

Choices and constraints over retirement income streams: comparing rules and regulations *

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Abstract:

The new Simplified Superannuation regulations for Australian superannuation provide tax concessions to retirement income streams which comply with legislated minimum drawdown rules. We evaluate these new drawdown rules against four alternatives, including three formula-based 'rules of thumb' and the previous legislated minimum drawdown limits for allocated pensions. We find that the new regulations are a substantial improvement on the previous rules for allocated pensions and, when compared with the four alternatives, are a good compromise in terms of simplicity, adequacy and risk. We also find that Simplified Superannuation means lower welfare for most individuals compared with following an optimal path or a simple fixed percentage drawdown rule, but that welfare could be improved with further simplification of the rules.

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1. Introduction

The past two decades have witnessed substantial changes to retirement savings policies and products around the world, as policy makers and the wealth management industry have attempted to address the retirement needs of ageing populations. Retirement income reforms in Australia, in the form of the superannuation guarantee and incentives to make voluntary contributions have resulted in a huge increase in the coverage of superannuation (from less than 50% of employees in the mid 1980s to close to 100% of full time employees by 2006). However, despite the imminent retirement of the first of the baby boomers, far less attention has been paid to policy and product development to enable an orderly drawdown of savings in retirement.¹

In Australia, in the absence of compulsion, successive governments have attempted to encourage the take-up of retirement income streams through incentives in the tax system and concessions under the age pension means tests. While these incentives and concessions have been continually modified over the past twenty years or so, they appear to have done little to address the Australian preference for lump sum benefits.

The Simplified Superannuation measures introduced in the 2006/07 Federal Budget have changed the constraints and concessions for Australian superannuants yet again. In particular, once the measures are fully implemented, retirees aged 60 and over will be exempt from tax on all retirement benefits – whether taken as a lump sum or an income stream – and all retirement income streams will be subject to the same age pension

¹ This is despite a growing literature on annuities and retirement payments. See for example Mitchell *et al* (1999), Brown (2001), Doyle *et al* (2002), Davidoff *et al* (2005), Dus *et al* (2005), Kingston and Thorp (2005), Horneff *et al* (2006) and Mitchell *et al* (2006).

income and assets tests, irrespective of income stream type. As well, where the retirement accumulation is drawn down under a legislated schedule of minimum percentages of account balance, the earnings on the underlying assets will be free of tax. This new drawdown schedule replaces the previous minimum and maximum drawdown limits for allocated pensions. The new rules appear to be designed to discourage retirees from using tax-concessional retirement savings for storing up bequests, while giving some guidance on a prudent spending plan (Bateman and Kingston 2007).

Economic theory² has long held that optimal drawdown plans in retirement will differ according to the preferences of each individual and the risks they face, while the financial planning industry has frequently proposed simple ‘rules of thumb’ as approximations to more complicated dynamic plans. In this study we investigate the risks and benefits of the new minimum drawdown requirements under Simplified Superannuation and compare them with the previous legislated limits for allocated pensions and a range of simple ‘rules of thumb’, as well as with theoretically optimal paths. We do this for retirees holding their retirement savings in typical investment plans, matching the most common offerings of allocated pension and superannuation investments, and accounting for longevity patterns drawn from the latest Australian Life Table projections.

We find that following the legislated minimum drawdown plan under Simplified Superannuation means lower welfare for most individuals when compared with following an optimal path or a simple fixed percentage drawdown rule. We also show that the regulations are a binding constraint for optimal drawdown plans, but the reductions in

² See the seminal paper by Merton 1971, and Campbell and Viceira 2002 for a more recent survey.

welfare when compared with the unconstrained plans are fairly small. Overall the new Simplified Superannuation regulations offer a substantial improvement over the previous allocated pension minimum valuation factors and are a good compromise in terms of simplicity, adequacy and risk. We conclude that welfare could be further improved with a minor simplification of the drawdown rules.

We begin with a survey of retirement income stream products and policies in Australia. We then evaluate the new minimum drawdown requirements under Simplified Superannuation against possible alternatives, using the criteria of simplicity, adequacy, risk and consumer welfare. We conclude by exploring ways to further improve the new rules and highlight avenues for further research.

2. Retirement income products and policies in Australia

The policy framework for retirement income streams in Australia has been evolving since the decision in the late 1970s to concentrate on encouraging (and later mandating) privately managed saving for retirement, rather than introduce the then popular OECD style system of earnings-related public pensions (Bateman, Kingston and Piggott 2001). However, the decision to mandate retirement saving did not include (and has not subsequently included) mandatory retirement incomes. Instead, retirement income policy (as opposed to retirement saving policy) has been the subject of a succession of reforms and changes as attempts have been made to encourage the voluntary take-up of income streams with particular features. These reforms commenced in the 1980s with the decision to exempt from tax the earnings of assets underlying annuities with certain limited features and have evolved since then to include tax and age pension means test

concessions for a wide range of types of income streams. The most recent changes are the Simplified Superannuation reforms, announced in the 2006 Commonwealth Budget and implemented throughout 2007, which were introduced with the stated aim of simplifying retirement income stream policies and products (Australian Treasury 2006a, 2006b).

An important initiative in the 1990s was the introduction of a statutory framework for a phased withdrawal product – called an allocated pension.³ As compared to an annuity, the purchaser retiree retains ownership of the capital sum, is able to choose the underlying asset allocation and has some discretion over the drawdown pattern. Under the pre Budget 2006 rules, payments under allocated pensions were required to be made at least annually and were subject to legislated minimum and maximum limits (which differed by age).⁴

At the time of the 2006 Budget, the regulatory framework recognized four types of retirement income streams: lifetime annuities, term certain annuities, allocated pensions (and annuities), and a hybrid product (introduced in 2004), called a term allocated pension (TAP) or market linked income stream.⁵ These alternative products provide different benefits to Australian retirees. Lifetime annuities insure against longevity risk and investment risk and can be designed to address inflation risk. However, pricing issues and conservative asset allocations may compromise adequacy. Life expectancy term annuities have similar attributes, with the exception of longevity risk, while allocated

³ An allocated pension is periodic drawdowns from a retirement accumulation.

⁴ The maximum payments were designed to exhaust the account balance by age 80, while the minimum payments were designed to last until past 100 years of age.

⁵ See Thorp, Kingston and Bateman (2007) for a description of the product features.

pensions and TAPs, have the possibility of higher expected returns, but leave retirees exposed to investment risk and longevity risk.

The pre Budget 2006 approach provided the greatest incentives through the tax system and under the age pension means tests to purchase lifetime annuities, life expectancy term annuities and TAPs. The centerpiece was the 50 percent exemption from the age pension assets test (which itself had been reduced from a 100 percent exemption in 2004), while income streams defined as ‘complying annuities’ were also free of tax on the earnings of the underlying assets. As well, retirees who took certain types of income streams were eligible for the higher pension retirement benefit limit (RBL) and the 15% annuity rebate.⁶

The tax and age pension means tests treatment of each of the retirement income types, before and after the implementation of Simplified Superannuation, are summarized in Table 1.

<insert Table 1 about here>

Despite these incentives, the overwhelming preference of Australian retirees, who take income streams rather than lump sums at retirement, has been to purchase allocated pensions⁷. The market share for the four types of retirement income streams over the period 1999 to 2006 is illustrated in Figure 1.

<insert Figure 1 about here>

⁶ In 2006/07 the pension RBL was \$1,356,291, or twice the lump sum RBL of \$678,149.

⁷ Allocated pension is defined to include allocated annuities.

In the September quarter 2006, allocated pensions accounted for 87.6 percent of the market for retirement income streams (by dollar amount sales). The remainder comprised 9.7 percent for term annuities, 2.6 percent for TAPs and less than 0.2 percent for life annuities.

Figure 1 clearly illustrates the impact of changes to the tax rules, age pension means tests and regulatory environment on the take-up of the different types of income streams. For example, the announcement in the May 2004 Budget of a plan to reduce the assets test preference for lifetime and life expectancy annuities (from a 100 percent to a 50 percent exemption) from 20 September of that year saw an increase in sales of these products in the September quarter 2004, followed by a significant fall in subsequent quarters. This change, in conjunction with legislative approval for a market linked annuity product, led to a fall in the market share of life annuities from around 3 percent to less than 0.2 percent

Under Simplified Superannuation, the rules and regulations for the different types of retirement income streams were streamlined. Following implementation, all superannuation benefits will be tax free (for retirees aged 60 and over) and retirement income streams that meet minimum standards will accumulate free of tax. From 20 September 2007, the age pension means tests will apply equally (and fully) to all types of retirement income streams.

The new minimum standards include the drawdown of a minimum amount at least annually, no residual capital value and transfer only upon death. The minimum drawdown payments are defined as a percentage of the remaining account balance and

vary by age as summarized in Table 2 below.⁸ The new rules replace the previous minimum and maximum limits for allocated pensions.

Table 2: Minimum drawdown by age under Simplified Superannuation

Age	Per cent of account balance
55-64	4
65-74	5
75-84	6
85-94	10
95 and over	14

In the analysis that follows, we evaluate these new drawdown rules against a number of alternatives using criteria to assess simplicity, adequacy, risk, and consumer welfare as measured by a utility function.

3. Evaluating alternative drawdown rules

Alternative drawdown rules

We compare the minimum drawdown payouts under Simplified Superannuation against four alternative drawdown rules, including the previous legislated minimum payments for allocated pensions and three standard 'rules of thumb'. In summary, the five rules under

⁸ An exception is 'transition to retirement' pensions which are subject to a 10 percent maximum.

consideration comprise two statutory rules and three formula-based rules of thumb⁹, as follows:

- The minimum drawdown requirements under Simplified Superannuation (referred to from now on as the ‘legislated minimum’). The minimum drawdown varies by age from 4 percent of the outstanding account balance for those aged 55-64 to 14 percent for retirees aged 95 and over (see Table 1);
- The pre Budget 2006 legislated minimum payments for allocated pensions (referred to from now on as the ‘previous legislated minimum’). The minimum (and maximum) drawdowns are determined by age-based statutory Pension Valuation Factors - where, for example, the minimum payment limit for a 65 year old would be the account balance divided by the minimum Pension Valuation Factor for a beneficiary aged 65;¹⁰
- A fixed percentage rule: where a constant fraction of the outstanding account balance is withdrawn each period;
- A $1/T$ rule: where the annual withdrawal is determined by $T = N - (x+t)$. That is the oldest age in mortality table (N) less the retirees current age ($x+t$), where x is the age at retirement, N is the oldest age in the mortality table and t is the year since retirement ($t = 1 \dots N-x$); and
- A $1/E(T)$ rule: where $E(T)$ is life expectancy at the retiree’s current age (age $x+t$).¹¹

⁹ These formula-based payout rules were used in Horneff *et al* (2006) as the basis for the comparative analysis styled on policy and industry experience in the US and Germany.

¹⁰ The minimum and maximum pension valuation factors by age are set out in the Superannuation Industry (Supervision) Amendment Regulations. We focus on the minimum drawdown regulations.

¹¹ The life expectancies are computed as the 25 year improved survival probabilities from age 10 to age 110 from the 2002 Australian life tables.

A standard metric for comparison of alternative drawdown rules is the benefit/wealth ratio (ω). This is defined as $\omega = B_t/V_t$, where B_t is the payout at time t and V_t is equal to the account balance (prior to payment of the benefit) at time t . For the fixed percentage rule we set the percentage drawdown equal to the first year payout had a single life annuity been purchased with the retirement accumulation. This is referred to from now on as the ‘benchmark life annuity’ and the annual payment as the ‘benchmark annuity payout’. Using current annuity prices, we estimate the benefit/wealth ratio for the ‘benchmark life annuity’ at 6.0% for females and 6.1% for males.¹²

The benefit/wealth ratio paths (over the potential retirement period) for each of the five drawdown rules under consideration are illustrated in Figure 2. The results we present here, and from now on, are for a hypothetical female in retirement. As noted in Horneff *et al* (2006) it is appropriate to focus on the case of the female retiree as longevity risk is more important for women than for men.

<insert Figure 2 about here>

The benefit/wealth ratio paths differ substantially between the alternative drawdown rules. The fixed percentage rule, by definition, is a fixed throughout retirement at 6.0% for females, while the new legislated minimum rules are almost as simple with only five different benefit/wealth ratios over the entire period of potential retirement. By comparison, the benefit/wealth ratio for 1/T rule commences at 2% and increases every

¹² The annuity payouts are the average of current annuity quotes for a single life annuity with no guarantee for males and females purchased with a premium of \$100,000 premium - of \$6,110 for males and \$6,000 for females. That is, the benefit/wealth ratios are 6.1% for males and 6% for females (see DEXX&R 2007).

year to 100%, the $1/E(T)$ rule generates a gradual increase in the benefit/wealth ratio from 3.7% to 78.5%, while the drawdowns under the previous legislated minimum increase from 6% to 29% of the account balance.

The benefit/wealth ratios provide valuable information on the pattern of drawdowns and the complexity of the different rules (in terms of reasonably constant or continually changing drawdown percentages). However, the benefit/wealth ratios provide no indication of the adequacy of these drawdown rules to fund ongoing retirement expenses or of the risk associated with the underlying asset allocations. Nor do they provide any indication of how a retiree might evaluate the drawdown rules after taking account of risk aversion and time preference.

Portfolio return and volatility

One of the features of products allowing periodic drawdowns, as compared with standard annuity products, is the ability to choose the asset allocation of the portfolios underlying the income streams. As such we have constructed five ‘representative’ investment portfolios for our alternative retirement drawdown rules. These are designated High Growth, Growth, Balanced, Conservative and Capital Stable and comprise different proportions of asset classes comprising Australian shares, international shares, Australian property, Australian fixed interest and cash. Figure 3 shows the allocation pattern for each portfolio. The methodology underlying the construction of these portfolios is set out in Appendix A.

<insert Figure 3 about here>

We can now combine the drawdown patterns, as illustrated by the benefit/wealth ratios, with our representative portfolios to evaluate the alternative drawdown rules.

Assessment of the alternative drawdown rules for retirement incomes

We assess the five alternative drawdown rules in terms of simplicity, adequacy, risk and consumer welfare as measured by a utility function. Initially we assume that the underlying assets are held in a balanced portfolio (an assumption we later relax). The portfolio allocation underlying our ‘balanced portfolio’ is illustrated in Figure 3. As well, we ignore possible taxes on the earnings of the underlying assets and do not take account of interactions with the public age pension.¹³

Simplicity: Our gauge for simplicity is a clearly defined schedule of drawdown percentages, as indicated by the benefit to wealth ratios discussed earlier and summarized in Figure 2. Here the fixed percentage rule dominates (by definition) followed closely by the five-phase minimum drawdown rules under Simplified Superannuation. For the other rules evaluated here, the benefit to wealth ratio is different for every drawdown.

Adequacy: Our metric for adequacy is ‘expected benefit’. This is defined as the annual expected benefit from a particular drawdown rule (where the account balance is invested in a balanced portfolio) as a proportion of the annual payment from the ‘benchmark life annuity’. Figure 4 shows expected benefit paths for each of the five drawdown rules, assuming that the individual survives to age 108, and the underlying assets are invested in the balanced portfolio plan.

¹³ While all benefits are now tax free, the earnings on the underlying assets are tax free where the minimum standards are met.

<insert Figure 4 about here>

As shown in Figure 4, there are significant differences in the expected benefit by type of drawdown rule and by age. The expected benefit under the fixed percentage rule starts off at 100% of the benchmark life annuity (by design) and then gradually increases with age (as the rate of return on the underlying assets exceeds that on the lifetime annuity). The expected benefit under the $1/T$ rule starts at a lower level, but continues to rise by age, reaching 200% of the benchmark annuity when the retiree is in her 80s, and 500% by her 90s. This happens because the rule results in small payouts in the early years, leading to higher accumulations to be paid out in later years. Finally, the $1/E(T)$ rule initially provides a lower expected benefit, which then rises to peak at age 84, and then falls to close to 0% at very old ages.

Of the statutory rules, the expected benefits under the previous legislated minimum tracks the $1/E(T)$ rule quite closely although it provides a higher expected benefit for the first 13 years of retirement (under our assumptions). The Simplified Superannuation legislated minimum generates expected benefits just below the benchmark annuity (and the fixed percentage rule) in the early years of retirement, but then the expected benefit under Simplified Superannuation increases to around 300% of the benchmark annuity as the higher percentage drawdowns take effect. Payouts under this rule then fall back to around 100% of the benchmark annuity for those still alive at age 100.

The impact of altering the underlying asset allocation from a balanced portfolio to the alternatives of high growth, growth, conservative and capital stable, is to change the level of expected benefits, but not the rankings of the alternative drawdown rules. The

expected benefit paths for the Simplified Superannuation drawdown rules under the five illustrative portfolio allocations are illustrated in Figure 5. Our estimates suggest that the expected benefit will be less than the benchmark annuity for all of our illustrative portfolios until the retiree reaches age 65 – suggesting that legislated minimum drawdown for the early years of retirement may be too low. The expected benefit under the capital stable portfolio is less than the benchmark annuity until our retiree reaches age 75.

<insert Figure 5 about here>

Risk: As an indication of risk, we construct a measure representing a ‘worst case scenario’ for each drawdown rule, given an underlying asset allocation. More precisely our metric is defined as the dollar amount of retirement income represented by the first percentile of the payout distribution as generated using the rates of return and standard deviations estimated for the alternative portfolios, as a proportion of the annual payment from the ‘benchmark life annuity’.¹⁴ Figure 6 illustrates this worst case scenario for each of the five drawdown rules under consideration for the case of a balanced portfolio. It is noted that with the exception of the $1/E(T)$ rule all of the worst case scenarios are below the benchmark annuity payouts until retirees are in their early 80s.

<insert Figure 6 about here>

¹⁴ It is noted, however, that if the retiree were still alive, she would receive an annual drawdown of at least this minimum payout with a probability of 99 percent.

In the early years of retirement (for retirees in their 60s) the probable minimum benefits are quite similar under both the previous legislated minimum and the fixed percentage rule, but are lower for both the $1/E(T)$ rule and the new rules under Simplified Superannuation. Under the fixed percentage rule and the previous legislated minimum rule, the probable minimum benefit is less than the benchmark annuity payout over the entire potential period of retirement.

On the other hand the probable minimum payments under the $1/T$ rule start at very low levels (of less than 50 percent of the benchmark annuity payout) in the early years of retirement but increase rapidly in later retirement to over 300% of the benchmark annuity for those who live into their 90s. Under the balanced portfolio, the Simplified Superannuation rules result in a minimum benefit well in excess of the benchmark annuity for retirees who live past their mid 80s.

As with expected benefits, the impact of altering the underlying asset allocations, is to change the level of the minimum benefit, but not the rankings of the alternative drawdown rules. The minimum benefit paths under Simplified Superannuation for the five alternative portfolio allocations are illustrated in Figure 7. The minimum expected benefit under all five portfolio allocations (except capital stable) is less than the benchmark annuity until retirees are well into their 80s.

<insert Figure 7 about here>

Consumer welfare: Finally, to take account of risk aversion and the time preference of the retirees, we evaluate the five drawdown rules using a utility framework.

Following the approach taken in Horneff *et al* (2006) we adopt CRRA preferences with uncertainty over survival and assume that the retiree's objective function U is defined over total benefits received and a bequest left at death, and takes the form

$$U = E \sum_{t=0}^T \left\{ \left(\prod_{i=0}^{t-1} p_{x+i} \right) \left[\beta^t p_{x+t} \left(\frac{B_t^{1-\gamma}}{1-\gamma} \right) + k \beta^t (1-p_{x+t}) \left(\frac{V_t^{1-\gamma}}{1-\gamma} \right) \right] \right\} \quad (1)$$

Where β , is the time preference of the investor (set to 0.96 in line with previous analysis - Horneff *et al* 2006, Blake *et al* 2003), k is the strength of the bequest motive (ranging from 0 to 1), p_{x+t} is the probability that a female of age $x+t$ ¹⁵ survives one more year and the individual's coefficient of relative risk aversion is represented by γ , which ranges from 0.5 to 8 in this analysis.¹⁶ As indicated earlier, the nominal benefit from a draw-down plan in period t is given by B_t and the value of assets remaining in the account is V_t .

As with our earlier analysis we assume that the assets underlying the retirement income stream are invested in a balanced portfolio. To compare the utility of different rules, we calculate the expected lifetime utility (using equation 1) where the underlying assets are held in a balanced portfolio (and the bequest weight is 0) for each of the five alternative

¹⁵ As noted earlier, the life expectancies are computed as the 25 year improved survival probabilities from age 10 to 110 from the 2002 Australian life tables.

¹⁶ As indicated in Horneff *et al* 2006, γ below 1 represents low risk aversion, γ of between 1 and 5 represents moderate risk aversion, while γ above 5 represents high risk aversion.

drawdown rules, for levels of risk aversion ranging from 0.5 to 8. We then translate each utility level into an equivalent annuity income stream for life and express this as a proportion of the ‘benchmark annuity’. We also compute the optimal path of drawdown using dynamic programming for each level of risk aversion as a point of comparison. The annuity equivalent income stream can be interpreted as the constant nominal lifetime income stream that would provide the same level of utility to the retiree as the drawdown in question.

Consumer welfare from each of the rules varies as consumer preferences vary. Differences in welfare derived from a particular drawdown path are illustrated in Figure 8. For each of the five withdrawal rules (and the optimal path), we graph the annuity equivalent income stream as a proportion of the benchmark annuity stream, for levels of risk aversion from 0.5 to 8.

<insert Figure 8 about here>

The results show the importance of risk aversion in determining the preferred drawdown rule (as observed in Brown 2001). The $1/E(T)$ rule is most preferred for females with low levels of risk aversion, but least preferred for those with medium to high levels of risk aversion, while the $1/T$ rule is least preferred for low levels of risk aversion and then ranks mid range as levels of risk aversion increase. After the optimal paths, which are most preferred for any level of risk aversion by construction, the fixed percentage rule dominates all other strategies for female retirees with medium and high levels of risk

aversion.¹⁷ The new rules under Simplified Superannuation, rank mid range across the spectrum of risk tolerance, while the previous legislated minimum drawdown for allocated pensions ranks poorly, except for females with very low levels of risk aversion.

So far we have assumed that the underlying assets are held in a balanced portfolio. The impact of the alternative portfolio allocations on consumer preferences is to change the size of the certainty equivalent annuity estimates, but not the rankings by risk tolerance of the alternative drawdown rules. As would be expected, the path of certainty equivalent annuity estimates become flatter as one changes the underlying asset allocation from high growth, to growth, balanced, conservative, and then capital stable. As well, the results do not change significantly if we relax the assumption of no bequests.

4. Discussion and concluding comments

We have assessed five alternative drawdown rules in terms of simplicity, adequacy, risk and consumer preferences. A key finding is that the different drawdown rules perform differently under each of the criteria for assessment, for retirees at different ages and for different levels of risk aversion. Further, as one would expect, modifying the underlying asset allocation changes the drawdown amounts, but not the ranking of the alternative drawdown rules. In summary:

- The benefit/wealth ratios provide some indication of simplicity – where simplicity is defined as clearly identified drawdown percentages. The fixed percentage rule ranks first (by assumption) closely followed by the new legislated minimum rules.

¹⁷ Similar results were found for male retirees.

- Under the metric for expected benefit - expected drawdown as a percentage of the 'benchmark annuity payment' – the previous legislated minimum performs well for younger retirees, the $1/T$ rule does well for older retirees, while the fixed percentage and Simplified Superannuation rules do quite well for retirees of all ages.
- Similarly, under the metric for risk - the minimum expected benefit defined as the dollar amount of retirement income represented by the first percentile of the payout distribution as a proportion of the 'benchmark annuity payment' - the previous legislated minimum rules for allocated pensions perform best for younger retirees, the $1/T$ does best for older retirees, and the fixed percentage and Simplified Superannuation rules have reasonably high minimum benefits for all ages.
- The analysis of consumer welfare shows that the fixed percentage rule dominates the new legislated minimum drawdowns at high levels of risk aversion while the $1/E(T)$ is preferred for those with a low level of risk aversion. The Simplified Superannuation rules dominate the fixed percentage drawdown rule at low levels of risk aversion. The optimal path is (by construction) preferred to all rules for any level of risk aversion.

Overall, the new legislated minimum drawdown rules under Simplified Superannuation perform reasonably well under all criteria, and offer a substantial improvement over the previous allocated pension drawdown limits.

So far we have treated the minimum drawdown regulations as if they were fixed. We note, however, that the new minimum drawdown rules are not upper bounds on withdrawals, and retirees are free to make larger drawdowns than the minimum if they wish. In this context we investigate the case where the fixed percentage and optimal

drawdown rules are followed, except where they breach the new rules – in which case the new legislated minimum rules apply.

In Figure 9 we compare the certainty equivalent annuity proportions for the so-called ‘unconstrained’ drawdowns – that is the simple fixed percentage and optimal drawdown paths set out in Figure 8, with the certainty equivalent annuity proportions where the drawdowns are ‘constrained’ by new rules.

The results show that utility improves slightly across all levels of risk aversion where the drawdown patterns of the fixed percentage rule are constrained by the new five-phase drawdown rule under Simplified Superannuation (as shown in Table 2), but a retiree following an optimal path is made slightly worse off by having to abide by the minimum at higher levels of risk aversion. The reason for improvements in welfare when the fixed percentage rule is constrained by the minimum regulations is that the retiree is compelled to consume at a faster rate towards the end of life by the regulations, a pattern which mimics more closely the optimal path. Similarly, the fixed percentage rule increases consumption in early retirement compared with the new legislated minimum rules, again aligning closer to the optimal path. The combination of both rules improves welfare for most consumers. Slightly lower utility attaches to the constrained optimal path compared with the unconstrained path because the new legislated minimum rules compel very risk-averse retirees to consume slightly faster than they would like at older ages.

<insert Figure 9 about here>

An interesting outcome of this analysis is that we can now ‘back-out’ the benefit to wealth ratios implied by the ‘constrained’ drawdown pattern. Under the ‘constrained’

optimal path - assuming the underlying assets are invested in a balanced portfolio, there are no bequests and the level of risk aversion is fixed at 2 - the implied drawdown pattern by age (for females) are summarized in Table 3. Here the implied drawdown begins at 6.7% at age 60 then increases gradually by-age, reaching 8.7% by age 75, 12.0% by 85, 17.3% by 95 and then increases more rapidly to 56.2% by age 107. For the case of the ‘constrained’ fixed percentage rule – again assuming a balanced portfolio, no bequests and the level of risk aversion fixed at 2 - the implied drawdown pattern by age (for females) is far simpler, as shown in Table 3. Compared to the new legislated minimum, the implied drawdowns under the constrained fixed percentage rules compress into a three-phase increase of 6% until age 84, 10% at ages 85-94 and 14% thereafter – whereas Simplified Superannuation requires 4% until age 64, 5% from 65-74, 6% from 75-84, and then the same drawdowns as the constrained fixed percentage rule.

Table 3: Actual and implied drawdown rules

Age	Simplified Superannuation	Constrained fixed percentage	Constrained optimal
	(Per cent of account balance)¹⁸		
under age 65	4	6	6.7 (age 60)
65-74	5	6	7.1 (age 65)
75-84	6	6	8.7 (age 75)
85-94	10	10	12.0 (age 85)
95 and over	14	14	17.3 (age 95)
			56.2 (age 108)

¹⁸ The rule for males (under the same assumptions) would be the same, with 6.1% rather than 6% for retirees under 85.

In sum, our analysis indicates that the new legislated minimum drawdown rules under Simplified Superannuation are not only a significant improvement on the previous drawdown limits for allocated pensions, but perform well against a range of alternative rules. We also find that welfare can be improved for all retirees where the current five-phase drawdown rules are further simplified to a three-phase rule, under which retirees are required to drawdown at a faster rate during their earlier years of retirement – as indicated by the ‘constrained fixed percentage column in Table 3..

So far we have ignored taxes and the interaction of the drawdowns with the public age pension. While superannuation benefits are tax free (for retirees age 60 and above), the earnings on the underlying assets are only free of tax where the legislated minimum drawdown requirements are met. In circumstances where the legislated minimum drawdown rules are not met, the effective tax rate applying to the earnings of the underlying assets will then depend upon the particular portfolio allocation (due to the working of the imputation system).

As well, although the age pension means tests now apply equally to all retirement income streams, the availability of a public age pension (which has the features of an indexed life annuity) would influence the estimates of utility.

Overall, our analysis suggests that welfare could be further improved with even more simplification of Simplified Superannuation. Future research will explore whether these results still hold when account is taken of taxes and public age pension interactions.

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Appendix A: Methodology for construction of investment portfolios

Using monthly observations on asset class returns indices (30 December 1989 -- 30 December 2005), we calculate monthly periodic returns and then take a weighted average to make the periodic portfolio return. The net of fees portfolio return is then

$$r_{P,t} = \ln(1 + i_{P,t}) - \ln(1 + f_{P,t})$$

Where $i_{P,t}$ is the periodic nominal portfolio return and $f_{P,t}$ is the percentage rate of management fees. The annualized expected value and volatility of this process are:

$$\mu = 12 \frac{1}{N} \sum_{n=1}^N r_{P,t} + \frac{1}{2} \sigma^2$$

$$\sigma = s\sqrt{12}$$

$$s = \sqrt{\frac{1}{N-1} \sum_{n=1}^N (r_{P,t})^2 - \frac{1}{N(N-1)} \left(\sum_{n=1}^N r_{P,t} \right)^2}$$

where N is the number of observations in the sample. Table A1 sets out the annualized net-of-fees returns and standard deviations for each investment strategy.

Table A1: Portfolio returns and volatilities

Investment Option	Nominal Rate of Return	Nominal Return less fees	Std. Deviation
High Growth	10.4%	8.50%	9.88%
Growth	10.0%	8.20%	7.90%
Balanced	9.2%	7.50%	5.82%
Conservative	8.5%	6.80%	3.80%
Capital Stable	7.5%	5.90%	1.50%

Notes: This table presents estimates of nominal returns and standard deviation values for five representative investment portfolios. Returns are the annualised log change in the weighted sum of monthly periodic returns to the component asset classes, less a deduction for management fees. (Weights for each portfolio are given in Figure 1.) We compute monthly gross returns to each asset class index where Australian equities are the Australia-DS Market index, International equities are the AC WORLD INDEX ex AUSTRALIA translated into Australian dollars at the end-month AUD/USD exchange rate, fixed income is the UBS Composite All Maturities index for Australia, property is the S&P/ASX 300 Property index and cash is the UBS AU Bank Bills All Maturities index, all from Datastream. The total return price index (RI) of the relevant asset class index was used for calculations of the periodic monthly returns. Sample data runs monthly from December 1989 – December 2005

The sample period from which these returns are calculated includes a long period of strong performance in the domestic equity and property markets, which may slightly favour self-insurance over annuitisation in our analysis since annuity payouts are dependent on returns from fixed interest securities. Notwithstanding some possible overstatement of investment returns, if we condition on a specific allocation, comparisons between alternative draw-down paths and the regulated minimum are valid.

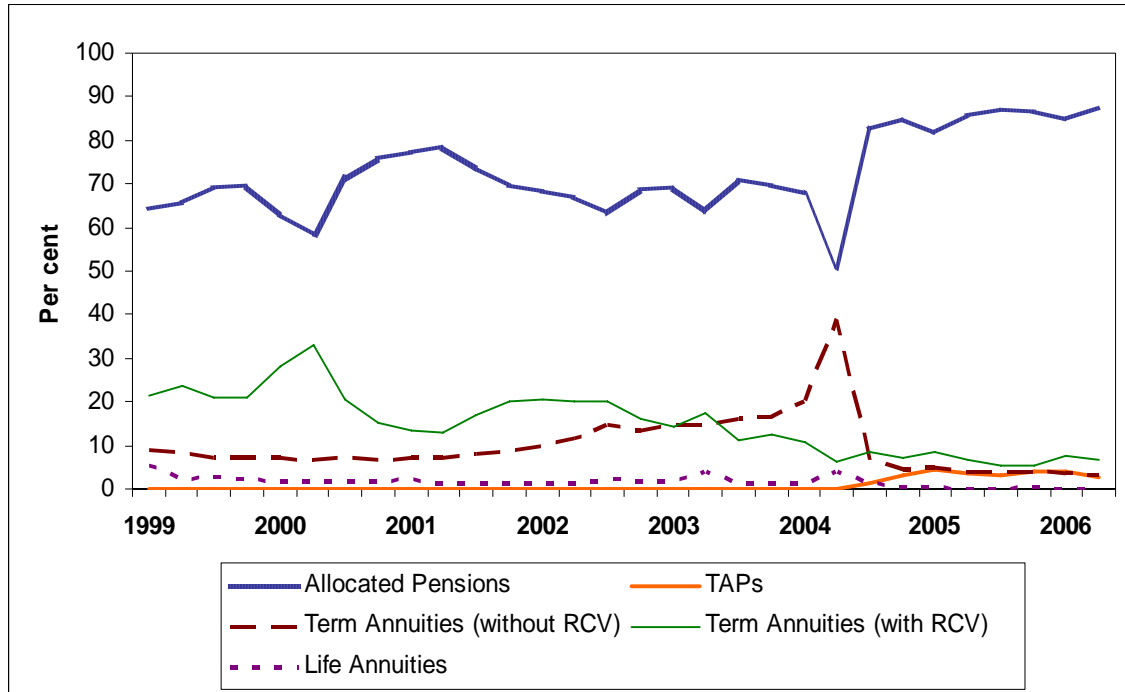
Table 1: Taxation and age pension means test treatment of retirement income streams

	Income streams purchased pre 2007		Income streams purchased post 2007	
Product type	Taxation	Means tests	Taxation	Means tests
Life pension or annuity Life expectancy pension or annuity Term allocated pension (TAP)	Taxable income adjusted for annual deductible amount ^a Earnings on underlying assets tax exempt	50% assets test exemption ^{b c} Income adjusted for return of capital	Benefits tax exempt Earnings on underlying assets tax exempt if satisfy minimum standards ^d	Full assets test applies ^e Income adjusted for return of capital
Allocated pension or annuity Other term annuity (> 5 years)	Taxable income adjusted for annual deductible amount Earnings on underlying assets taxed	Full assets test applies Income adjusted for return of capital		

Source: Bateman and Kingston (2007).

- a. Annual deductible amount = undeducted purchase price (UPP)/life expectancy (or term).
- b. Asset test taper: \$3 per fortnight for every \$1,000 of assets above assets free area for income.
- c. 100% assets test exemption if purchased before 20 September 2004.
- d. Earnings on underlying assets taxed at 15% for pensions which do not satisfy the 'minimum standards'.
- e. Assets test taper halved to \$1.50 per fortnight for every \$1,000 of assets above assets free area. Applies to assets purchased on or after 20 September 2007.

Figure 1: Market share of retirement income streams (1999-2006)



Source: Plan for Life Research, The Pension and Annuity Market Research Report, Quarterly 1999-2006.

Figure 2: Benefit to wealth paths under alternative drawdown rules

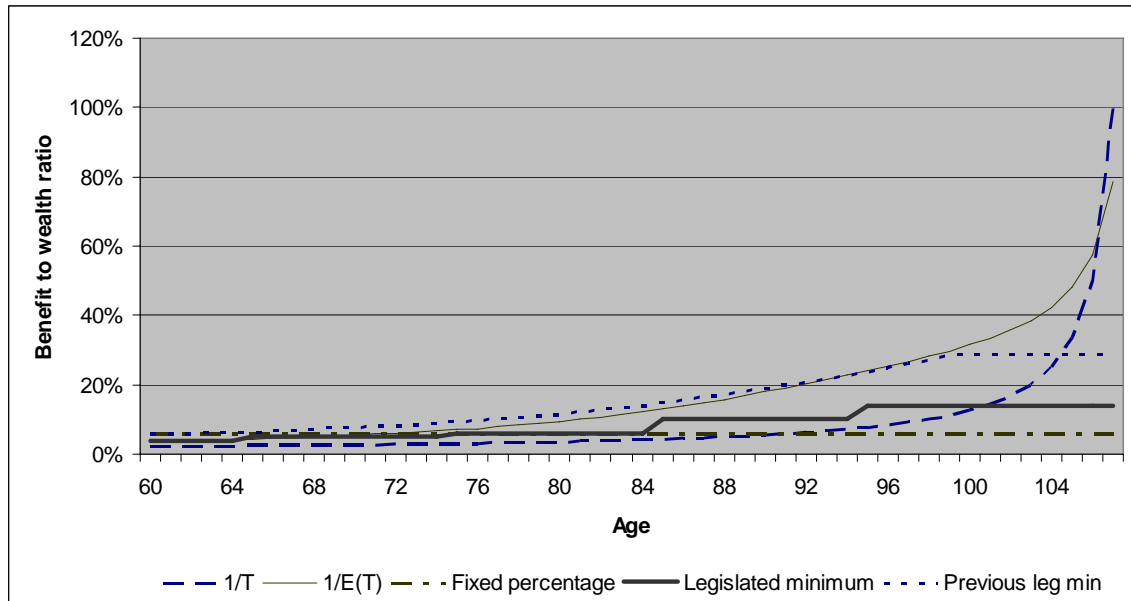
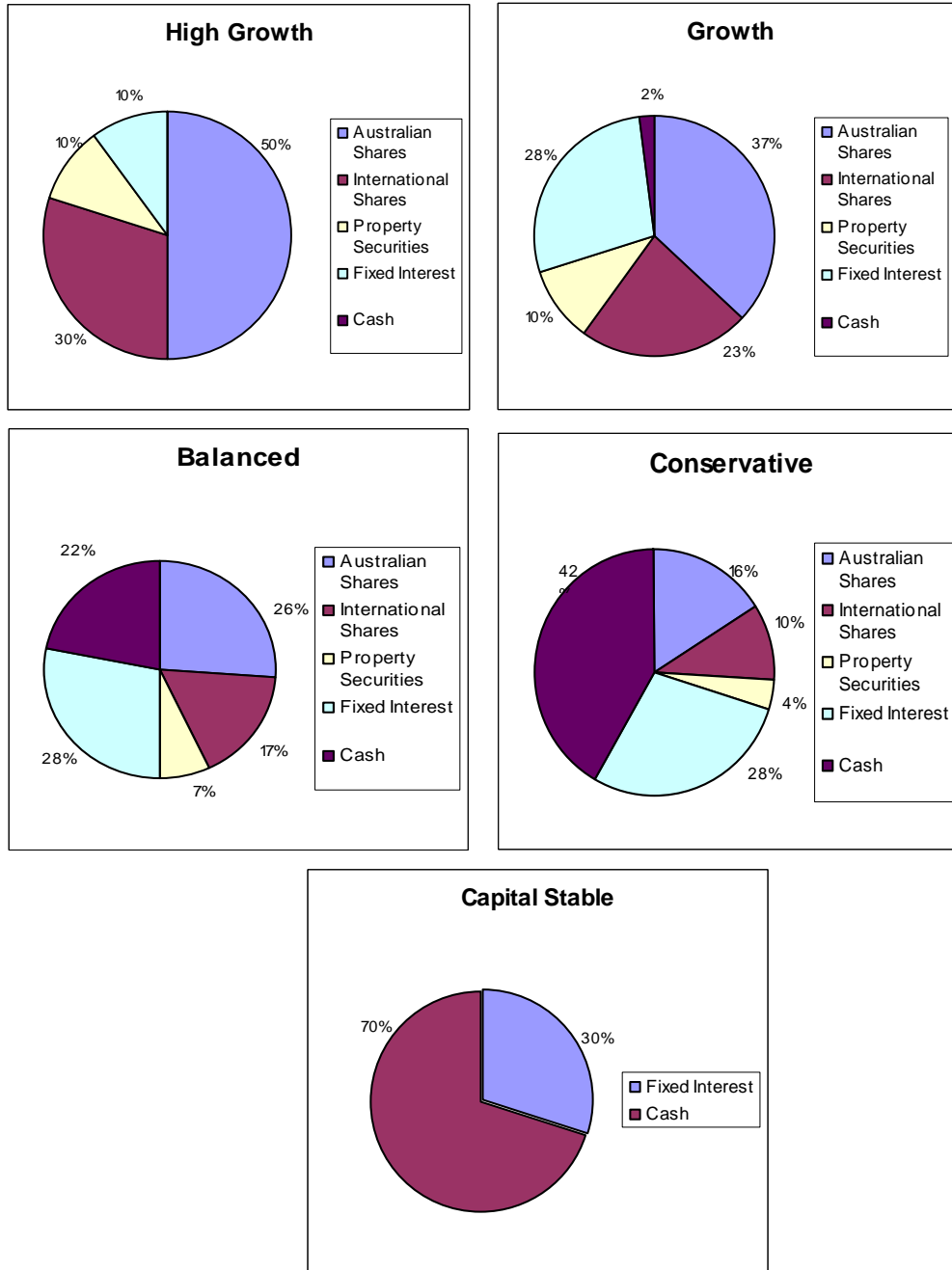


Figure 3: Portfolio allocations underlying retirement payouts



This figure presents the compositions of representative investment portfolios. Each investment is a combination of two or more asset classes including Australian shares, international shares, Australian property securities, Australian fixed interest and cash.

Figure 4: Expected benefit as a proportion of the benchmark annuity payment, under alternative drawdown rules

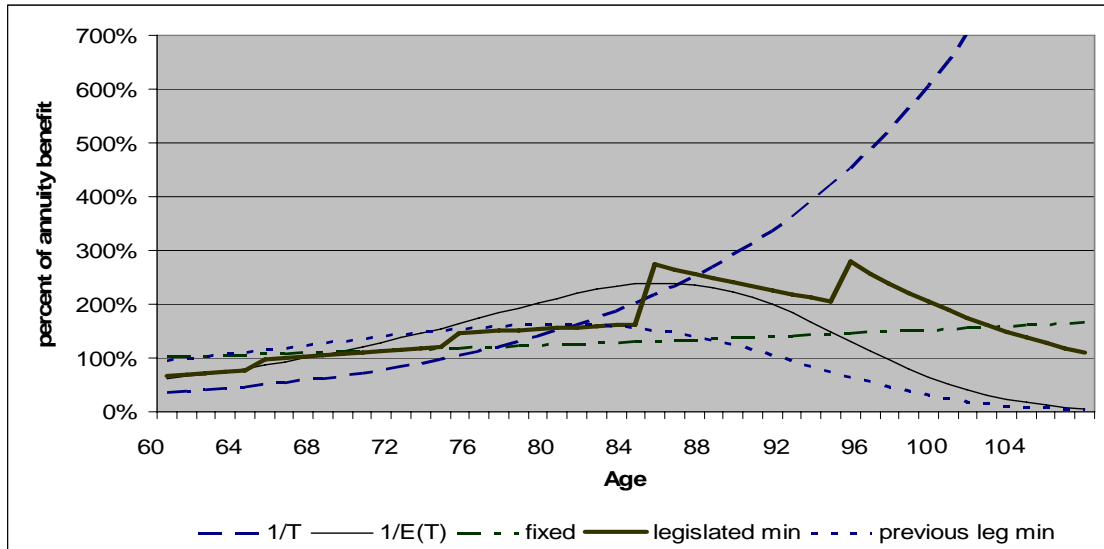


Figure 5: Expected benefit from Simplified Superannuation as a proportion of benchmark annuity payment, under alternative portfolio allocations

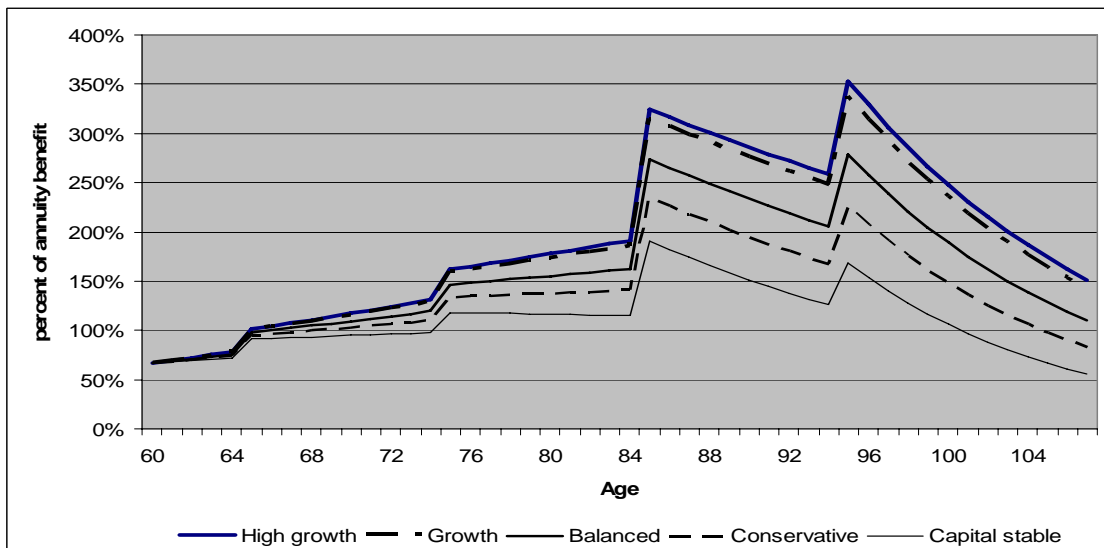


Figure 6: Probable minimum benefit as a proportion of benchmark annuity payment, under alternative drawdown rules

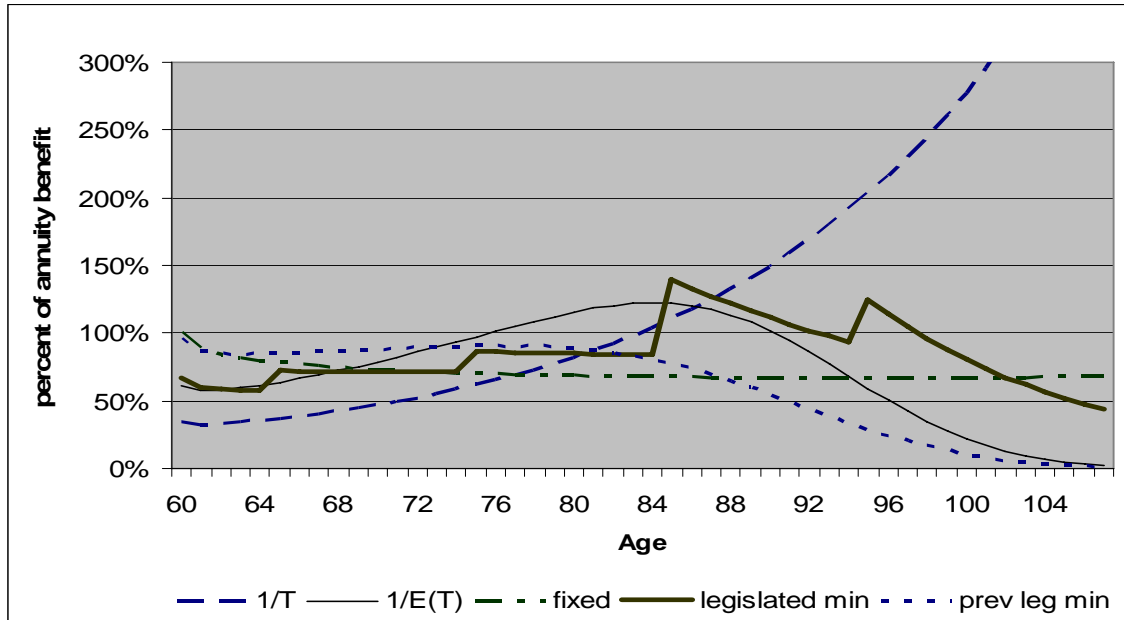


Figure 7: Probable minimum benefit from Simplified Superannuation as a proportion of benchmark annuity payment, under alternative portfolio allocations

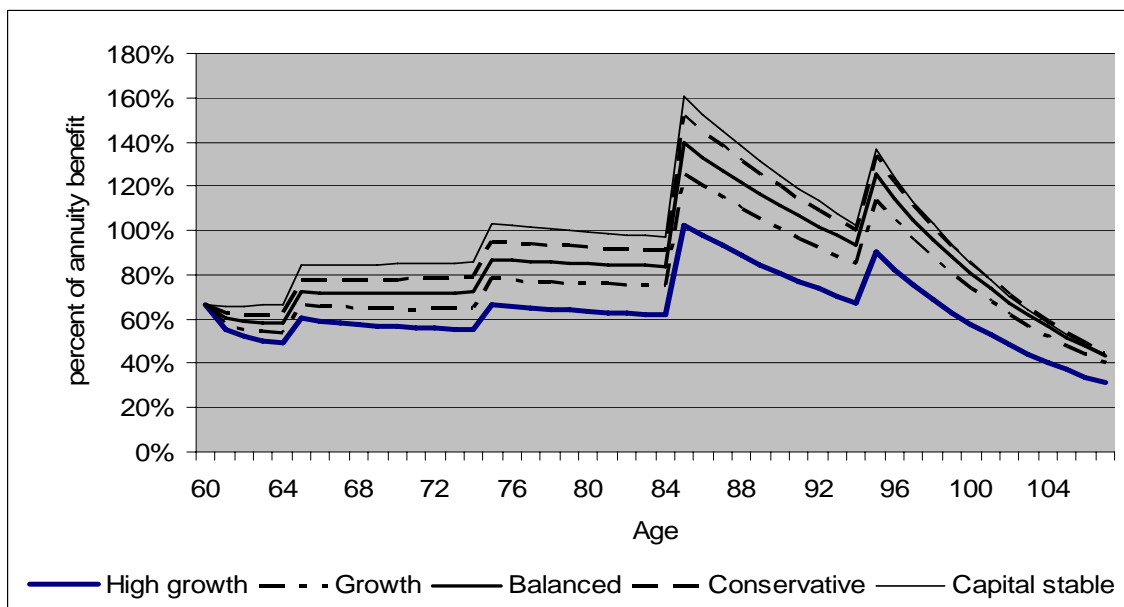


Figure 8: Comparison of drawdown rules for a range of risk tolerances

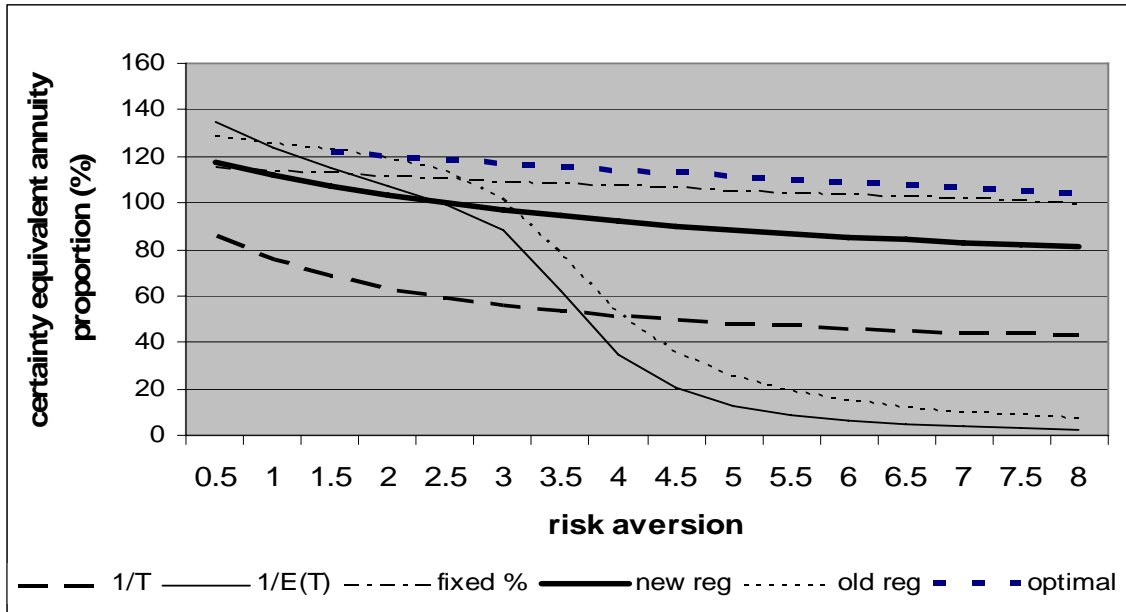


Figure 9: Comparison of constrained with unconstrained drawdown rules

