

Alternative Retirement Income Arrangements and Lifetime Income Inequality: Lessons From Australia

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Abstract

This paper examines the implications for lifetime income equality of alternative retirement income arrangements, using the Australian scheme as a benchmark. In Australia, the pay-as-you-go financed age pension is means-tested and thereby provides a contrast with those countries where part or all of a basic pension is paid to all aged persons. Many governments are considering an increase in the level of means-testing. The results showed that the introduction of a universal pension coupled with significant changes and simplifications to the structure of taxation and superannuation have little effect on lifetime redistribution. The results suggest that it is possible to eliminate complexities without having any deleterious effect on equity.

1 INTRODUCTION

The provision of adequate retirement incomes over the long term is an issue that confronts many governments around the world as a result of the ageing of the population, the maturing of many unfunded social security systems, and increasing longevity. Indeed, many nations are now considering a range of options to reduce the long term financial burden of providing previously promised levels of state pensions; see World Bank (1994), Brown (1994), Canadian Institute of Actuaries (1995). Tactics suggested to ameliorate the emerging difficulties include:

- (i) an increased degree of means testing in respect of state pensions;
- (ii) a shift from an unfunded public provision to a funded mandatory system administered and invested in the private sector;
- (iii) higher retirement ages;
- (iv) increased contributions by employers and employees; and
- (v) reductions in the level of taxation support for pension schemes.

In view of these world wide developments it is useful to consider the existing Australian arrangements where the government pension, known as the age pension, is fully means-tested (there is no universal component), there is a mandatory superannuation system funded and administered in the private sector and there is taxation on pension fund contributions, fund investment income and benefits. The Australian system contains some of the features being considered by other countries, so some lessons may emerge as a result of focussing on this system.

The purpose of the present paper is to evaluate the redistributive implications of the current system in Australia in terms of the lifetime incomes of members of a single cohort and to compare this system with two alternative schemes. The alternatives incorporate a universal pension and other features which are closer to the existing arrangements in many other countries. The evaluation requires the use of a simulation model and the full details of the model (known as LITES) are given in Atkinson, Creedy and Knox (1994); a brief summary is given in the appendix to this paper. For this study, attention is restricted to the experience of a cohort of males in continuous employment, assumed to be home owners (a classification required for the purpose of administering the Australian means-tests).

In Section 2 national retirement income programmes are discussed and the unique Australian arrangements are contrasted with those found in many OECD countries. The two alternative structures are presented in Section 3, and the three schemes are then compared in Section 4. Some conclusions are presented in Section 5.

2 RETIREMENT INCOME PROGRAMMES

2.1 International context and developments

National programmes to provide retirement income exhibit enormous variety. Some are dominated by a national, centrally managed scheme whereas others have very little government involvement and are concentrated in the private sector, under either employer or individual control. In many nations, informal arrangements are more dominant than formal schemes. The Australian arrangements, which provide the benchmark for this research, are unique amongst those of OECD nations and it is therefore necessary to place these arrangements within the context of other national retirement income schemes.

The World Bank Report (1994) noted that there are three 'pillars' in the provision of retirement income. These are the public pension pillar managed by the Government, the occupational pension pillar managed within the private sector and the voluntary personal savings pillar. The relative importance of each pillar varies significantly among countries and over time within the same country.

Many European and North American countries have a Government pension system based on a pay-as-you-go basis with each year's contributions, from both employers and workers, paying for the pensions provided in that year. In many cases, the total pension paid is a combination of a universal flat-rate pension and an additional pension linked to a measure of the individual's lifetime earnings or contributions. There may also be a means-tested supplementary pension available, perhaps as part of the welfare system.

The relative importance of the government pension system determines the significance of the occupational pension system managed within the private sector. Where the public system provides generous benefits (for example, in Italy or Spain), or there is a substantial central fund (for example, in Singapore) a less significant occupational pension arrangement operates. By contrast, if the level of the public pension is smaller or permits contracting-out (as in Canada and the United Kingdom respectively), the occupational pension schemes are more important; on U.K. and European systems, see

Blake (1992), and Dilnot et al (1994).

Many governments are being forced to reconsider seriously the affordability of their unfunded public sector pension plans. Typically, actions that have been taken to reduce the net long term costs include the introduction of means-tests for part of the pension (as in New Zealand), the reduction in the amount of the pension (such as in the United Kingdom for the earnings related component), and the raising of the entitlement age (as in the United States).

Within this context of significant change on the international scene, the existing Australian system incorporates some of the characteristics currently under consideration elsewhere. It is therefore instructive and appropriate to assess some of the consequences of a system like the Australian one so that countries which are considering incorporating features of this system into their own arrangements (such as the introduction of means-testing) are better placed to make an informed decision.

2.2 Unique Australian characteristics

The Australian system contrasts with the norms of the existing systems found in many countries. There is no public pension programme associated with employment. A means-tested age pension, funded on a pay-as-you-go basis by general taxation revenue and not by specifically targeted contributions, is payable to an individual who has income and assets below certain prescribed limits. This is essentially a welfare rather than a retirement benefit. Currently about 53% of the aged population receive the full pension (which is equivalent to approximately 26% of the average wage) while another 27% receive a reduced pension. The remaining 20% of the aged population receive no pension from the Government since their assets or their level of income from employment, business or investment, exceeds the prescribed limits.

The provision of retirement benefits in the private sector is now compulsory. Currently, employers must contribute 6% of earnings to a regulated pension or lump sum fund. This minimum contribution rate is planned to rise to 9% of earnings in 2002 and be further supported by a mandatory minimum employee contribution of 3% of earnings from 1999. These funds are subject to solvency requirements (they must be fully funded except in the public sector), are administered in the private sector (either through corporate, industry or personal plans) and are permitted to invest in areas that are consistent with the investment objectives set by the individual fund's trustees, with relatively few restrictions.

A reason for the Government's introduction of mandatory contributions is that the development of a comprehensive retirement benefit system (known

as superannuation) is expected to reduce the future cost of the means-tested age pension due to the availability of funded superannuation benefits. It is argued that a total contribution rate of 12% of earnings is sufficient for many employees to provide an adequate level of retirement income; see Dawkins (1992). Appendix B gives a simplified description of the current extremely complex Australian arrangements.

Hence, in terms of the three tiers of retirement income mentioned above, the Australian situation can be summarised as follows:

- (i) The public pillar is restricted to a means-tested age pension financed from general taxation and there is no universal base pension;
- (ii) The occupational pillar is provided by the mandatory minimum contributions by employers and employees on a fully funded basis, and is administered by and invested in the private sector;
- (iii) The voluntary savings pillar is provided by additional contributions by employers and/or individuals at their discretion within, or outside, the superannuation system.

Integration of the first two pillars (namely the means-tested age pension and occupational retirement benefits) is incomplete. Recent proposals have suggested that the abolition of the means-test would improve this integration and clarify the incentives within the total system; see World Bank (1994), Institute of Actuaries of Australia (1994). A purpose of this paper is to evaluate the redistributive implication of the abolition of the means-tests. Although this research arises from an Australian context, many national retirement income programmes are now introducing, or considering the introduction of, a degree of means-testing into their schemes. Hence, the results in this paper should be of interest to an international audience, where the relative merits of means-testing are a matter of topical concern.

Another of the fundamental differences between the Australian arrangements and those in place in many developed economies is the method of taxation of pensions. In most OECD countries, contributions made to pension plans by employers and employees (in many cases) are tax-deductible and are not subject to any tax when received by the pension fund. Furthermore, the investment income earned by the pension fund is exempt from taxation. However, the benefits paid from the fund in the form of pensions are normally subject to taxation at normal income tax rates, and the pension benefits that are taken as a cash lump sum are taxed at special rates. This pattern of taxation is sometimes known as the EET (Exempt/Exempt/Tax)

Table 1: The Current Structure in Australia

Contributions tax	15% on tax deductible employer contributions
Employee Contribution income tax rebate	10% of employee contributions, subject to income tests (maximum rebate of \$100), and age related maxima on total contributions. The rebate may not exceed tax liability
Superannuation Fund Earnings Lump Sums	15% on investment income (assumed to be an effective rate of 7.5%, allowing for tax credits). The lump sum benefit (excluding employee contributions not receiving a tax deduction) is taxed at 16.4%, except for the first \$77,796 (in 1993-4) which is exempt from taxation.
Pension	A pension purchased directly from superannuation fund is taxed as income, but non tax-deductible employee contributions are exempt
Pension rebate	15% rebate to allow for the contributions tax.
Age Pension	Taxable age pension payable subject to income and asset means-tests. There is a pension-related, means-tested income tax rebate.

system, since taxation is deferred until benefits are received; see Knox (1990), Dilnot and Johnson (1993).

The Australian system in its mature form is described briefly in Table 1 and in more detail in the appendix. In brief, all tax-deductible contributions received by a fund are subject to a flat 15% contributions tax, paid on receipt by the fund. In addition, investment income is taxed at the 15% rate, although various investment credits often reduce the effective rate to between 5% and 10%. Benefits are also subject to tax, although the tax rates make some allowance for the 15% tax on contributions. In essence, taxation is paid on Australian pension funds at every stage: when contributions are made, as they accumulate, and, finally, when benefits are received. There is no doubt that these arrangements are complex. The next section describes two alternative schemes which incorporate major simplifications.

3 ALTERNATIVE REFORMS

The complexity of the current Australian scheme makes it very difficult for individuals to make plans and introduces a number of disincentives; see Atkinson, Creedy and Knox, (1995). The means-testing of the age pension provides

a disincentive to save or accept employment over a wide range of incomes, and a strong incentive to take the superannuation benefit as a lump sum and to spend some of this at retirement. This is demonstrated by the strong bunching of the income distribution of retired individuals at the lower threshold of the means-test; see Creedy and Disney (1990).

In recognition of these problems, the Institute of Actuaries of Australia (1994) proposed a revision of the Australian retirement income policy. The proposed structure incorporated a universal, taxable, age pension and a simplified taxation system for superannuation. These features are key elements in the two alternatives presented here.

The major problems with the Australian system are the complex taxation arrangements for superannuation and the lack of integration between the superannuation and age pension systems. The lack of integration is reflected in: (i) differences in entitlement ages with the superannuation preservation age being 55 and the pension ages being 65 for males and increasing from 60.5 to 65 for females; (ii) differences in the form which benefits take since the major proportion of superannuation benefits is paid as lump sums while the means-tested pension is provided in income form; (iii) conflicting incentive effects with the existence of the means-tests discouraging additional savings and post-retirement investment while the taxation incentives for superannuation exist to encourage savings; and (iv) differing bases for calculating the benefit entitlements as superannuation benefits broadly reflect the total level of lifetime earnings while the age pension is a fixed amount, independent of the individual's past earnings levels.

The two alternative structures address these defects in the current system. The integration problems can be overcome with the provision of a universal taxable age pension and a corresponding reduction in the level of compulsory superannuation contributions. The abolition of the means-tests would improve integration because a basic pension would be received by all individuals and the superannuation and other long term savings systems could build upon this foundation without being prejudiced by disincentive effects.

The Institute of Actuaries of Australia (1994) showed that with the introduction of a universal pension, the level of compulsory employer superannuation contributions could be reduced by 3% of earnings whilst maintaining the same level of net retirement income for most individuals. As noted earlier, the provision of a base pension forms an important component of the retirement income systems in most developed countries.

The complex taxation arrangements are more difficult to resolve. Two alternatives, referred to as Option A and Option B, are presented, with Option B representing the more radical approach. These are described in Tables 2 and 3, using the same format as for Table 1 for ease of comparison.

Table 2: Alternative Structure: Option A

Contribution tax	15% on tax deductible employer contributions
Employee Contribution rebate	10% of employee contributions, subject to age related maxima, but no other limitations. Refund may exceed tax liability.
Superannuation Fund Earnings	15% tax on investment income (for modelling: an effective rate of 7.5%, allowing for tax credits).
Lump Sum Tax	All Lump Sum benefits subject to tax schedule of: 0% on amounts $< 2 \times$ average weekly earnings 20% on amounts $2-4 \times$ average weekly earnings 35% on amounts $> 4 \times$ average weekly earnings Medicare levy of 1.4% on all amounts.
Pensions in payment	Superannuation annuities are taxed as income, except that the purchase price allowance is exempt.
Pension rebate	No rebate
Age Pension	Universal pension, taxable, no means-tests. Income tax rebate depending on income.

The 'purchase price allowance' is the cost of the annuity divided by the expected term of payment (14.6 years for males aged 65).

The Australian Government currently receives considerable tax revenue from superannuation funds and for this budgetary reason, the 15% tax on tax-deductible contributions and fund investment income is retained as a feature of both options.

Option A provides an incentive for all individuals to contribute by removing the very restrictive conditions on the current tax rebate of 10% of contributions. It provides greater encouragement for the use of annuities because the total benefit used to purchase an annuity constitutes a tax exempt undeducted purchase price. From the individual's perspective, it is a much simpler system. A rebate is received in respect of member contributions (although age-related maxima on contributions remain), benefits are taxable with a three-tier tax system for lump sum benefits, and pensions are subject to income tax but with a constant annual exemption. The exemption is equal to the purchase price divided by life expectancy at the age when the annuity commences.

Option B simplifies the taxation structure further by abolishing all maxima (whether expressed in terms of contributions or benefits) and introducing a progressive superannuation benefits tax. This tax, with rates ranging from 0% to 40%, is paid at retirement when the benefit is received by the indi-

Table 3: Alternative Structure: Option B

Contribution tax	15% on tax deductible Employer contributions
Employee Contribution rebate	10% of employee contributions refundable. No limitations apply.
Superannuation Fund Earnings	15% tax on investment income (assumed to be an effective rate of 7.5%, after allowance for credits).
Lump Sum Tax	No Lump Sum tax as such. Total superannuation benefit is subject to tax of: 0% on amounts $< 3 \times$ average weekly earnings 20% on amounts $3-10 \times$ average weekly earnings 40% on amounts $> 10 \times$ average weekly earnings No Medicare levy.
Pensions in payment	Superannuation annuities are exempt from income tax.
Pension rebate	No rebate.
Age Pension	Universal pension, taxable, no means-tests. Income tax rebate depending on income.

vidual. With these tax rates there is little incentive for excessive benefits to accrue, so maximum benefits can be abolished. Similarly, if the tax structure provides little incentive for very large contributions, there is no need for any restrictions on the size of contributions.

The superannuation tax in option B is paid on the capital value of the total superannuation benefits received and the tax rate is independent of any other income. Any subsequent annuity payments, generated from the superannuation benefit, are exempt from the tax system. This extreme simplification may appear generous. However, under the current system most of an annuity purchased by an amount that has already been subject to lump sum tax is exempt from income tax due to the allowance for the tax already paid in respect of the lump sum. The extension of this exemption to include the total annuity payment is both a simplification and a concession to annuitants who forego access to their capital during the term of the annuity.

There are other advantages in introducing a single tax on all superannuation benefits at the point of retirement. First, it is simple, because the tax is paid on one occasion and no further taxation is needed. Secondly, it is equitable, because all superannuation benefits are treated in the same manner and multiple benefits are easily accounted for since the tax rate applied is independent of other income. Thirdly, it has revenue advantages: the Government receives all the superannuation benefits tax at the time of retirement and thus some of the current revenue from the taxation on future

pension income is brought forward. Fourthly, there are administrative savings, because pensioners and the tax department no longer need to continue to administer the taxation of annuities.

4 SOME COMPARISONS

This section compares the alternative schemes in terms of their redistributive impact over the life cycle of a cohort of males, using the LITES model. The Gini inequality measure, based on present values of lifetime income, is used. Other measures were found to give similar results and are therefore not presented here.

This analysis is restricted to the experience of males, as their earnings data are readily available and the pattern of earnings change over the working life may be expected to be reasonably stable. Hence, the earnings distribution and mortality are representative of all Australian males. When calculating the taxation and benefit levels each individual is assumed to have no dependents. It is planned to extend the model to allow for household formation and the more complex labour market experience of females.

Results are presented illustrating the consequences of a number of different decisions made at retirement. Allowing the choices to depend on the precise tax and pension system would considerably complicate the analysis; these decisions are designed to cover the range of possible choices. It is assumed that superannuation represents the only source of cumulative savings throughout the working life; the effect of additional savings is discussed at the end of the section. Five different choices at retirement are examined, as follows:

Choice (i) allows for the superannuation benefit to be used for the purchase of an inflation linked annuity.

Choice (ii) uses 50% of the superannuation benefit to purchase an inflation linked annuity, and 50% is placed in an interest bearing bank account.

Choice (iii) also uses 50% of the superannuation benefit to purchase an annuity, but the balance is put to immediate consumption at retirement.

Choice (iv) entails all of the superannuation benefit being taken as a lump sum, then placed in an interest bearing bank account.

Choice (v) also commutes all the superannuation benefits to a lump sum, but all assets are spent on retirement, so that no income provision is made.

The interest bearing account contributes to the assets of the individual to the extent of the balance of the account, and is assessed in the application of the assets means-test associated with the age pension. It is assumed that the account is reduced by annual capital drawings and eventually extinguished, but if the retiree dies during the drawing-down period the balance in the account provides a capital bequest. The amount withdrawn from the account each year is the balance of the account at the start of a year, divided by the number of years outstanding until age 80. The interest which is earned on this account is taxable as income to the individual in the usual way, and is assessable as income in the application of the age pension income means-test.

The simulations are based on the assumption of differential mortality experience. The age at death in retirement for each individual relates to the lifetime earnings of that individual relative to the whole cohort, incorporating a stochastic component, on the basis of an earnings and mortality distribution derived from available data. The calculation of earnings profiles and ages at death are described in Appendix A.

Comparisons of the Gini measure of inequality of net lifetime income under alternative arrangements are shown in Table 4. The major result is that, for each method of disposing of the superannuation benefits, the effect on inequality of removing the means-tests on the government pension and simplifying the tax structure is very small. The two simplified structures represent very substantial reductions in complexity, much of which has arisen from an attempt to introduce some progressivity directly into the structure of superannuation taxation. Nevertheless, the substantial simplifications have a minor effect on inequality. Indeed, the results for the current scheme and Option A are more sensitive to the decision made by individuals in choosing how to invest the superannuation benefit; that is, the differences between the rows of Table 4 are more substantial than differences between tax structures. Option B raises more lifetime revenue per person, as measured by the ratio of the difference between arithmetic mean present values of gross and net lifetime incomes, divided by gross lifetime income; these are shown in Table 5. However, the measures associated with Option B are more consistent over the range of behaviours.

Differential mortality is an important determinant of lifetime inequality. This is particularly marked in the case where all of the superannuation benefit is used to purchase a lifetime annuity, and arises because the purchase price of annuities is independent of the individual's lifetime income. For example, if instead of differential mortality, all individuals are assumed to live for 14 years after retirement, the Gini inequality measures of net lifetime income, for the current tax structure, Option A and Option B respectively, fall to 0.2145, 0.2142 and 0.2103 respectively (compared with the corresponding

Table 4: Gini Measures of Lifetime Income

	Current	OptionA	OptionB
100% annuity	.2459	.2455	.2391
50% annuity 50% bank	.2303	.2328	.2298
50%annuity 50% cash	.2327	.2344	.2313
100%lumpsum all to bank	.2174	.2185	.2215
100% lumpsum all spent	.2242	.2215	.2244

Table 5: Total Tax Ratio

	Current	OptionA	OptionB
100% annuity	.1475	.1327	.1703
50% annuity 50% bank	.1457	.1445	.1777
50%annuity 50% cash	.1263	.1355	.1716
100%lumpsum all to bank	.1504	.1689	.1848
100% lumpsum all spent	.1170	.1553	.1745

values in the first row of Table 4 of 0.2459, 0.2455 and 0.2391) .

The above comparisons assume that superannuation contributions constitute the only savings for retirement. Additional saving typically implies a mixed (but very small) effect on inequality. However, the main result is unchanged; the tax and pension simplifications have little effect on the equity measures. The most significant differences arise as a result of the choice of alternative methods of disposing of resources at retirement. Further investigations were carried out to test the sensitivity of this result to the assumptions used. Variations included increasing employer superannuation contributions to 9% for Options A and B to match the employer contribution proposed under the current structure, and increasing the level of the basic age pension. In all cases the general result remains unchanged; that is, the significant differences arise from the choice of retirement behaviour rather than from the structure of taxes and benefits. Furthermore, the role of differential mortality is more significant than the differences in structure.

5 CONCLUSIONS

This paper has examined the implications for lifetime income equality under alternative retirement income arrangements, using the Australian scheme as a benchmark. The advantage of using the Australian system is that the pay-as-you-go financed age pension is fully means-tested and thereby provides a contrast with systems in those other countries where part or all of a basic

pension is paid to all aged persons. With many governments considering an increase in the level of means-testing, the Australian experience provides valuable insights.

The results showed that the introduction of a universal pension coupled with significant changes and simplifications to the structure of taxation on superannuation have very little effect on the redistributive impact of the tax structure in a life cycle framework. The analysis of lifetime inequality finds no substantial differences in the redistribution of lifetime income associated with means-testing and other features of the taxation system. It is concluded that the presence of means-testing may have no significant effect on lifetime inequality.

Alternative structures for the provision of retirement incomes which embody hybrids of the current Australian system and other systems in place internationally, do not necessarily imply significant changes in equity. The results suggest that it is possible to eliminate complexities from the system providing retirement benefits without having any deleterious effect on equity.

It was found that the progressivity of a system is substantially more sensitive to the characteristics of individual behaviour following retirement and the post-retirement mortality experience, than the presence or otherwise of means-tests for the age pension.

A THE LITES MODEL

The model is designed to calculate the contributions, taxes and benefits associated with earnings, direct and indirect levels of taxation, savings and superannuation, under a variety of conditions. It enables examination of selected individuals or simulated cohorts, and produces alternative measures of inequality and progressivity. For a full description see Atkinson, Creedy and Knox (1994).

A.1 Earnings profiles

Gross earnings in each year of working life are generated using a model of age-earnings profiles in which earnings in age group t are lognormally distributed as $\Lambda(\mu_t, \sigma_t^2)$, where μ_t and σ_t^2 are respectively the mean and variance of the logarithms of earnings. These two parameters are assumed to be quadratic and linear functions of t respectively, so that :

$$\mu_t = \mu_1 + (\theta + g)t - \delta t^2 \quad (1)$$

$$\sigma_t^2 = \sigma_1^2 + \sigma_u^2 t \quad (2)$$

where g is the nominal growth rate of earnings which affects all age groups equally. The five parameters $\mu_1, \sigma_1^2, \theta, \delta$ and σ_u^2 were estimated using data for Australian males and are $\mu_1 = 9.98064, \theta = 0.0385, \delta = 0.00086, \sigma_1^2 = 0.1817, \sigma_u^2 = 0.00575, g = 0.06$; see Creedy (1992).

A.2 Age at Death

The number of years the i th individual survives after retirement, d_i , is obtained, following Creedy (1982), using the following formula:

$$d_i = \bar{d} + \beta \log \frac{\bar{X}_i}{M} + u_i \quad (3)$$

where \bar{X}_i is the individual's annual average real earnings, M is the geometric mean value of the \bar{X}_i s, \bar{d} is the average number of years individuals in the general population survive after retirement and u_i is a random normal variable $N(0, \sigma_u^2)$. The values used are: $\bar{d} = 14.6, \beta = 8$ and $\sigma_u^2 = 50$.

A.3 Economic Assumptions

The major assumptions used in the simulation are as follows: net tax on super fund investment income 7.5%; tax on savings fund investment income 25%; annual increase in Average Weekly Ordinary Time Earnings 6%; annual increase in income tax thresholds 5.5%; annual inflation rate 5%; gross annual investment rate of return on Super accumulation 9%; gross annual rate of return on bank account during retirement 5%; the purchase price of retirement annuities is 12.5; Annuities purchased escalate in payment at 5%.

B THE CURRENT AUSTRALIAN SYSTEM

B.1 Superannuation taxation before retirement

The long term Government objective for superannuation contributions is an employer contribution of 9% of earnings and employee contributions of 3% of earnings. Define X as the level of the individual's gross earnings in any year. Employer contributions are $0.09X$, and employee contributions are $0.03X$. Let T_c represent the tax on employer contributions; then: $T_c = 0.15 \times 0.09X = 0.0135X$. The net contribution to superannuation each year is therefore equal to $0.1065X$. Assuming that these contributions are made, on average, mid year, that the superannuation fund (SF_t at time t) earns rate i per year, and that there is a net tax on investment earnings (after allowing for imputation and other credits) of 7.5%, and I represents the net investment income received in the year, then:

$$SF_t = SF_{t-1} + 0.925I + 0.1065X$$

where $I = i(SF_{t-1} + 0.5 \times 0.1065X)$

An individual may be entitled to a tax rebate in respect of employee contributions. The rebate is limited to 10% of the employee's contributions subject to a maximum of \$100 per annum. It is also income-tested: an individual with earnings in excess of \$31,000 receives no rebate. There is also a restriction linked to age and the level of the employer's contribution but this rarely applies due to the severity of the income testing. There is also a tax rebate payable to low income earners. Let R represent the total rebates payable.

Assuming that there are no other sources of income, income tax, T_X , is calculated on the value of gross earnings, X , rounded down to the nearest dollar. The Medicare levy (in respect of compulsory medical insurance) is also added. The total income tax payable by the individual, T , since rebates may not exceed the amount of tax assessed, may therefore be written as:

$$T = \text{Max} [T_X + \text{Medicare levy} - R, 0]$$

The individual's disposable income, A , is defined as the gross earnings less employee superannuation contributions less income tax payable so that: $A = 0.97X - T$.

In addition, non-superannuation savings may be accumulated each year in a fund (of F_t after t years). Assuming that savings are made, on average, mid year, the gross annual nominal rate of interest earned on savings is r , and that the effective tax rate on interest income is 25%: this is a simplifying assumption in view of the wide range of investment opportunities available. If S is the amount of non-superannuation savings made in the year, the value of F_t at the end of year t is:

$$F_t = F_{t-1} + 0.75r(F_{t-1} + 0.5S) + S$$

B.2 Taxation in retirement

Taxation in retirement includes a number of components including a tax on any lump sum benefit, tax on any superannuation pension or annuity and other income tax. The lump sum tax, T_L , is calculated as follows, with a threshold of \$77,796 (as applied in the 1993-94 tax year). First, if there is no 'excessive benefit' define L_T as the taxable post-1983 lump sum benefit excluding the sum of employee (undeducted) contributions. Then, if $L_T \leq 77,796$ then $T_L = 0$, but if $L_T > 77,796$, then $T_L = 0.164(L_T - 77,796)$.

The taxable benefit is considered excessive when it exceeds \$400,000 (if more than half the fund is taken as a lump sum) or \$800,000 in other circumstances. If there is an excessive benefit, then:

$$T_L = 0.164\{L_T(1 - E) - 77,796\} + 0.484L_T E$$

where E is the proportion of the superannuation benefit that qualifies as 'excessive'.

Part of the income arising from purchased annuities is subject to normal personal income taxation and the Medicare levy. The taxable component for annuities purchased by after tax capital (either savings or from after tax lump sum benefits) is the annual income, less the purchase price divided by 14.6. The deduction represents a spreading of the capital cost over the expected term of the annuity, in this case, a life expectancy of 14.6 years for a male aged 65.

Finally, there exists a special income tax rebate relating to superannuation annuities which is designed to compensate for the 15% contributions tax levied during the accumulation period of the fund. This rebate is 15% of the non-excessive proportion of the taxable annuity purchased by the superannuation taxable benefit.

B.3 Eligibility for the age pension

The amount of age pension awarded is subject to independent means-tests of income and assets. For the individuals considered in this study (single homeowners) the full rate of pension in 1994 was \$8,115 per annum.

The full rate of pension may be reduced depending on the income of the retiree. The income which is subject to the means-test includes all taxable income from sources other than the age pension, but excludes the repayment of capital amounts in any annuity. If Y is the level of income subject to the income test, the reduction in the age pension, R_P , is:

$$R_P = 0 \text{ for } Y \leq 2,236$$

$$R_P = 0.5(Y - 2,236) \text{ for } 2,236 \leq Y \leq 18,466$$

$$R_P = 8,115 \text{ for } Y > 18,466$$

The pension payable also depends on the asset test limitations. For individuals in this study, the reduction in the pension arising from the asset test, R_a , is:

$$R_a = 0 \text{ for assets } \leq \$112,750$$

$$R_a = 0.078(\text{assets} - 112,750) \text{ for } \$112,750 \leq \text{assets} \leq \$216,788$$

$$R_a = 8,115 \text{ for assets } \geq \$216,788$$

The actual age pension paid is the lesser one resulting from the independent application of the income test and the assets test.

A tax rebate, P_r , may also be received by some age pensioners. Where Y_t represents taxable income, this is calculated as:

$$P_r = 972 \text{ if } Y_t \leq \$10,260$$

$$P_r = 972 - 0.125(Y_t - 10,260) \text{ if } \$10,260 \leq Y_t \leq \$18,036$$

$$P_r = 0 \text{ if } Y_t > \$18,036$$

If a pension rebate is payable, the tax payer is also exempt from the Medicare levy.

References

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