

- 8.11 This product combination delivers about 30 per cent more retirement income than the account-based pension drawn down at minimum rates. At the same time, it does not result in any increase in the risk of outliving savings. The product delivers less income than the 100 per cent GSA – this is the price to be paid for the additional flexibility offered by the account-based pension component.
- 8.12 Notably, this product combination also delivers about the same level of retirement income as an account-based pension which is run off over the period to age 90. Thus, an account-based pensioner could achieve the same level of retirement income (around \$25,000 per annum in real terms) by drawing down their account-based pension faster. However, relevantly, this drawdown strategy results in an increased risk of running out of money. Any retiree who survives to age 90 will, in fact, run out of money under this drawdown strategy. We estimate that about 40 per cent of 65 year old males will survive to age 90. Therefore, although it is possible to use an account-based pension to deliver income at this level for a period of time, the strategy also involves a 40 per cent risk of running out of money.
- 8.13 Second, for the purpose of this paper, we describe a simple deferred GSA. The main features of the deferred GSA are:
- Retirees pay a proportion of their accumulated superannuation balance at retirement into a ‘deferred longevity pool’. No payments are made from the deferred longevity pool before contributors reach the ‘trigger age’
 - The balance of the accumulated superannuation account balance is available to be drawn down by the retiree on an account-based pension basis
 - For retirees who survive to the ‘trigger age’, payments are made each year from the deferred longevity pool according to a pre-determined formula (to provide transparency)
 - No death benefits are payable
 - There is no scope to withdraw from the deferred GSA¹²
- 8.14 In order to allow comparison with the other products we have modelled the deferred GSA product as follows:
- Retirees are assumed to be 65 year old males with a superannuation retirement balance of \$400,000
 - Retirees contribute around 13 per cent of their balance (around \$52,000) into a deferred GSA¹³

¹² As for GSAs more complex deferred GSAs could contemplate the inclusion of limited death and withdrawal benefits.

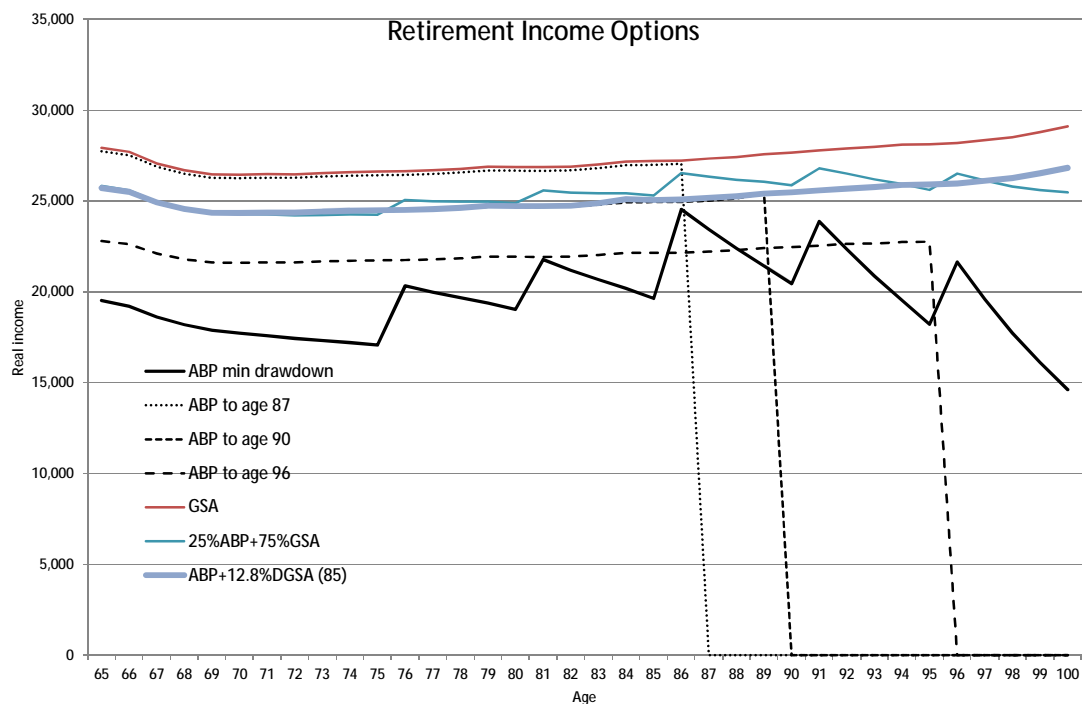
- The trigger age for the deferred GSA is 85. For those who survive to age 85, the deferred GSA works from that age onwards in the same way that the GSA works from age 65.
- The remaining balance (around \$348,000) is used as an account-based pension and is drawn down progressively over the 20 years from retirement to age 85

8.15 The deferred GSA provides a form of longevity risk insurance. That is, it secures a level of income later in retirement (for those who survive that long). We estimate that more than 60 per cent of retirees will survive to age 85.

8.16 Since later life retirement income is secured by the deferred GSA, this allows the residual balance (again, applied to an account-based pension) to be drawn down more quickly without increasing the risk of running out of money. Indeed, this is likely to be the primary reason for constructing this type of product combination.

8.17 The chart below shows the income payable from the combined account-based pension and deferred GSA arrangement with the income paid from the products considered earlier in this paper.

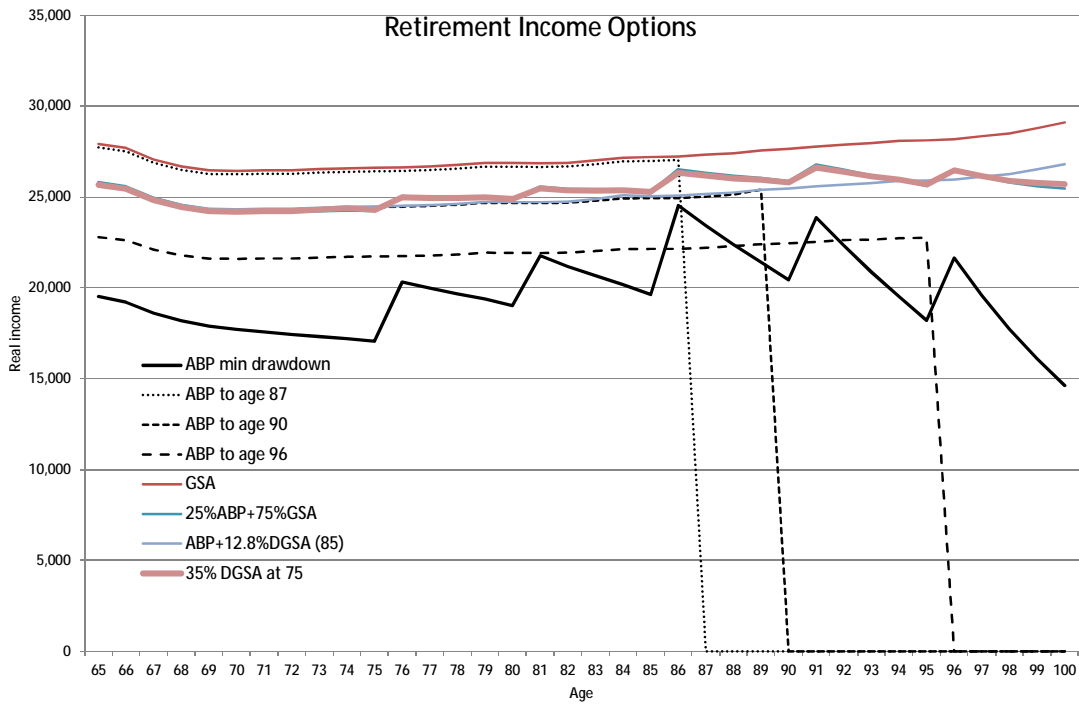
Figure 12: ABP + 12.8% DGSA combination income pattern



¹³ The 13 per cent contribution was selected to ensure a reasonably stable income throughout retirement, in expectation. A higher contribution would be expected to result in higher post age 85 income levels at the expense of lower pre-age 85 income levels and vice-versa.

- 8.18 As for the previous product combination, this product combination is more efficient than an account-based pension but is somewhat less efficient than the 100 per cent GSA.
- 8.19 In fact, it delivers an income profile which is similar to the first product combination described above.
- 8.20 The fact that these two product combinations give similar results (in terms of retirement income expectations) indicates a 'frontier' of reasonably efficient product combinations. It is easy to envisage a family of product combinations where $x\%$ of the initial balance is used to purchase a GSA product with payments commencing from the GSA product at age y while retaining the other $(1-x\%)$ in an account-based pension. Here, the combination of 25 per cent account-based pension/75 per cent GSA has x at 75 per cent and y at 65 years. The combination of 87 per cent account-based pension/13 per cent deferred GSA has x at 13 per cent and y at 85 years.
- 8.21 To illustrate the concept we have described another product combination which gives similar outcomes. In this combination:
- Retirees are assumed to be 65 year old males with a superannuation retirement balance of \$400,000
 - Retirees contribute 35 per cent of their balance (around \$140,000) into a deferred GSA
 - The trigger age for the deferred GSA is 75. For those who survive to age 75, the deferred longevity pool works from that age onwards in the same way that the GSA works from age 65.
 - Of the remaining balance (\$260,000), 80 per cent (\$208,000) is used as an account-based pension and is drawn down progressively over the 10 years from retirement to age 75
 - The final \$52,000 is retained in an account until age 75 where-after it is drawn down at account-based pension minimum rates
- 8.22 The chart below illustrates that this product combination again delivers around \$25,000 in annual retirement income in expectation, similar to the other product combinations discussed above.

Figure 13: ABP + 35% DGSA combination income pattern



Source of retirement income

8.23 It is interesting to see how the account-based pension and the GSA product interact in each of these three product combination strategies to deliver the retirement income. In the 25 per cent account-based pension/75 per cent GSA combination both products contribute to the retirement income in each year. In the 87 per cent account-based pension/13 per cent GSA, the account based pension is used up over the period until age 85 and the deferred GSA is used thereafter. In the third combination, the account-based pension is used throughout retirement and the deferred GSA kicks in from age 75 onwards. The charts below illustrate.

Figure 14: 25% ABP + 75% GSA combination income split

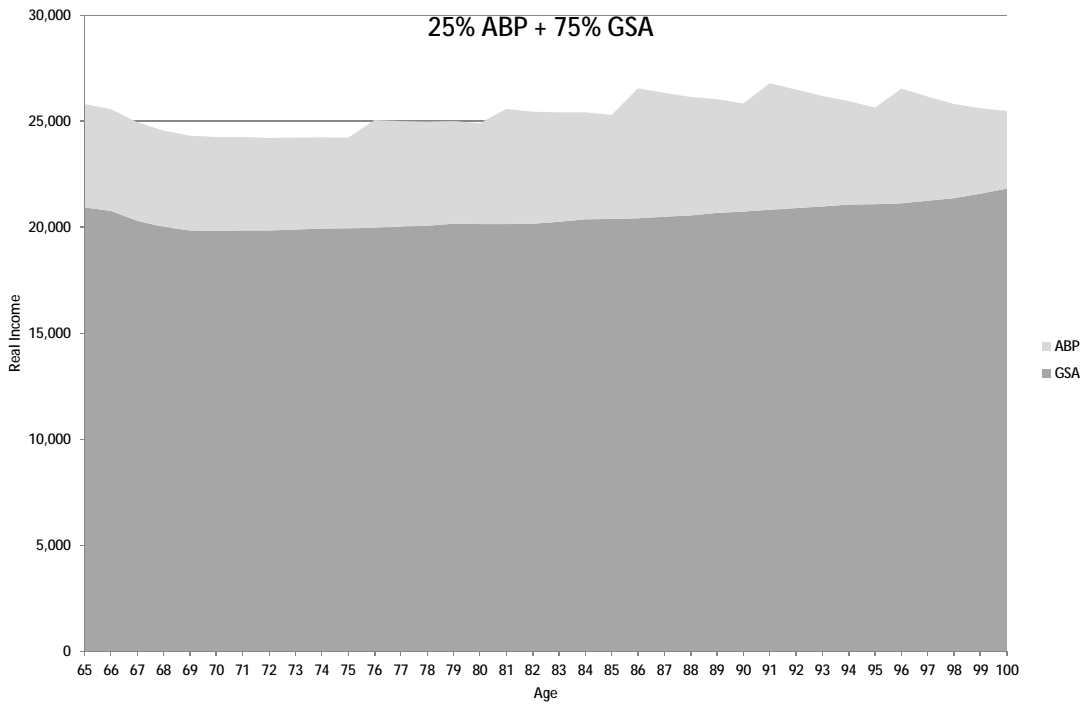


Figure 15: ABP + 12.8% DGSA combination income split

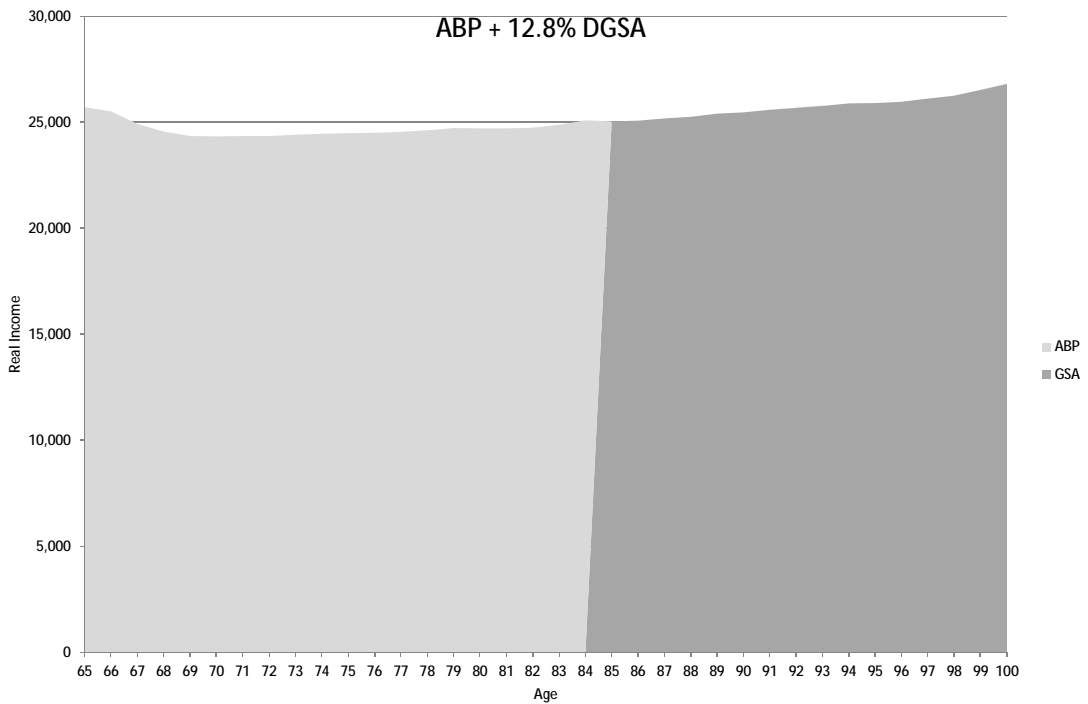
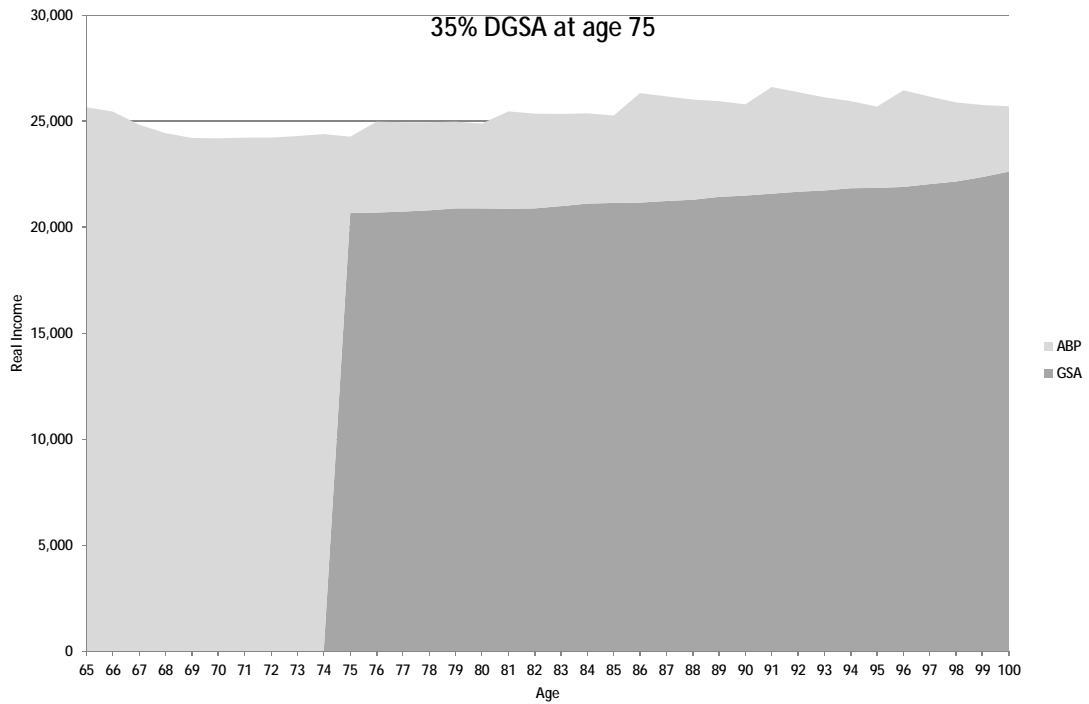


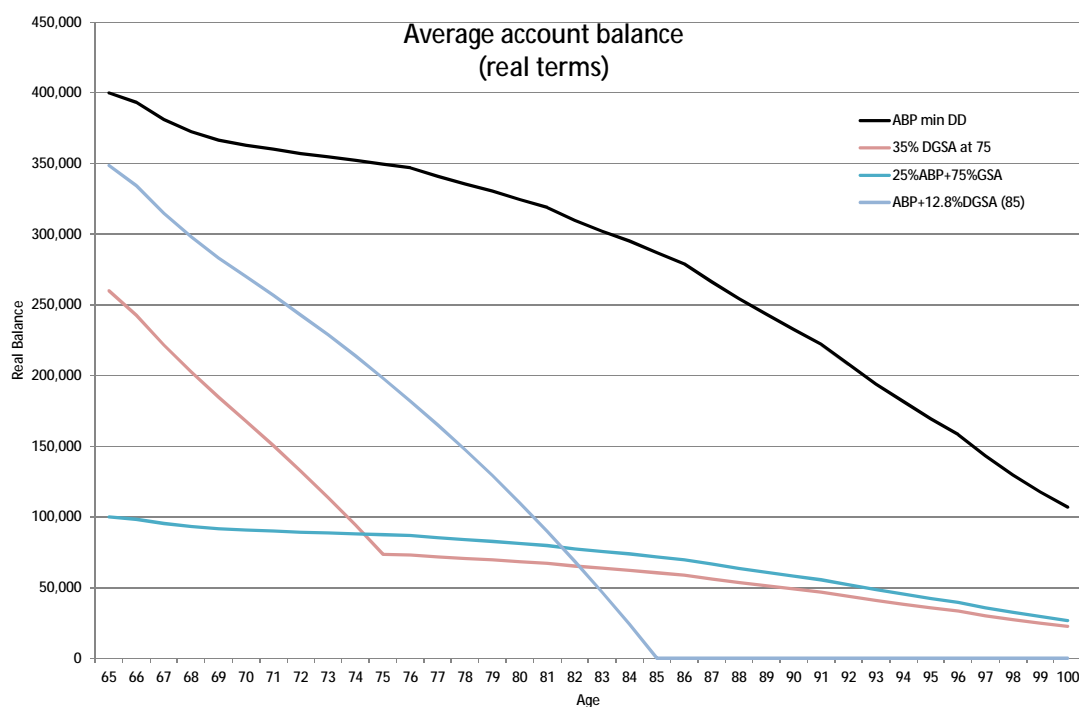
Figure 16: ABP + 35% DGSA combination income split



Death benefits

- 8.24 Since these product combinations involve the use of an account-based pension, they provide for a limited death benefit as well as providing about 30 per cent more retirement income than an account-based pension drawn down at minimum rates. Obviously, the death benefit that is available is lower than that which is available from the account-based pension drawn down at minimum rates. This is because GSA products redistribute money that would otherwise be applied to bequests to increase the income paid to all retirees in the pool.
- 8.25 The chart below shows the average account balance (real terms) that would be available to the retiree’s estate on death at each age under each of these product combinations and under the account-based pension drawn down at minimum rates.

Figure 17: Product combinations real account balance



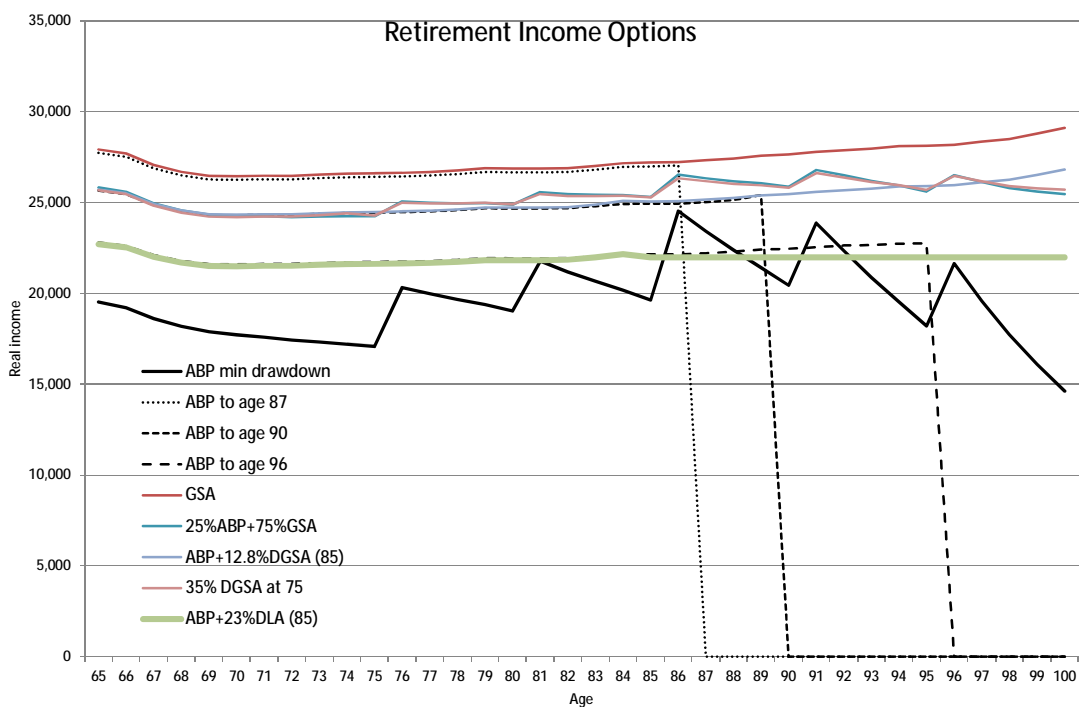
Deferred life annuities

- 8.26 A deferred GSA should not be confused with a deferred life annuity. A deferred life annuity provides for a guaranteed level of income commencing from the trigger age. Like immediate life annuities, deferred life annuities require capital to support the guarantee. As a result, they are relatively inefficient. Indeed, they are less efficient than immediate life annuities.
- 8.27 The FSI has asked us to model a product combination which involves the use of a deferred life annuity commencing at age 85. We have been asked to assume that a purchase price of \$10,000 will provide a CPI-indexed deferred life annuity for a 65 year old male, with annual payments commencing at \$2,390 per annum (today's dollars).
- 8.28 In order to ensure that a combination of an account-based pension and a deferred life annuity will provide a reasonably smooth income throughout retirement in expectation we have made the following assumptions:
- Retirees are assumed to be 65 year old males with a superannuation retirement balance of \$400,000

- Retirees contribute 23 per cent of their balance (around \$92,000) to purchase a deferred life annuity¹⁴
- The trigger age for the deferred life annuity is 85. For those who survive to age 85, the deferred life annuity provides a guaranteed CPI-indexed income stream for life
- The remaining 77 per cent of the initial balance is applied to an account-based pension which is drawn down steadily over the period until age 85

8.29 The chart below illustrates that this product combination delivers somewhat less annual retirement income in expectation, when compared with the product combinations discussed above.

Figure 18: ABP + 23% DLA combination drawdown pattern



8.30 This product combination delivers about 14 per cent more retirement income than the account-based pension drawn down at minimum rates. At the same time, it does not result in any increase in the risk of outliving savings.

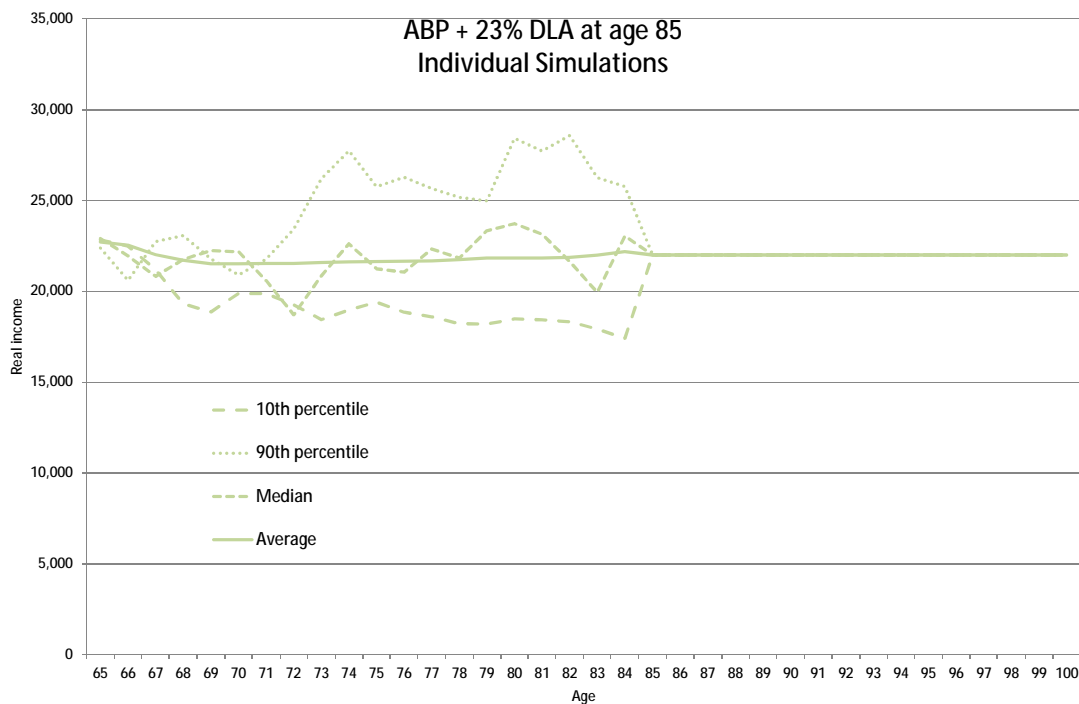
8.31 Notably, this product combination also delivers about the same level of retirement income as an account-based pension which is run off over the period to age 96. Thus, an account-based pensioner could achieve the same level of retirement income (around \$22,000 per annum in real terms) by drawing down their account-

¹⁴ The 23 per cent contribution was selected to ensure a reasonably stable income throughout retirement, in expectation. A higher contribution would be expected to result in higher post age 85 income levels at the expense of lower pre-age 85 income levels and vice-versa.

based pension faster. However, relevantly, this drawdown strategy results in an increased risk of running out of money. Any retiree who survives to age 96 will, in fact, run out of money under this drawdown strategy. We estimate that about 16 per cent of 65 year old males will survive to age 96. Therefore, although it is possible to use an account-based pension to deliver income at this level for a period of time, the strategy also involves a 16 per cent risk of running out of money.

- 8.32 The reason that this product combination delivers less expected retirement income than the earlier combinations relates to the price that needs to be paid to secure the guaranteed income later in life. Unlike a deferred GSA, the deferred life annuity provides a guarantee and this guarantee necessarily comes at a price.
- 8.33 It is interesting to consider the effect of the guarantee by looking at individual simulations from the model output. The chart below repeats the line above which showed the average outcome for each age and then adds three individual simulations. The simulations chosen represent the 10th percentile, median and 90th percentile of all the simulated investment environments. It can be seen that this product combination can result in a cliff shift in retirement income at trigger age.

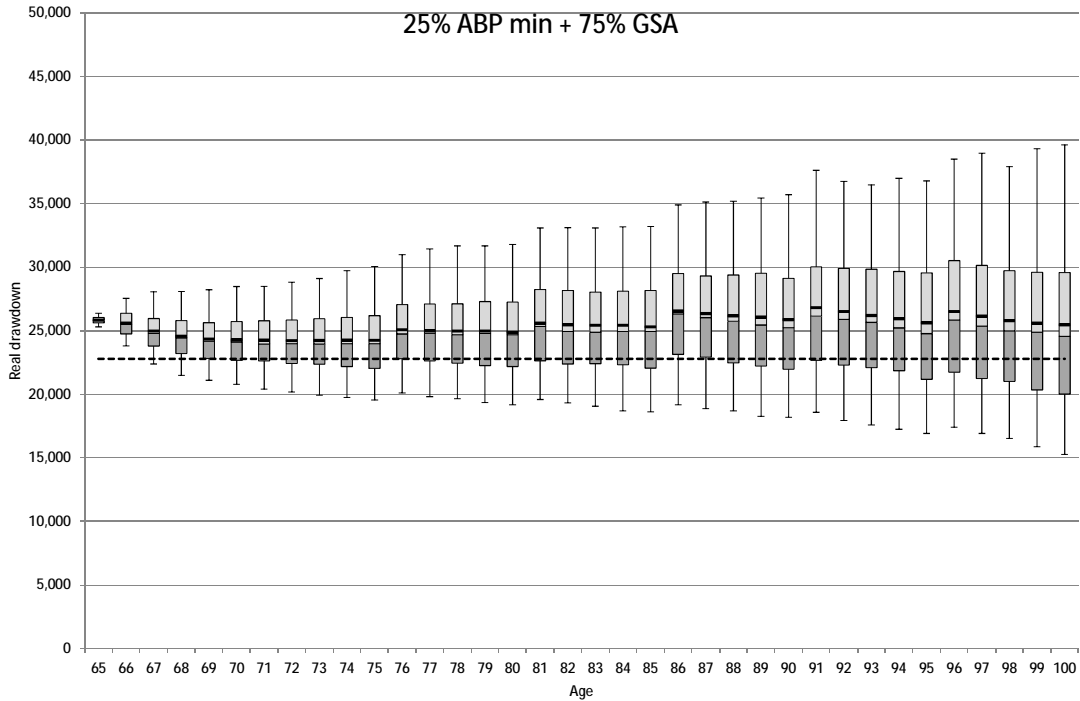
Figure 19: ABP + 23% DLA combination individual simulations



- 8.34 To further illustrate the effect of the guarantee, the charts below illustrate the impact of investment risk on some of the various product combinations discussed so far. Again, the life annuity curve (dashed line) is included for comparison.
- 8.35 The first chart illustrates the 25 per cent account-based pension/75 per cent GSA combination discussed above, again compared with an immediate life annuity. Although this combination delivers more income in expectation than the life

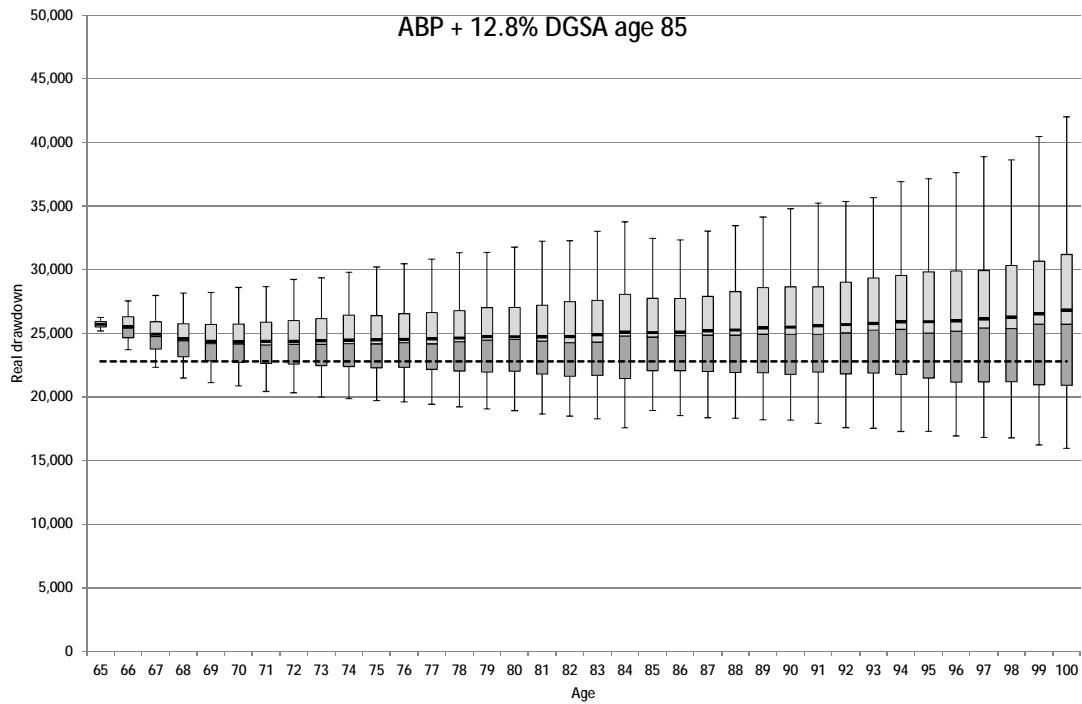
annuity, when compared with the 100 per cent GSA there is an increased risk that it will underperform the life annuity. On the assumptions adopted, that risk is more than 15 per cent.

Figure 20: 25% ABP + 75% GSA combination distribution of annual income



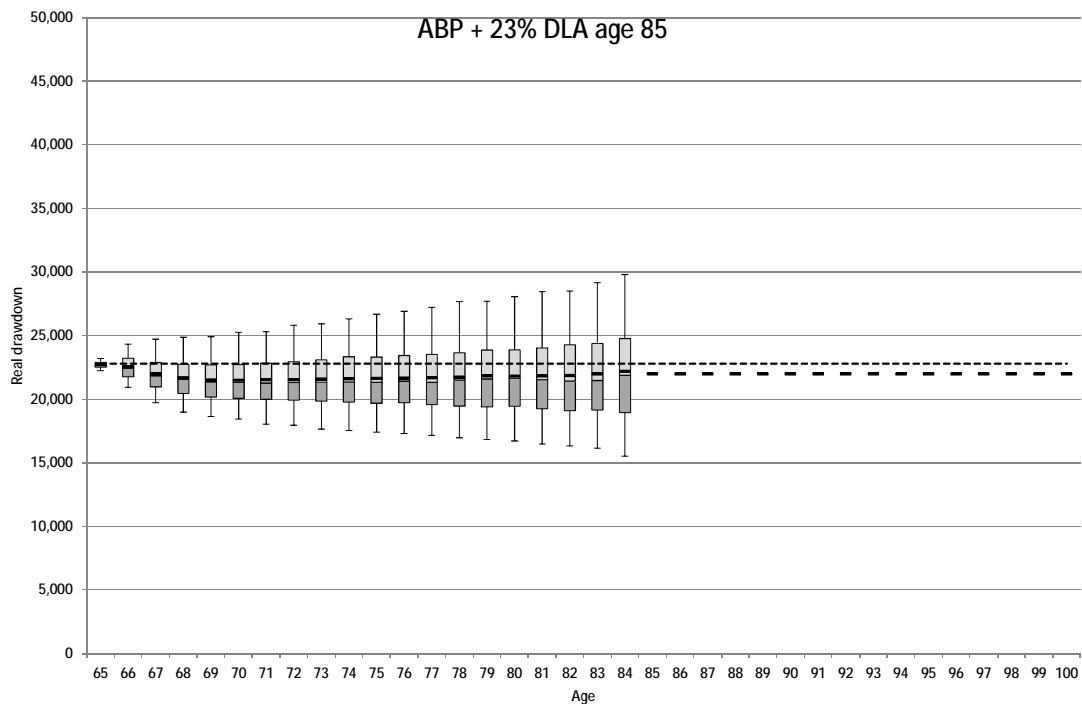
8.36 The next chart illustrates the 87 per cent account-based pension/13 per cent deferred GSA combination discussed above, again compared with an immediate life annuity. Although this combination delivers more income in expectation than the life annuity, again there is a risk that it will underperform the life annuity. On the assumptions adopted, that risk is more than 20 per cent. The chart also suggests that this product combination entails some additional risk as the retiree approaches the trigger age for the deferred GSA – the boxes and whiskers are wider just before age 85 than just after.

Figure 21: ABP + 12.8% DGSA combination distribution of annual income



8.37 The final chart illustrates the 77 per cent account-based pension/23 per cent deferred life annuity combination discussed above, again compared with an immediate life annuity.

Figure 22: ABP + 23% DLA combination distribution of annual income



8.38 Although this combination delivers more income than the basic account-based pension in expectation, it underperforms the life annuity as illustrated above. This is further evidence of the risks to life insurers involved with providing a deferred life annuity product. It is also noteworthy that this product combination entails material investment risk and the possibility of quite volatile incomes during the period before age 85 and then certainty thereafter. The result can be a step change in income upon reaching trigger age.

8.39 Finally, we have summarised in the table below a number of informative metrics derived from our analysis of these various product combinations. To obtain these metrics we considered each of the 1,000 simulations individually. (The charts above summarise the information by age whereas in the table below we have summarised the information by individual simulation produced by our model). First we present the table with some discussion further below.

Table 2: Product comparisons

Product		Life Annuity	GSA	25%ABP + 75%GSA	87%ABP + 13%DGSA(85)	77%ABP + 23%DLA(85)	ABP min
Prob > percentile relative to ABP min	Expected income	22,800	27,000	25,100	24,900	21,900	19,200
	22,800	0%	97%	83%	80%	25%	4%
	5%	22,800	23,200	21,600	21,400	19,600	16,600
	10%	22,800	23,900	22,200	22,000	20,000	17,000
	50%	22,800	26,900	25,000	24,800	21,800	19,200
NPV retirement income		328,000	388,000	359,000	357,000	314,000	275,000

8.40 The first row shows the expected average annual income (real terms) delivered by each product combination. To calculate this we first calculated the average annual retirement income in each simulation individually. This average was a weighted average where the weights were the probability of dying at each future age after 65. Then we averaged these averages across all simulations.

8.41 For example, on average, the GSA will deliver expected annual retirement income of around \$27,000 on the assumptions adopted. By comparison, the expected annual income derived from an account-based pension drawn down at minimum rates is around \$19,200. Trivially, the income expected from the life annuity is \$22,800.

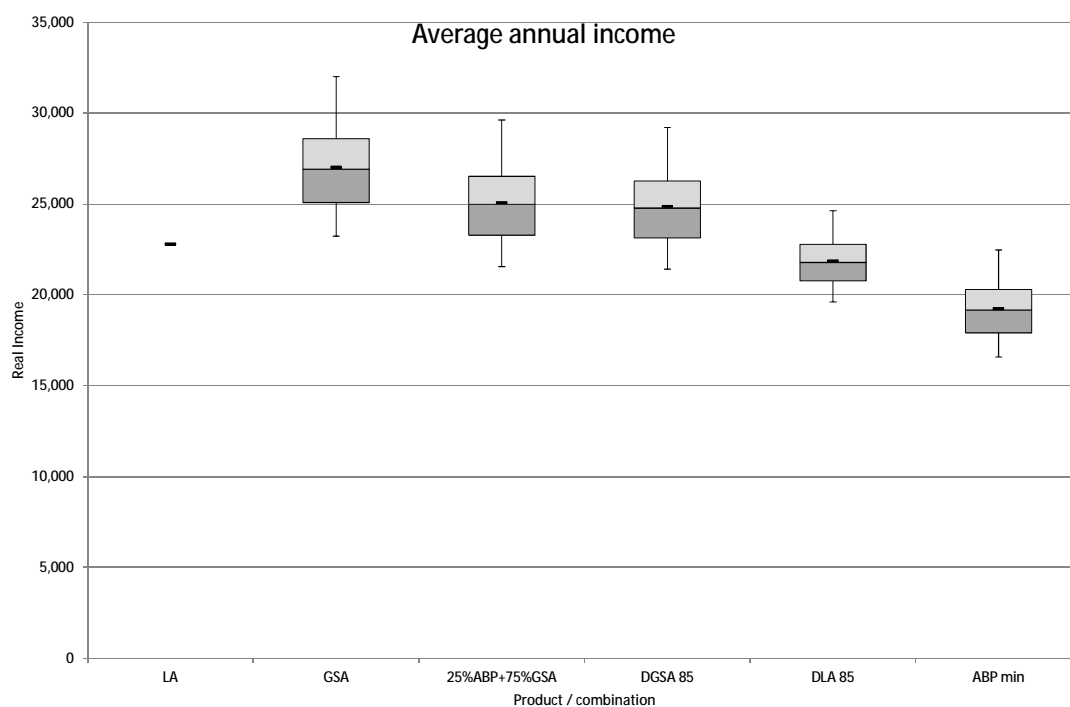
8.42 The next row shows the probability that each product will deliver higher average retirement income than the life annuity (again on the adopted assumptions). This shows, for example, that, of the 1,000 simulations, 970 resulted in the GSA outperforming the life annuity¹⁵. In 830 out of 1,000 simulations the 25 per cent

¹⁵ We tested a scenario where the life expectancy of GSA members was about two years longer than assumed here (that is, around 24 years compared with 22 years). In that circumstance the probability that the GSA delivers higher average retirement income than the life annuity is estimated at around 85 per cent.

account-based pension/75 per cent GSA combination outperformed the life annuity. In only 40 out of 1,000 simulations did the account-based pension outperform the life annuity. These 40 simulations would necessarily have involved unusually good investment performance.

- 8.43 The next three rows show various percentiles of average annual income delivered by each combination. For example, in 10 per cent of simulations, the average annual income delivered by the GSA was less than about \$23,900. This means that there is a 90 per cent chance (on the assumptions adopted) that the GSA will deliver more than \$23,900 per annum on average. On the other hand the 25 per cent account-based pension/75 per cent GSA combination is estimated to deliver average annual income of at least \$22,200 90 per cent of the time.
- 8.44 The next row summarises the performance of each combination relative to the account-based pension drawn down at minimum rates. The two GSA product combinations deliver, in expectation, around 30 per cent more income than the account-based pension.
- 8.45 The final row shows the expected net present value of the retirement income that is generated by each product and can be compared with the purchase price of \$400,000. This was calculated by discounting the expected retirement income cashflows at the average modelled investment return rate, net of account-based pension management fees. The GSA has a net present value of slightly less than \$400,000 because of the allowance for additional management fees. For other product combinations, there is a level of leakage (maximised for the account-based pension drawn down at minimum rates) related to the money expected to be left over in the account-based pension on death. Finally, for the deferred life annuity combination, there is a further margin in the pricing to support the required capital.
- 8.46 Finally, the chart below illustrates the distribution of average annual retirement income generated by each product combination.

Figure 23: Average annual income distributions by product/combination



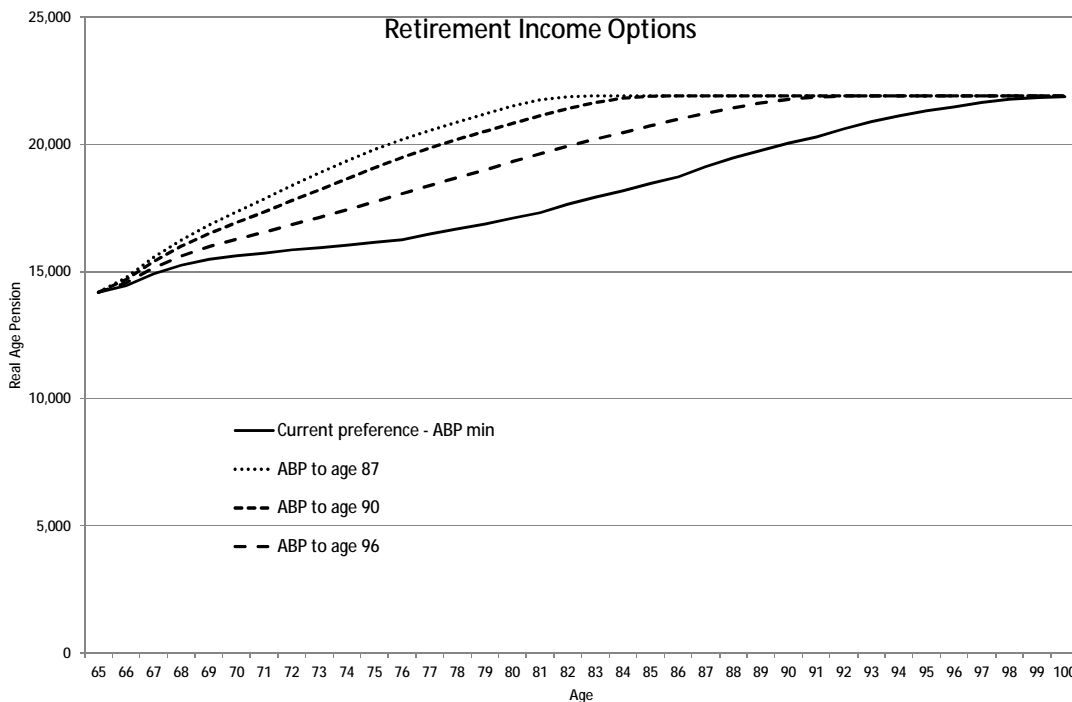
9 Age pension

- 9.1 The government funded age pension is means tested. In Australia, means testing arrangements involve both an assets test and an income test.
- 9.2 Most retirees will get some age pension at some stage during their retirement.
- 9.3 This section looks briefly at a few issues related to the interaction of the age pension means testing arrangements and the retirement income products described earlier.
- 9.4 For the purpose of the discussion here, we have made the simplifying assumptions that the only source of income available to the retiree is from their retirement income product and that the individual is single and a home owner.
- 9.5 We have also assumed that the age pension means testing arrangements for account-based pensions are the arrangements that come into force on 1 January 2015. In other words, we have assumed that the application of the income test to account-based pensions is based on deemed income rather than actual drawdown.
- 9.6 Finally, for simplicity we have assumed that increases in the age pension as well as the means test thresholds are in line with increases in the CPI and that the age pension is available from age 65.

Account-based pension

- 9.7 Retirees with a low account balance at a given time (less than roughly \$150,000 in today's dollars) will be entitled to a full age pension. Retirees with a large account balance (more than roughly \$770,000) will not be entitled to any age pension.
- 9.8 In general, the amount of age pension entitlement for an account-based pensioner depends on the balance in their account and therefore, over time, depends on their drawdown strategy¹⁶. In general, the faster that an account-based pension is drawn down, the higher is the subsequent level of age pension entitlement, all else equal¹⁷.
- 9.9 The chart below illustrates the age pension payable to an account-based pensioner with an initial balance of \$400,000 and assuming the drawdown strategies discussed earlier in this paper and assuming that all money drawn down is consumed. The minimum drawdown strategy results in least age pension cost to the taxpayer.

Figure 24: Account based pension age pension receipts



- 9.10 In the discussion above it has been noted that account-based pensioners face both longevity and investment risk. Taxpayers fund age pension costs and are

¹⁶ This also depends on investment performance.

¹⁷ This assumes that all money drawn down from the account is consumed.

also exposed to these risks. Both poor investment performance and increased longevity expose the taxpayer to higher age pension outlays, all else equal.

9.11 At the same time, as illustrated in the chart above, the taxpayer is exposed to behavioural risk since the level of taxpayer support provided to a retiree via the age pension who owns an account-based pension is linked directly to the retiree’s own drawdown choices.

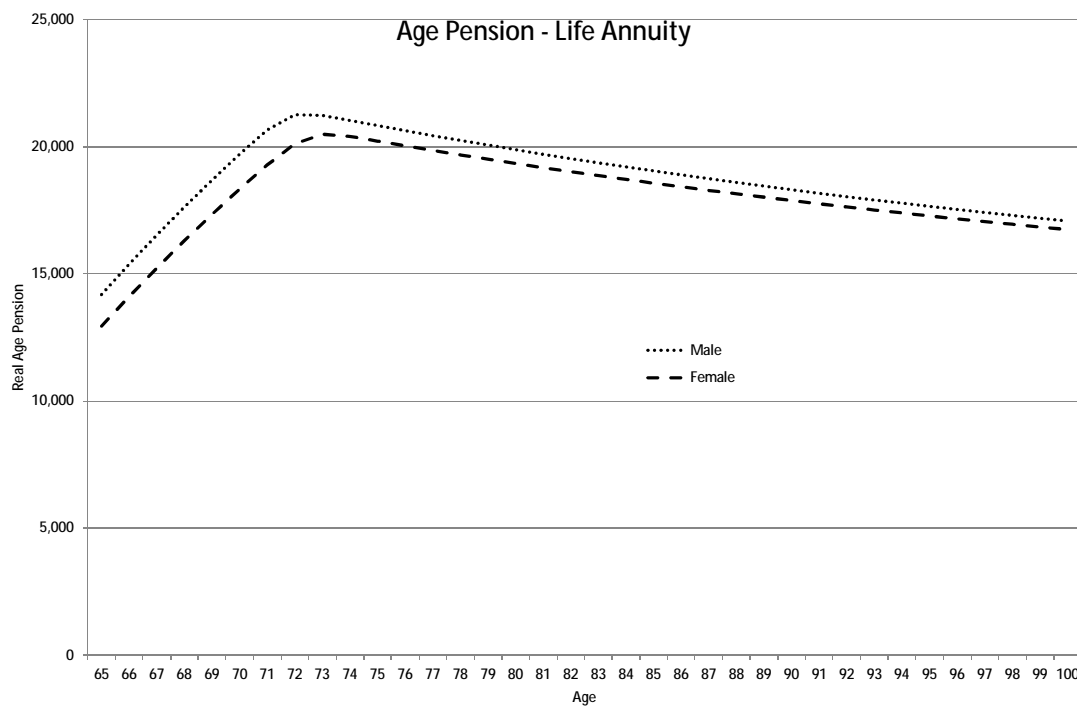
Life annuity

9.12 As discussed earlier, a traditional life annuity pays a guaranteed level of retirement income for life. In this paper, we have considered CPI-indexed life annuities.

9.13 The example that we have used in this paper sees a life annuity which pays \$22,800 pa (real) throughout retirement.

9.14 Even though the retiree receives a constant real income from the life annuity throughout retirement (and, by assumption, no other income), the age pension payable to the retiree is not constant throughout retirement. The amount of age pension payable increases until the annuitant reaches their early-70s, after which it decreases. Moreover, on the pricing assumptions provided to us, a male with a \$22,800 life annuity would be entitled to more age pension than a female with a \$22,800 life annuity. The chart below illustrates the age pension payable from year to year to a male and female life annuitant who is each in receipt of a \$22,800 CPI indexed life annuity.

Figure 25: Life annuity age pension receipts



GSA

- 9.15 The means testing arrangements for a GSA will be dependent on the income and assets available to the customer from the product. As there are no GSA's currently in payment it is not possible to know exactly how the means test would apply to a GSA.
- 9.16 Since the simple GSA discussed in this paper is a product with zero residual capital value, it is possible that the application of the income test to a GSA could be similar to that of a life annuity (based on actual payment from the product less an amount for return of capital). For the purpose of this paper we have assumed that this is how the income test would be applied. Further, since the GSA entails at least a notional asset balance for each member, it is possible that the assets test could have regard to this notional balance (rather than being based on a formulaically depreciating purchase price as for a life annuity). For the purpose of this paper we have assumed that this is how the assets test would be applied.
- 9.17 The chart below illustrates the resulting age pension. To allow comparison with the result for a life annuity, the chart also includes the curve shown further above (for the male).

Figure 26: Group self annuity age pension receipts



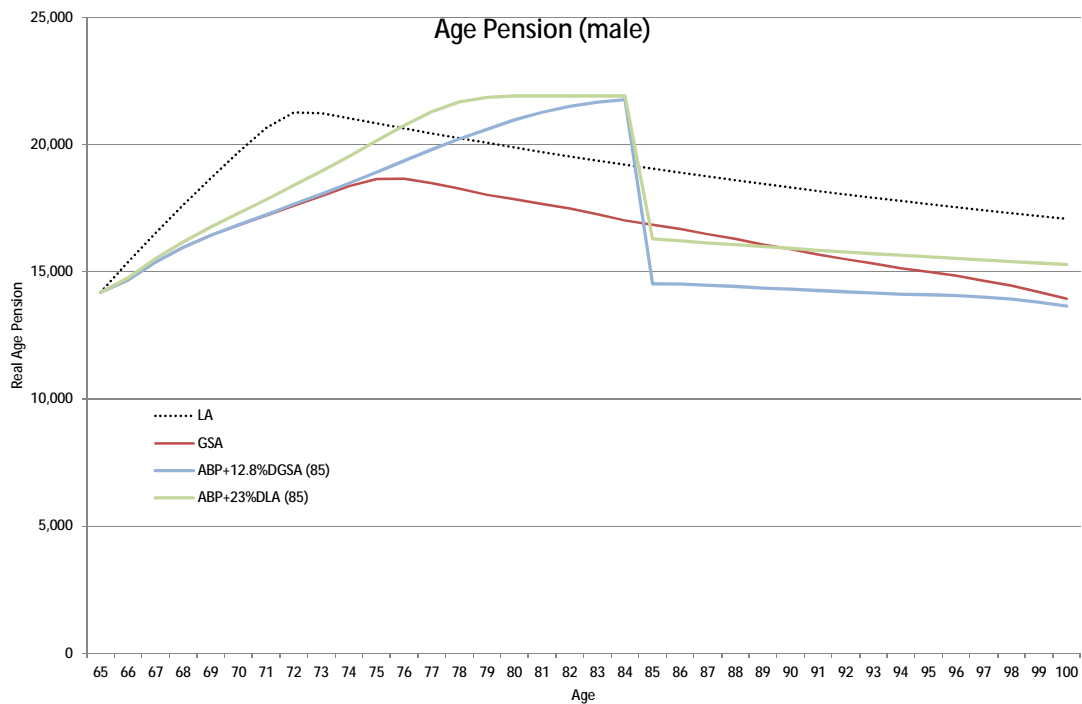
- 9.18 On the assumptions adopted, the GSA would result in lower age pension outlays than the life annuity, due mainly to the higher levels of assessed income. However, similar to the life annuity, the shape of the age pension curve is noticeably convex even though the average annual payment from the GSA is reasonably steady in real terms.

Products with a deferral period

- 9.19 The means testing arrangements for products which involve a deferral period will be dependent on the income and assets available to the customer from the product. As there are no deferred products currently available it is not possible to know exactly how the means test would apply.
- 9.20 For the purposes of our modelling, the deferred GSA is assumed to be treated essentially the same as the (assumed treatment of the) GSA, with the only difference being that the assessed income during deferment is zero. The account balance is assumed to be fully asset tested during deferment.
- 9.21 For the purpose of modelling the deferred life annuity, we have assumed that the asset test during deferment would apply to the initial purchase price with no reduction for return of capital. Once the deferred life annuity commences payment it is assumed to be treated in the same way as a standard life annuity.
- 9.22 The chart below illustrates that, on the assumptions adopted¹⁸, the means testing arrangements would result in a cliff shift in age pension for products involving a deferral period. The cliff shift happens when the retiree reaches the product's trigger age. In general, the deferred GSA results in less age pension than the deferred life annuity. This reflects the differences in the assumed means testing arrangements as well as differences in the residual account-based pension balance (during the period before trigger age). Again, it is important to note that this age pension modelling is based on a series of assumptions regarding means test treatment. It is very conceivable that the actual means test treatment could differ from that which has been assumed.

¹⁸ Which includes the assumed drawdown strategy for the account-based pension

Figure 27: Deferred products age pension receipts



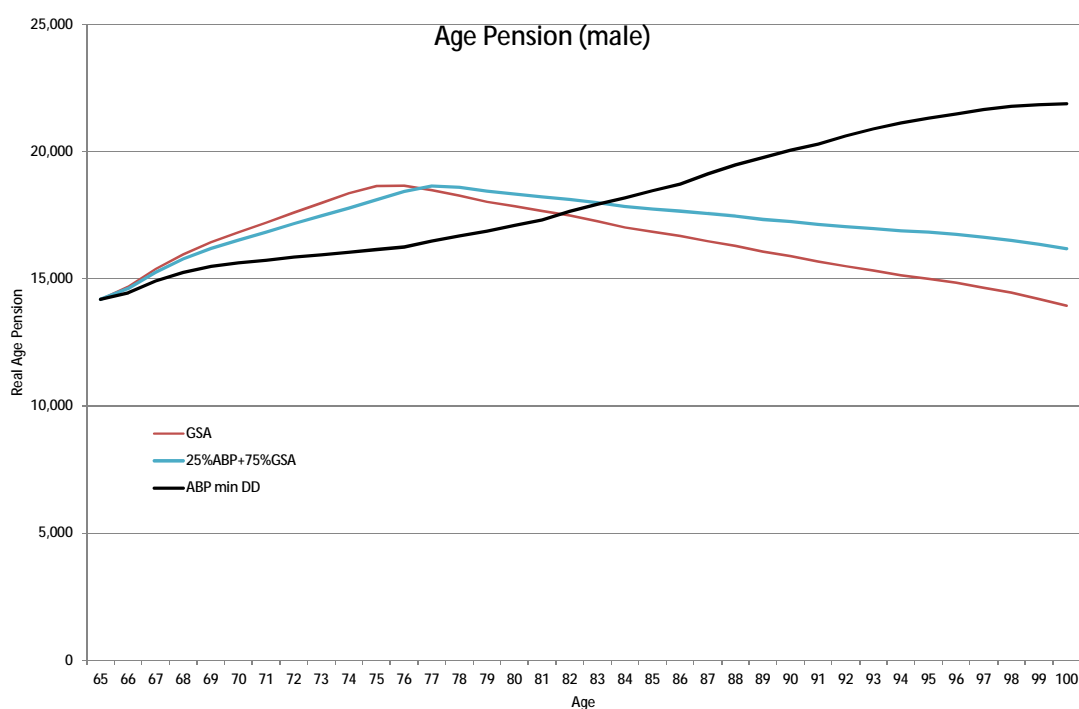
Product combinations

9.23 The chart below compares the age pension outcome for:

- a GSA;
- an account-based pension drawn down at minimum rates; and
- a 25 per cent account-based pension and 75 per cent GSA combination.

9.24 The chart illustrates that, for a period during the late-70s and early-80s the retiree would get more age pension out of the combination than they would get from either of the two products individually.

Figure 28: Combined account based pension and group self annuity age pension receipts



Conclusion on age pension

- 9.25 Age pension outcomes from the means testing arrangements depend on all of an individual's relevant circumstances. However, based on our simplified assumptions, the means testing arrangements do not appear to be product neutral. We have only provided a few simple illustrations here and there are other examples where the outcomes are more extreme.
- 9.26 There is a deal of uncertainty around exactly how the means testing arrangements would apply to both GSAs and products with a deferral period.
- 9.27 These issues need consideration.
- 9.28 Two principles that could reasonably be considered, given the long term nature of these income stream products, are:
- two people with the same means should have the same age pension outcome, regardless of their product choice; and
 - if a person's means do not change from one year to the next then their age pension outcome should not change either.

10 Concluding remarks

- 10.1 The dominant retirement income product in Australia is the account-based pension. Account-based pensions involve an inevitable and unavoidable trade-off between living standards during the early retirement years and the risk of running out of money during older age. That is, with an account-based pension, the price

to be paid for higher early retirement living standards is an increased risk of outliving savings.

- 10.2 Unless a retiree knows when they are going to die, drawing an account-based pension down at the minimum rates is the only way for an account-based pensioner to achieve a reasonably smooth income profile while retaining a zero risk of running out of money.
- 10.3 Longevity risk refers to the uncertainty, at the time of retirement, around ones future lifespan. The two sources of uncertainty for a retiree wondering how much longer they will live are referred to as systematic and idiosyncratic longevity risk.
- 10.4 Systematic risk refers to the (unpredictable) forces that can affect the mortality of many or all people in a group (or population) in the same or a similar way and affects the average life expectancy of a group.
- 10.5 Idiosyncratic risk refers to this individual randomness that has been and remains a feature of our mortality experience. For an individual retiree seeking to plan the drawdown of their account-based pension, idiosyncratic longevity risk is likely to be a bigger risk than systematic risk. In other words, it is only of limited use to a retiree to know that their life expectancy is, say, 22 years when their actual future lifespan could be anywhere between a few months to 40 years.
- 10.6 By pooling longevity risk a GSA provides an efficient means of reducing idiosyncratic longevity risk. As a result a GSA can deliver retirement incomes that are, in expectation, about 40 per cent higher than from an account-based pension drawn down at minimum rates. Importantly, this result can be achieved without any increase in the risk of outliving savings. In effect, the GSA redistributes money that would otherwise be applied to bequests to other retirees.
- 10.7 A traditional life annuity delivers a guaranteed level of retirement income in retirement. The price of the guarantee means that the income from a life annuity is very likely to be less, on average, than the income from a GSA.
- 10.8 Both pure GSAs and life annuities involve loss of flexibility for retirees (when compared with an account-based pension). Product combinations (eg a combination of an account-based pension and a GSA) can deliver significantly more retirement income than an account-based pension while retaining a degree of flexibility. Importantly, this result can again be achieved without any increase in the risk of outliving savings.

- 10.9 Similar results can be achieved by combining account-based pensions with deferred GSAs.

A handwritten signature in black ink, consisting of several overlapping loops and a long horizontal stroke extending to the right.

Peter Martin
Australian Government Actuary

1 December 2014

Towards more efficient retirement income products

For the DLA, we have assumed that the assets test during deferment would apply to the initial purchase price with no reduction for return of capital. Once the DLA commences payment it is treated in the same way as a standard life annuity.