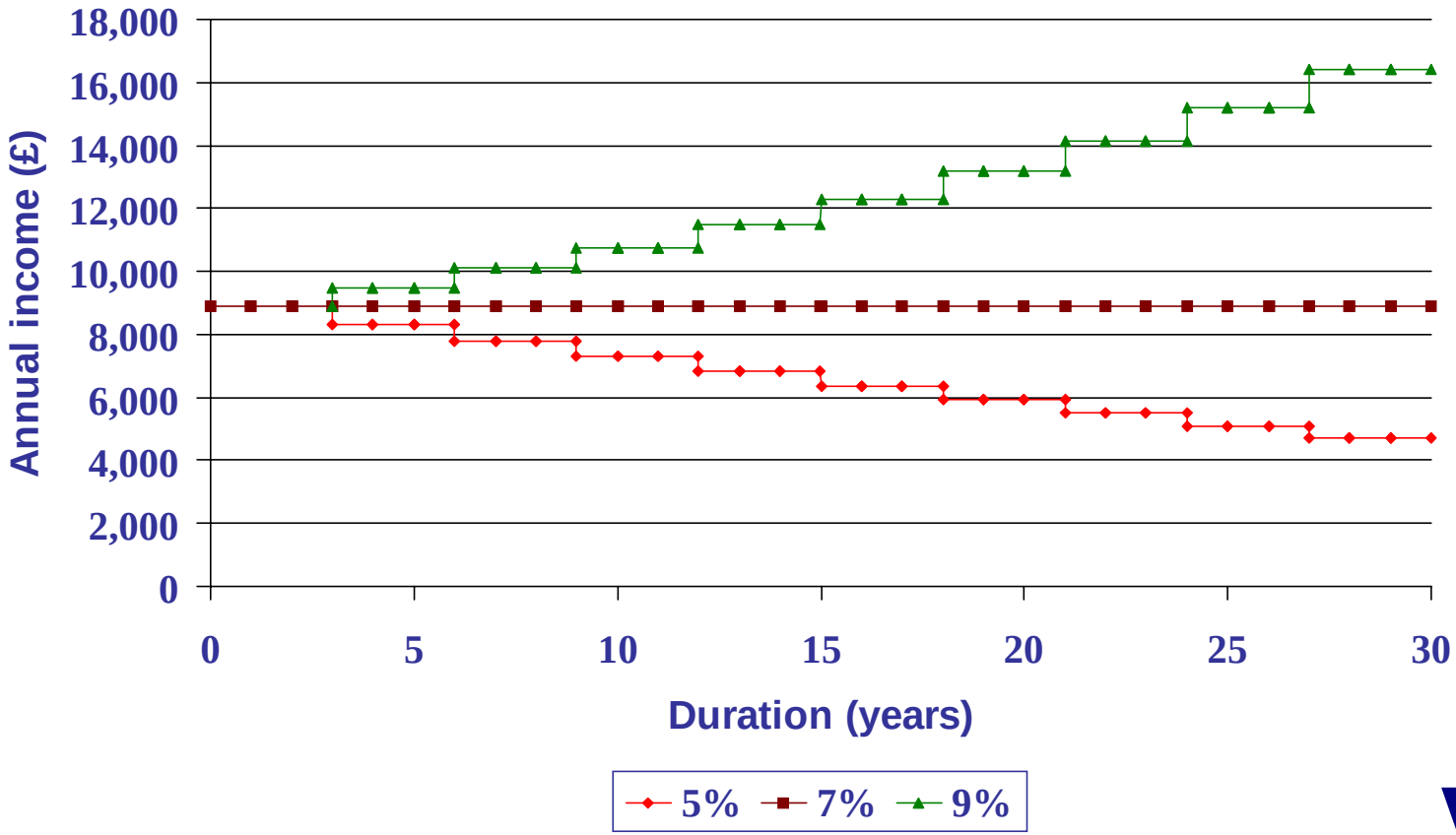


Table 18

Communication of benefits

income taken initially = 1.1 x income supportable at 7% pa

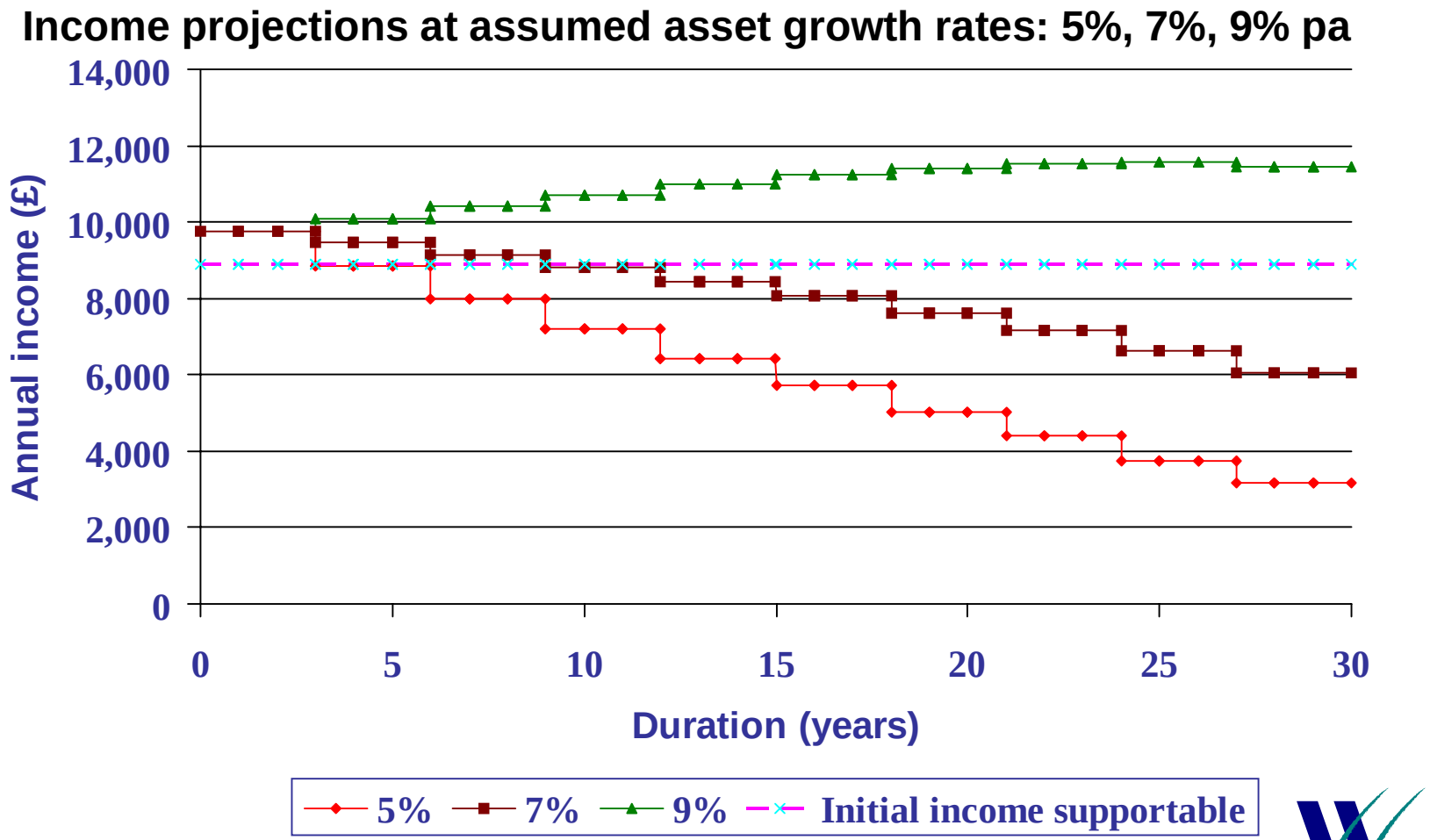


Table 19

Communication of benefits

income taken initially = 0.9 x income supportable at 7% pa

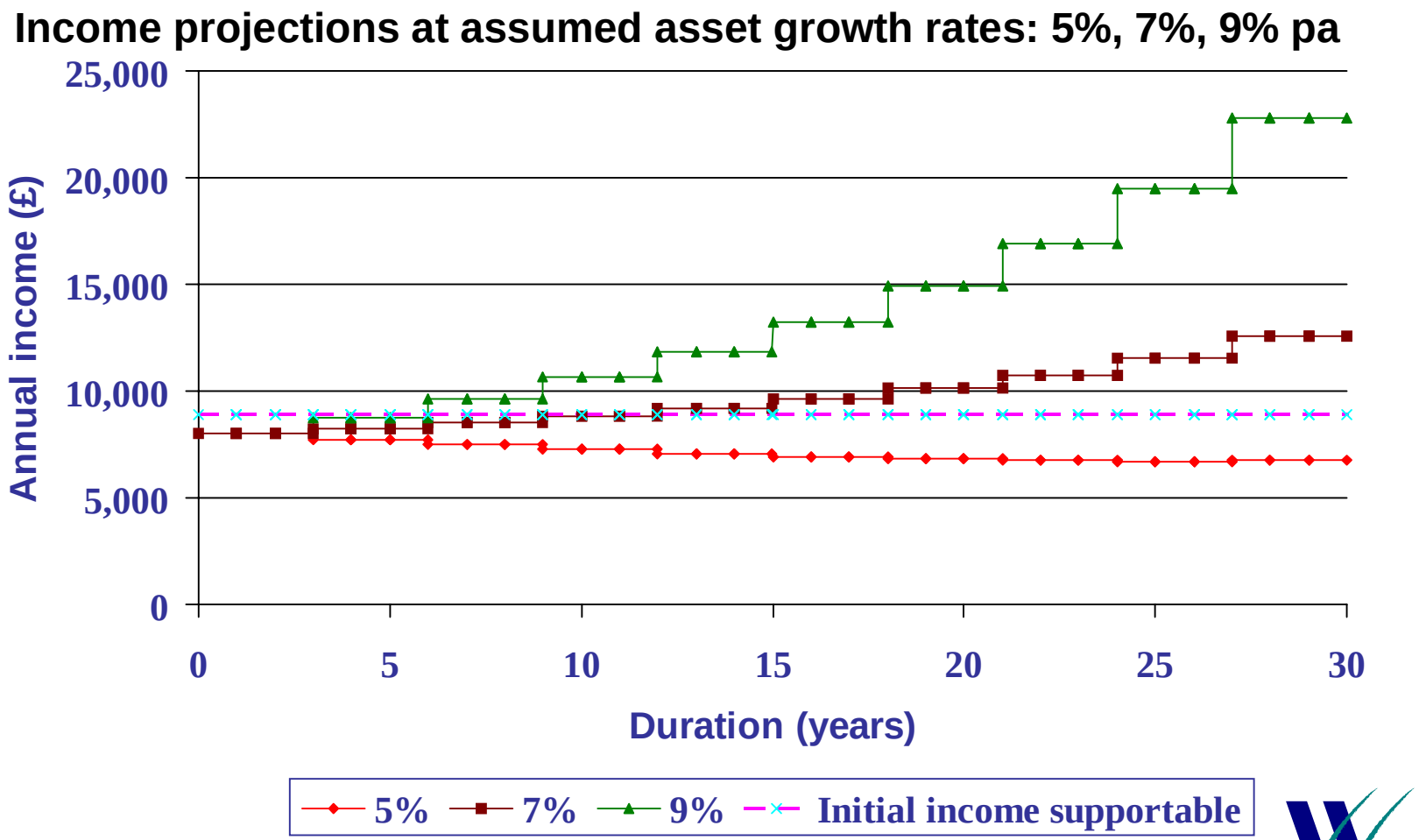


Table 20

Income projections: variable investment model

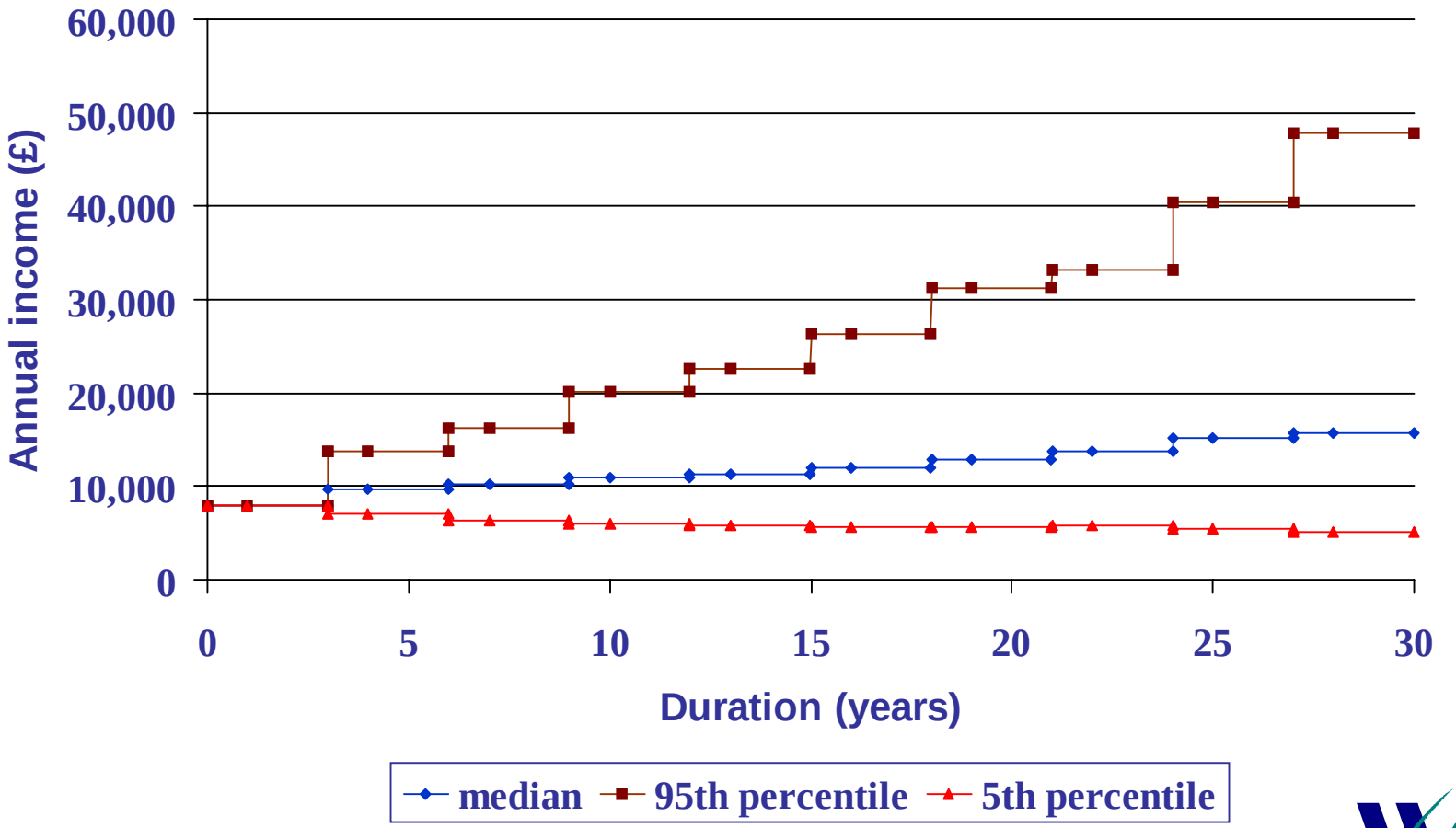


Table 21

Profit signature:
conventional annuity versus annuitised fund