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THE COST AND EQUITY IMPLICATIONS OF THE INSTITUTE OF ACTUARIES OF AUSTRALIA PROPOSED RETIREMENT INCOMES STRATEGY

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THE COST AND EQUITY IMPLICATIONS OF THE INSTITUTE OF ACTUARIES OF AUSTRALIA PROPOSED RETIREMENT INCOMES STRATEGY *

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1 INTRODUCTION

The issue of providing an adequate and secure level of retirement income has been subject to a significant debate during the last decade. In particular, there have been changes within the Australian context including the introduction of Award superannuation and then the Superannuation Guarantee Charge, changes to the taxation of superannuation, a series of maximum benefits systems, and tighter means-testing for the age pension. Further recommendations for change have been made by FitzGerald (1993).

There is no doubt that the rate of change has been significant and a period of relative stability is desirable to engender community confidence in the system. Yet, further changes are inevitable as the Government and the community address the perceived challenges; these, as outlined in Dawkins (1992), include the need for a long term perspective, the ageing of the population, the inadequacy of voluntary provision, the issue of equity and the need for national savings.

It was within this context of continuing debate that The Institute of Actuaries of Australia (IAA) submitted to the Senate Select Committee on Superannuation in March 1994 a proposed retirement incomes strategy for Australia. The approach adopted by the IAA was to specify nine guiding principles which a retirement income policy should satisfy. These include comprehensiveness, an income orientation, long term stability, sustainable costs, flexibility, the encouragement of advance funding and ease of understanding. The proposed structure was designed to satisfy the basic requirements and it is in this context that the IAA describes its scheme as rational. The IAA judged that the current scheme does not meet all of these objectives. It is of course possible that the current scheme meets an alternative set of objectives held by the government.

The IAA strategy involves a three-tiered structure for benefits, involving a modified form of the age pension, the Superannuation Guarantee Charge and voluntary superannuation saving. The major features are as follows:

(i) a taxable universal age pension with the age of commencement (and hence the level) chosen by the individual;
(ii) a continuation of the Superannuation Guarantee Charge but with the employer contributions rising to 6%, rather than 9% of earnings, as in the current government strategy; and

(iii) a tax system which provides rebates for individual contributions and taxes on benefits that encourage the use of income streams during retirement rather than lump sums.

More details of the IAA proposal are given in Appendix 1. The strategy aimed to establish a structure which can be maintained over a long period of time but which includes sufficient flexibility to accommodate both long term and short terms objectives such as cost, national savings and social policy. The Institute stressed that its proposals were primarily concerned with the development of a strategy that was consistent with the nine stated principles and contained sufficient variables (such as retirement age, tax rates, contribution levels) that could be adjusted over time to accommodate changes in circumstances. In terms of quantitative comparisons, the submission restricted itself to showing that the net retirement income received by most individuals under both the present policy and the IAA's strategy are similar. It provided no comparisons in terms of long term Government revenue or measures of equity. The objective of this paper is to provide estimates of the implications of the proposal in these two important areas.

Section 2 examines the implications of the proposal for Government expenditure. It compares projected costs of the IAA scheme with the current strategy, using the National Mutual/Treasury model, referred to as the RIP model. Section 3 compares the proposed strategy and the current system in terms of lifetime inequality and progressivity measures. Finally, Section 4 summarises the findings and draws some conclusions.

2 LONG TERM COST IMPLICATIONS

The impact of the proposed retirement income strategy on long term Government expenditure is examined in this section using a projection model of the population incorporating the age pension and superannuation parameters. The model was developed by National Mutual and has been amended by the Treasury Retirement Income Modelling Task Force. A brief summary of the model is given in Appendix 2.

Before examining an alternative to the current retirement income policy, it is necessary to establish the implications of the current system. Alternative proposals can then be compared with the current system by undertaking some sensitivity analysis. Any long term modelling also requires a number of assumptions relating to inflation, earning rates and salary growth and these are also set out in Appendix 2, together with the projected population. Projections of 70 years are used to determine the total impact on Government revenue of the costs of the age pension, costs of the tax deductions for superannuation contributions, the taxes paid by funds on contributions and investment earnings, the taxes paid on sperannuation benefits, the costs of unfunded superannuation benefits and the taxes paid on these benefits.

The results of the projections for various retirement income strategies can be displayed in graphical form showing the annual cost to the Government in 1994 dollars (that is discounting for inflation). Figure 1 shows the annual costs (in $ millions) for both the current system and the IAA's proposed structure. It shows that:

(i) the cost to the Government rises significantly in real terms during the next four decades under both systems, although the cost expressed as a percentage of GDP would rise more slowly.

(ii) the IAA proposal is less costly until 2034 but is more expensive thereafter. The first result is due largely to the fact that the IAA proposal assumes a female pension age of 65, so that costs are lower. However, the eventual maturing of the compulsory Superannuation Guarantee Charge implies that future age pension outlays are reduced in later years in the current scheme due to the means-tests applying to the age pension.

Figure 2 allows for an increase in the female retirement age to age 65 in the current scheme. This has been proposed by the Government and, as expected, it reduces the costs.

Assuming a common retirement age of 65 for both systems implies that the costs are very similar for the next 30 years.

As mentioned earlier, long term economic assumptions are very critical in this form of modelling. Figures 1 and 2 assume annual gross investment earnings of superannuation funds equal to 5% in excess of inflation. This may be considered to be optimistic and Figure 3 shows the results assuming annual gross real investment earnings of 4%. This assumption reduces the accumulated value of superannuation benefits available on retirement and therefore increases the age pension costs under the current means-tested system. Under this assumption, the IAA proposal is less expensive until 2050.

Another very important assumption is the extent to which superannuation benefits are taken as lump sums and immediately consumed, that is, not invested in income bearing assets, at retirement. In an environment where employees are entitled to receive much larger superannuation benefits due to the maturing of the SGC system, it may be reasonable to assume that a higher lump sum amount is used at retirement to pay off debts or consumed. Figure 4 assumes that for each individual $120,000, as compared to the value of $60,000 used in the previous estimates, is taken as a lump sum and consumed. Due to the higher tax rates on lump sum benefits under the IAA strategy, the IAA proposal results in lower Government costs until after 2050 under this alternative.

These graphs indicate only the first-order effects on the change in costs due to the change in structure or assumptions. However, if the IAA structure encouraged additional saving outside the superannuation area, due to the absence of the means-tests, or higher employment, due to the lower SGC charges for employers or more incentive for individuals to remain in the labour force, there may be other positive effects on Government revenue.

The major conclusion that can be drawn from this long term modelling of Government costs is that the cost to Government revenue of the IAA proposal is very similar to the current Government strategy for at least the next 30 years. Reasonable variations in some of the long term assumptions can be made to vary the results so that either alternative may be seen to be preferable. That is, it is unclear whether either system has a definite long term advantage when viewed from the perspective of Government costs. Of course, it should also be recognised that long term economic parameters fluctuate considerably and rarely remain stable for several decades.

In addition, it should be noted that the proposed IAA structure permits changes to a number of parameters (for example, the entitlement pension age) without affecting the overall structure. These changes may be implemented in 30 or 40 years time to reduce the net cost to Government revenue, irrespective of the actual structure. However such changes are unlikely to be politically acceptable unless there is confidence in the total system and an expectation of fairness between individuals and generations. It is therefore necessary to examine the strategy proposed by the IAA using some standard measures of lifetime inequality.

Figure 1. : The standard comparison

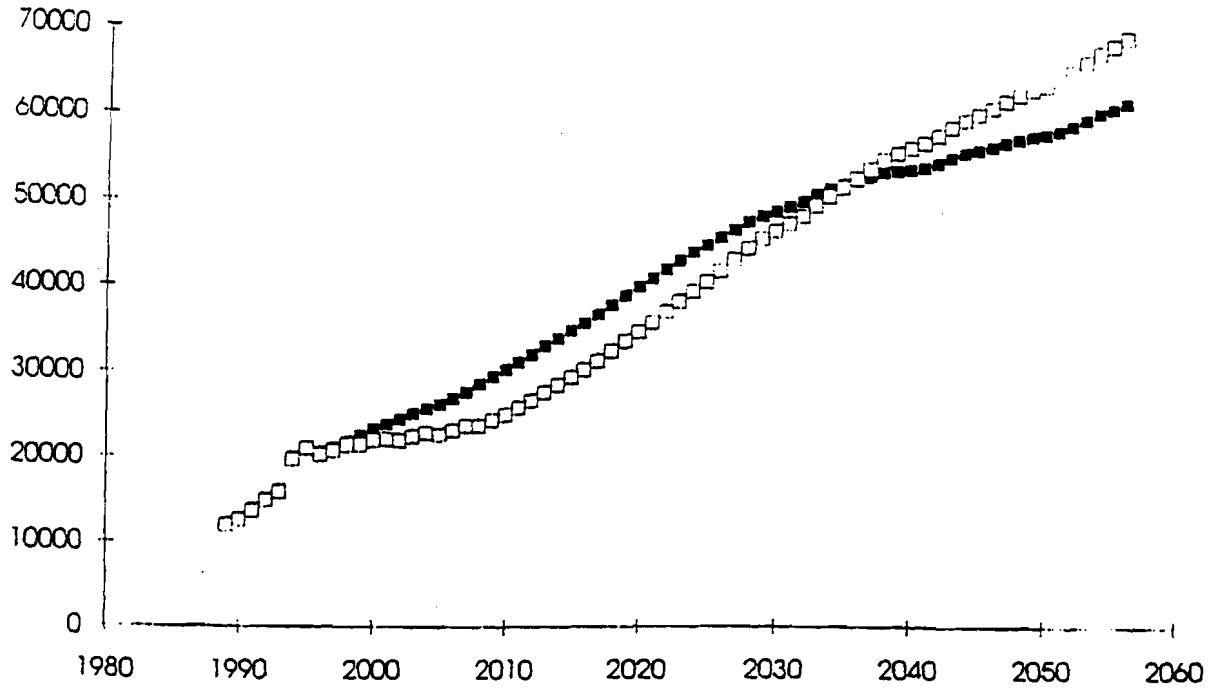


Figure 2. : Assuming a female age of 65 for both

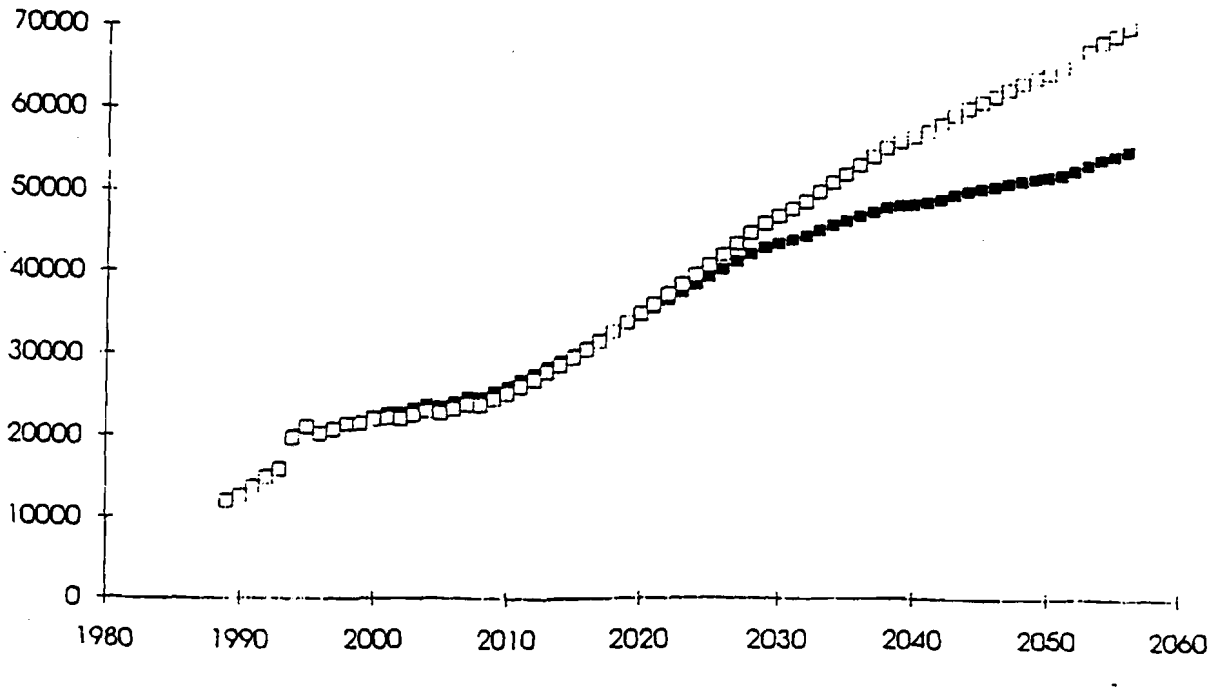


Figure 3. : Decreasing the annual gross real investment earnings from 5% to 4%

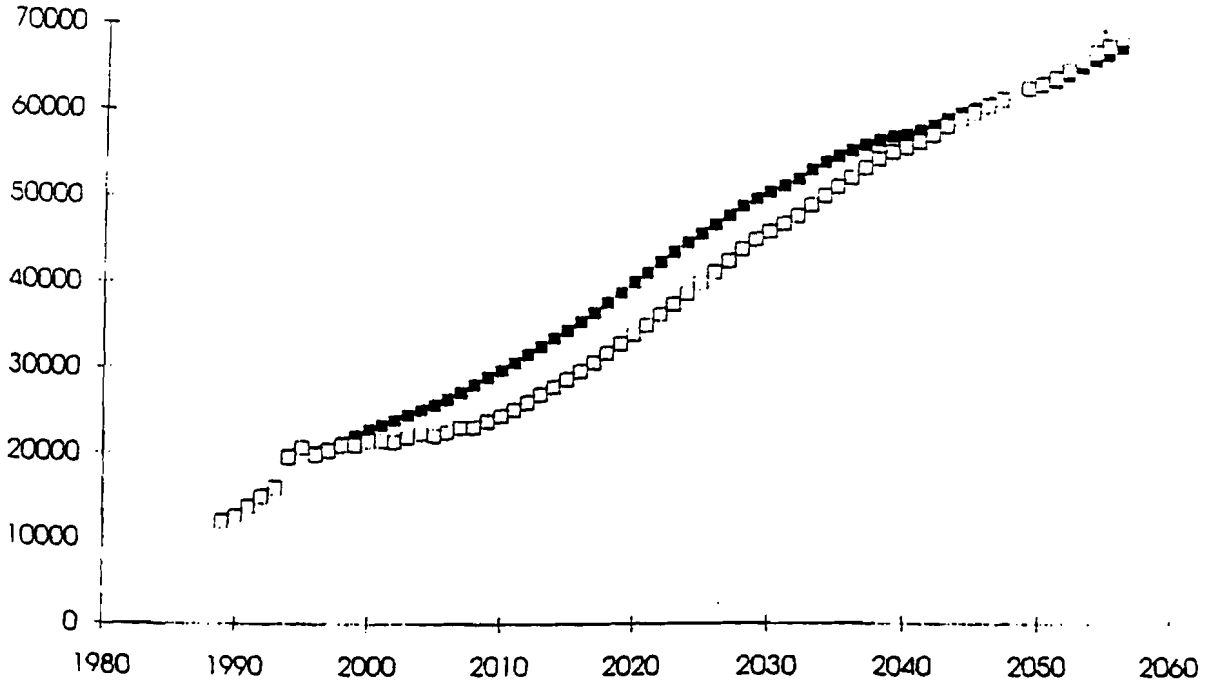
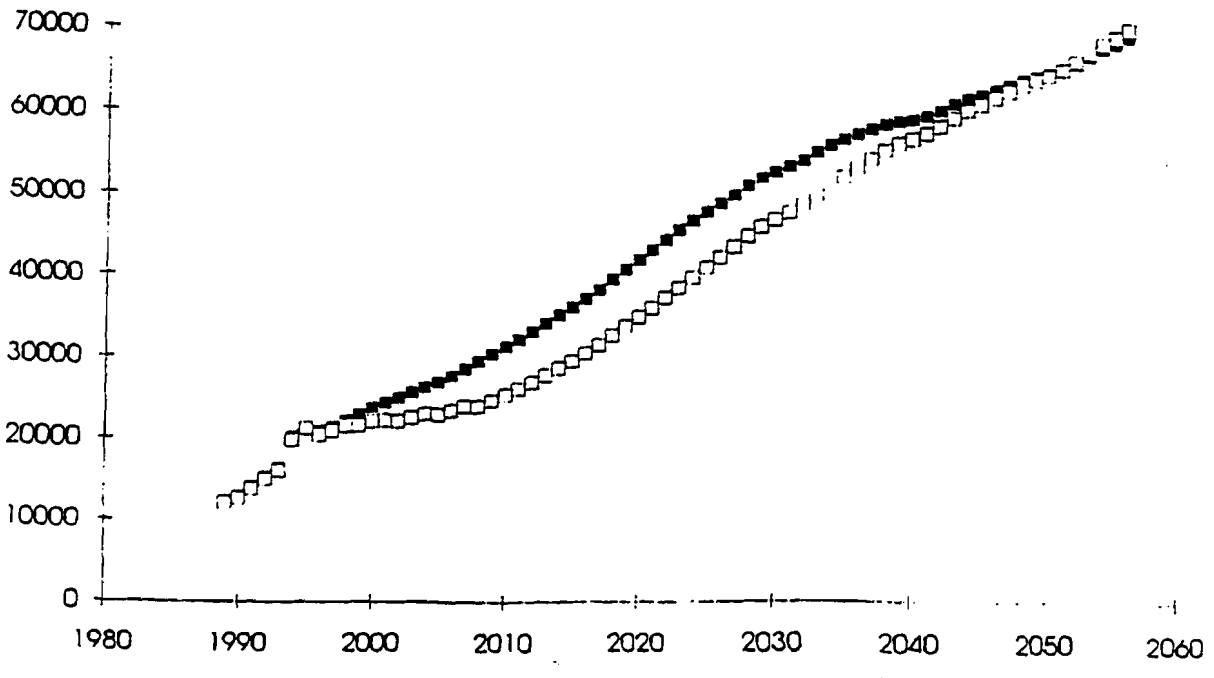


Figure 4. : Increasing the lump sum dissipation from $60,000 to $120,000



3. LIFETIME INEQUALITY AND PROGRESSIVITY

The previous section concentrated on the aggregate implications for government expenditure over time, under alternative assumptions about the present scheme and the IAA's alternative strategy. The present section takes an entirely different perspective and concentrates on the experience of a single cohort of individuals. The individuals are male employees who are assumed to enter the labour force in 1994 and who all retire at age 65 in the year 2039. The reported simulations are based on the simulation model LITES, described in detail in Atkinson, Creedy and Knox (1994).

The earnings experience of a large population of males is simulated using a stochastic model which has been estimated using Australian earnings data. The alternative tax and superannuation schemes are then applied to each individual, for specified assumptions concerning decisions made at retirement. It is therefore possible to calculate the present value of each person's gross (pre-tax) income and net income over life, where the latter allows for all taxes, rebates and the age pension. Measures of inequality and progressivity are based on comparisons of the two distributions of gross and net 'lifetime' income. Further information about the simulation model is given in Appendix 3.

It is argued that this type of cohort simulation modelling is preferred to a much simpler approach in which the implications for retirement incomes are examined for alternative constant streams of earnings. A larger scale simulation model is able to introduce much more realistic assumptions and can be used to produce a wide range of summary statistics concerning inequality and other measures whose properties have been well established.

The measures used

Studies of the redistributive impact of taxes and transfers (such as the age pension) over the life cycle can be analysed using a number of income concepts and measures of inequality and progressivity. Creedy (1994) showed that there is a substantial amount of agreement in the direction of change, as a result of tax policy changes, of a number of commonly used inequality and progressivity measures for various alternative measures of 'lifetime income'. Hence, the present study compares the progressivity of the current Government strategy and the IAA proposal using the following measures based on present values:

(i) The Kakwani progressivity index

(ii) The Gini measure of inequality of net income
(iii) The Welfare premium from progression
(iv) The Atkinson-Plotnick measure of horizontal inequity

Suppose that x_i is a measure of individual i's pre-tax income, and this is transformed into post-tax and transfer income, y_i, where both are defined in present value terms. Individuals can be ranked in ascending order so that $x_1 < x_2 <...< x_N$. The well known Gini measure of inequality, G_x, is usually defined in terms of pairwise comparisons or areas in a Lorenz diagram, but it can usefully be expressed in terms of the following covariance:

$$G_x = \left(2/\bar{x}\right)\mathrm{Cov}\,(x, F(x)) \qquad (1)$$

Where F(x) is the distribution function, with $F(x_i) = i/N$ and $\bar{x}$ is the arithmetic mean. On the use of covariances to express other inequality and progressivity measures, see Jenkins (1988). Pre-tax income x is transformed to y using the superannuation, pension and tax system and the overall effect can be summarised using $y = x - t(x)$. The term t(x) is thus an overall effective tax function. The corresponding measure, G_y, may be obtained in the same way, after re-ranking individuals according to y. If, however, the ranking by x is maintained, an alternative measure of the distribution of net income, the concentration index, C_y, is given by:

$$C_y = \left(2/\bar{y}\right)\mathrm{Cov}(y, F(x)) \qquad (2)$$

A similar concentration index, C_t, of tax paid, t(x), may be obtained in the same way by substituting $\bar{t}$ for $\bar{y}$ and t(x) for y in (2). Kakwani's index of disproportionality in tax payments, K, is defined as the difference between the tax concentration index and the Gini measure of x:

$$K = C_t - G_x \qquad (3)$$

Both measures are defined according to the ranking of individuals by pre-tax income. The Atkinson-Plotnick index, P, measures the extent of horizontal inequity in terms of the amount of re-ranking caused by the tax and transfer system. If two individuals have the same (present value of) lifetime income, the requirement of horizontal inequity would imply that they also have the same net income. Therefore, the re-ranking of individuals when moving from the distribution of x to that of y measures horizontal inequity. Hence P can be defined as:

$$P = \frac{G_y - C_y}{2\,G_y} \qquad (4)$$

Since C_y involves ranking by x and G_y involves ranking by y, but are otherwise the same, as seen from (1) and (2), an absence of re-ranking implies that $P = 0$.

Let the aggregate tax rate, g be defined as the total present value of tax revenue divided by the present value of gross income over all individuals. An important relationship between the various measures defined above is as follows:

$$G_X - G_y = K\{g/(1-g)\} - 2G_y P \qquad (5)$$

This shows that the redistributive effect of the tax and transfer system, $G_X - G_y$, is proportional to its progressivity, K, less a term that depends on the extent of horizontal inequity. For further discussion see Lambert (1993).

Equation (5) shows that if there is no re-ranking, the reduction in the Gini coefficient arising from the tax and transfer system is proportional to the Kakwani measure of disproportionality of tax payments. However, a change in the tax system or superannuation structure which, for example, increases the disproportionality of tax payments need not necessarily reduce the Gini inequality of net income further, because the net effect depends on what happens to the aggregate tax rate.

It is also of interest to relate the changes in inequality to a measure of social welfare, in view of the fact that a specific welfare rationale is available for the Gini measure of inequality; see Lambert (1993). It is convenient to use the associated abbreviated social welfare function defined in terms of only arithmetic mean income and inequality. Abbreviated social welfare from the pre-tax distribution is expressed as:

$$W = \bar{x}\,(1 - G_X) \qquad (6)$$

Hence both equality, measured by 1 - G, and total income, reflected in $\bar{x}$, contribute positively to social welfare and the trade-off between these two objectives is made explicit in (6). The percentage increase in $\bar{x}$ that would compensate for a 1% increase in inequality is given by G/(1 - G), so that if G = 0.2 an increase in $\bar{x}$ of 0.25% would be required. This type of comparison is useful in evaluating changes in measured inequality.

Social welfare for a proportional tax system which raises the same net revenue as the actual tax system, W_p, is given by:

$$W_p = (1 - g)\,\bar{x}\,(1 - G_x) \qquad (7)$$

The social welfare from the progressive tax, W_y, is, since $\bar{y} = (1 - g)\,\bar{x}$, given by :

$$W_y = (1 - g)\,\bar{x}\,(1 - G_y) \qquad (8)$$

Hence the welfare 'premium', Π, from progressive tax is given by:

$$\Pi = W_y - W_p$$

$$= (1 - g)\,\bar{x}\,(G_x - G_y) \qquad (9)$$

This measures the increase in social welfare resulting from a progressive tax which raises the same revenue as a proportional tax. This approach assumes that the pre-tax distribution, x, is not affected by the tax system. This assumption is made by the simulation models used in this paper.

Simulation results

Table 1 shows the above measures for both the current Government strategy and the IAA proposals for a simulated population of 3000 males under five different retirement choices, assuming that all individuals live for the same length of time (79 years) and that there are no savings in addition to those involved in the Superannuation Guarantee Charge. The other assumptions used for this simulation model are outlined in Appendix 4.

For both the current scheme and the IAA's proposal it was found that there is a negligible amount of horizontal inequity caused by a re-ranking of individuals via the tax and transfer system (when individuals are ranked in terms of their present value of income before and after all taxes and transfers). This means that in considering the redistributive and other effects of the two schemes, the term involving P in equation (5) can be ignored.

Consider first the case where all individuals use their superannuation savings to purchase an annuity; this is the option which the IAA wishes to encourage. In fact the stimulus for

individuals to take this option, compared with the others examined, is clearly demonstrated by the aggregate tax ratio shown in the last two columns of Table 1. The increase in the tax ratio (resulting from a move from the current scheme to the IAA scheme) is much lower when this option is chosen, and is greatest when all individuals consume their savings at retirement and subsequently rely on the age pension for their income. When individuals take the first option, it is seen that the measure of progressivity increases and the inequality of net lifetime income falls; the increase in K is reinforced by the increase in g/(1 - g) to produce an unequivocal increase in the redistributive effect of taxes and transfers. Furthermore, the greater redistributive effect of the IAA scheme with this option dominates the fall in (1 - g) so that the welfare premium from the progressive tax and transfer system (compared with a proportional tax system which raises the same net revenue) also increases. This is the only case in Table 1 where the welfare premium increases when moving to the IAA scheme.

In the situation where all savings are spent in retirement, the reduction in the progressivity of the system is dominated by the increase in the tax ratio, so that the redistributive effect of the tax system is seen to increase, reflected in the fall in G_y when moving from the current to the IAA scheme. However, the substantial increase in the tax ratio also implies, despite the redistributive effect, a fall in the welfare premium. In all other cases the fall in progressivity dominates the increase in the aggregate tax rate so that the redistributive effect falls, leading unequivocably to a fall in the welfare premium.

Table 1: Comparative equity measures with uniform mortality

Retirement option	Kakwani progressivity		Gini measure of inequality (net income)		Welfare premium (Gini based)		Tax Ratio	
	Current	IAA	Current	IAA	Current	IAA	Current	IAA
100% annuity	0.389	0.390	0.2145	0.2122	26.250	26.966	0.1554	0.1592
50% annuity 50% bank	0.429	0.375	0.2108	0.2121	27.775	26.814	0.1492	0.1647
50% annuity 50% spent	0.504	0.391	0.2112	0.2132	28.285	26.676	0.1293	0.1571
100% bank	0.445	0.322	0.2080	0.2091	28.818	26.956	0.1494	0.1928
100% spent	0.556	0.344	0.2127	0.2091	28.146	27.283	0.1166	0.1830

Note : Gini inequality of pre-tax income = 0.2860

Table 1 assumed a uniform expectation of life after retirement of 14 years for all men aged 65 years. However, mortality is linked to socio-economic conditions and it is therefore appropriate to introduce mortality rates that are linked to income. Each individual's age at death is assumed to depend on his annual average real income in relation to the cohort as a whole, with a further stochastic component. The survival curve of the simulated population closely replicates the curve for Australian males; further details are given in Appendix 3. Table 2 shows the corresponding results.

A difference arising from the introduction of differential mortality is that the measure of horizontal inequity is higher. In view of the stochastic element in the determination of the age at death, individuals with the same annual average earnings will receive retirement income streams for different periods so that there are rank-order changes when comparing gross and net incomes. It is not surprising that these are largest when the 100% annuity option is chosen at retirement. However, the horizontal inequity measures are quite low, and the differences between measures depend on the retirement option chosen rather than the superannuation scheme (current or IAA) in operation.

The systematic tendency for the relatively richer individuals to live relatively longer also means that the redistributive effect of the tax and transfer system is substantially reduced when compared with the uniform mortality assumption. All the progressivity measures in Table 2 are lower than the corresponding values in Table 1, while the inequality of net income is higher in every case. Similarly, the additional social welfare which results from the tax and superannuation scheme, compared with a proportional tax system raising the same revenue, is correspondingly lower. The main difference from this point of view is that the welfare premium when the 100% annuity option is assumed is much lower than for all other options in Table 2. However, other comparisons are similar. Thus a shift from the current scheme to the IAA scheme increases progressivity, reduces inequality and raises the welfare premium when the 100% annuity option is used.

Comparisons between Tables 1 and 2 show that differential mortality has a substantial effect on lifetime inequality and progressivity. But in the present context, that of comparing the current with the IAA scheme, the substantive comparative results are very similar. The results show that there is very little to choose between the two schemes from the point of view of the lifetime redistributive impact within a cohort. Larger differences arise from the assumed choice made at retirement.

The simulations have assumed in each case that all individuals follow the same option at retirement. However, in practice the incentives facing individuals with different earnings experience and expectation of life may differ. The production of simulation results where each individual makes an optimal choice at retirement is a topic for future research, and considerably complicates the present model. Some interdependence with the age of retirement may also be expected in practice, but again this is not straightforward.

It should also be recognised that the comparisons between alternative schemes and options shown in Tables 1 and 2 are not revenue-neutral, in that the aggregate effective tax rate faced by the cohort is allowed to differ between alternatives while the various components of the schemes are specified in advance. The imposition of lifetime aggregate revenue neutrality would involve changing at least one of the annual rates or thresholds, combined with the use of iterative search procedures.

Table 2: Comparative equity measures allowing for differential mortality

Retirement option	Kakwani progressivity		Gini measure of inequality (net income)		Welfare premium (Gini based)		Tax Ratio		Horizontal inequity	
	Current	IAA	Current	IAA	Current	IAA	Current	IAA	Current	IAA
100% annuity	0.245	0.261	0.2474	0.2428	14.286	15.880	0.1492	0.1541	.0089	.0088
50% annuity 50% bank	0.325	0.284	0.2318	0.2329	20.056	19.293	0.1478	0.1631	.0047	.0048
50% annuity 50% spent	0.373	0.293	0.2339	0.2347	19.750	18.884	0.1280	0.1549	.0054	.0050
100% bank	0.377	0.275	0.2188	0.2201	24.742	23.036	0.1526	0.1951	.0015	.0017
100% spent	0.458	0.290	0.2255	0.2251	23.175	22.862	0.1185	0.1844	.0021	.0021

Note : Gini inequality of pre-tax income = 0.2860

4. CONCLUSION

The presentation of the IAA retirement income strategy included very limited quantitative analysis and provided no analysis in terms of long term costs or equity. This paper has endeavoured to provide an analysis of two retirement income systems which are very different in their fundamental approaches. The current Government strategy is to increase the role of occupational superannuation and maintain a means-tested age pension. The IAA argued that such a system provides limited incentives to save and distorts the allocation of resources in the post retirement period. As a result it recommended that a universal pension be introduced with a corresponding smaller role for occupational superannuation. In comparing the two systems in terms of costs and equity the major results can be summarised as follows:

(i) It was found that the long term annual costs to Government revenue are similar under the two systems for the next 30 years. Beyond that date, the long term assumptions are critical in determining the relative costs of each system. Alternatively, if a specified level of future Government costs is required, then certain parameters (such as retirement age, level of the universal pension) will need to be adjusted over time to meet these objectives. Under either system, these changes should be announced many years in advance. Costs to Government in the retirement income area comprise both taxation support for superannuation and age pension payments. Hence an increase in cost in one of these areas which is compensated by a reduction in cost in the other does not increase the total cost.

(ii) In terms of recognised lifetime inequality and progressivity measures, it was found that there is not a substantial difference between the two systems. Other issues, such as the benefit choice at retirement and differential mortality, are found to be much more important in determining the lifetime redistributive impact of superannuation. However, in the case where all funds are used at retirement to purchase an annuity, a shift from the current scheme to the IAA strategy involves an increase in progressivity and a reduction in lifetime inequality.

The basic rationale of the current scheme is quite different from that behind the IAA proposals. The use of a means-tested age pension is based on the view that government transfer payments should be targeted directly towards those who are considered to be in most need, thereby saving government expenditure while dealing with the problem of poverty in old age. The current government approach is also paternalistic in that it

assumes that individuals, if left to their own choices, would make insufficient plans for their retirement income. Therefore, it has a substantial compulsory element in the form of the Superannuation Guarantee Charge. This scheme requires part of the current income to be deferred until retirement, but when allowance is made for the substantial shifting of the employer's contributions to employees in the form of lower wages, it is not clear that all employees would prefer such an intertemporal adjustment.

There are inconsistencies in such an approach. For example, the current system provides a strong tax incentive to convert superannuation funds to lump sums which are consumed at retirement. The incentive is further strengthened by the means-testing of the age pension, and the net effect is to increase the number of people who are eligible for the pension. The existence of the means-testing also provides a disincentive to save, and to participate in the labour market. There is thus an inconsistency in discouraging savings with one policy instrument and imposing compulsory savings with another instrument, while at the same time encouraging the consumption of such accumulated savings at retirement rather than the provision of an income stream in the form of an annuity. For further discussion of the saving incentives, see Creedy and Disney (1990).

The argument in favour of means-testing in terms of its 'target efficiency', that is concentrating a given amount of government expenditure on a specific target group, also involves a very narrow criterion. Not only does it ignore the point that the target group itself is likely to be increased simply by the use of means-testing (thereby raising the expenditure required), but it can be argued that tax and transfer schemes should be evaluated in terms of their wider impact on inequality and social welfare. It can be shown that if wider criteria are used, while still satisfying a basic requirement of reducing poverty, the use of universal benefits dominates means-testing; see Creedy (1994a).

The proposed strategy of the IAA recognises the internal contradictions of the current scheme and involves a universal, but taxable, age pension along with the provision of incentives for individuals to use a substantial part of their life cycle savings to purchase an annuity. The incentive to save is thereby enhanced, and the distortion involved in the allocation of accumulated savings at retirement is removed. The preliminary simulations reported here show that the cost and redistributive implications of the alternative superannuation strategies do not appear to differ markedly. Therefore the choice between the two structures should be made on the grounds of the objectives stated and/or the consistency of the proposed structure with these objectives and not the criteria of costs or equity.

Appendix 1: The IAA proposals

The IAA strategy suggested that retirement income should come from the following three sources:

(i) A taxable universal age pension;
(ii) Tax encouraged superannuation within certain limits, comprising:
    a. compulsory, occupation-linked superannuation;
    b. voluntary employer-sponsored superannuation;
    c. voluntary personal superannuation; and
(iii) Other forms of saving.

Features of the proposed universal age pension are:

(i) it would be payable to each person who meets the age and residency requirements;
(ii) the entitlement age would initially be 65 (males) and 60 (females), with the females' age changing from 60 to 65 more quickly than currently proposed by the Government. In future, the entitlement age could be increased given long periods of advance notice;
(iii) the pension would be paid to each individual;
(iv) the pension would be taxable but not means tested;
(v) the pension should be above an accepted poverty level; a value of 25% of AWOTE was used for illustrative purposes;
(vi) the pension level can be increased if individuals choose to increase their entitlement age, with the pension increasing by 3% of AWOTE for each year of deferral, (up to 40% of AWOTE at age 70);
(vii) there would be limited, means tested, supplementary benefits, such as dependent child's allowances.

Features of the proposed superannuation system include:

(i) a capping of the SGC at 6% employer contribution. This is made possible due to the removal of the means tests;
(ii) an encouragement for income streams rather than lump sums, with higher tax payments where more than 25% of the total benefit is taken as a lump sum;
(iii) the system would be open to non-earners, as individuals would be encouraged to contribute for others;
(iv) the maximum benefit that would receive taxation support would be equivalent to a pension of 50% of a person's final salary with a maximum tax supported benefit equal to a pension of twice AWOTE.

The proposed taxation structure for superannuation is:

Contributions

Employers: tax deductible but a 15% tax paid by the fund on receipt

Individuals: a rebate of 16.4% received by the individual *and* no 15% contributions tax.

Investment income

A 15% tax on investment income with imputation and other credits.

Benefits

Pension: taxed as normal income with a 10% rebate for income below the maximum limit. Income above this limit would receive no rebate and be subject to a 10% surtax.

Lump sums: taxed at rates of 0% (up to twice AWOTE), 20% (2-4 times AWOTE), and 35% on the balance. For lump sum benefits that exceed 25% of the total benefit or are above the maximum, these rates are increased by 20%.

Appendix 2. The RIP model

The model aims to estimate the year to year cost to Government of the age pension, superannuation concessions and tax revenue effects. The following description of the model is taken from Gallagher and Preston (1993) .

"The Retirement Incomes Policy Model (RIP) is a model used to estimate stocks and flows of superannuation funds and the impact on savings and costs to the Government's budget of various retirement income policy options. It was developed by National Mutual Operations Research and made available to the Retirement Incomes Modelling Task Force. The Task Force has used the model for policy analysis and has also substantially developed its capability.

The RIP model is based upon *person cohorts* (people of common sex and age) which are aged a year at a time and their superannuation benefits accumulated taking account of parameters such as wage levels, employment rates, inflation and rates of return on assets. At retirement the detailed interaction with the Tax and Social Security systems is accounted for.

The model incorporates three major phases:

(i) a population phase based on ABS data which projects the total Australian population by age and sex for each year in the future, allowing for births, deaths and immigration;

(ii) a superannuation dynamics phase which takes output from the population projection and projects:

- the number of people employed in each year;
- the number of people in each type of superannuation fund modelled (public and private sector, categorised by the type of superannuation contributions concerned); and
- the numbers retired because of death, disability or age retirement for each person cohort for each year of the projection;

(iii) an accounting phase which uses the outputs of the first two phases of the model to keep track of the total superannuation assets of each person cohort, allowing for contributions, earnings, benefits payments and tax. It calculates the relevant cash flows for each person cohort in each year and stores the results. On retirement, the model splits up the accumulated superannuation benefits of each age cohort according to income distribution and calculates the tax payments arising, the age pension payable, and the continuing retirement income stream from superannuation.

Aggregating the results in each year across all the person cohorts allows calculation of total stocks and flows for the Australian population within the model. The model also estimates the tax expenditure on superannuation for each year."

The major economic assumptions used for the figures in Section 2 are:

(i) pre-tax superannuation fund investment earnings: 9% .
(ii) inflation: 4%
(iii) increase in AWE: 5%
(iv) net tax rates on superannuation funds: 15% on employer contributions, 7.5% on investment income.
(v) dissipation at retirement: $60,000

The following table shows the projected population from 1990 to 2057.

		1990	2000	2010	2020	2030	2040	2050	2057
#male	18→59	5113100	5951600	6498700	6834300	7038700	7266900	7473100	7590400
#male	60→64	359300	405000	621000	736700	793400	780100	840300	863000
#male	65→74	553800	623100	810400	1134600	1343600	1440000	1426900	1494400
#male	75→89	266755	403705	505316	671824	939589	1109269	1224076	1253038
#male	90→100	11147	20998	33384	49077	58910	103231	134622	139461
#female	18→59	4965000	5800600	6344300	6638700	6810800	7019700	7211200	7321700
#female	60→64	362100	403700	626200	748100	797100	777100	836700	857200
#female	65→74	642400	675200	853700	1221600	1431900	1517300	1493000	1561100
#female	75→89	434334	605838	705516	884198	1242684	1441555	1565523	1607469
#female	90→100	36766	55160	84486	120702	147916	268644	360475	376630

Appendix 3: The LITES model

The model is designed to calculate the costs 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).

Results are based on calculations made for single income individuals, for each year of life from a given 'entry' age till death in retirement. Calculations made for cohorts representative of a specified income distribution are aggregates of individual results. This enables study of experience of individuals under specified circumstances, and also comparison with and between populations of specified income profiles.

Parameters applying during the working life from the specified age at entry include retirement age, savings behaviour, method of taxation on the interest earned (superannuation types and otherwise), income taxation, superannuation and savings concessionary taxation (as desired), and the method and level of consumption taxation. It is assumed that consumption occurs after all other decisions regarding disbursement of income have been made.

At the date of retirement, options are given to commute superannuation and savings funds either with respect to a desired level of income (in relation to some specified pre-retirement income experience), or in terms of the amount of cash available. Retirement annuities may be purchased from superannuation or savings funds, either before or after any lump sum is taken. Full facility is given for different tax rates to apply to superannuation contributions from various sources, and concessionary or punitive taxation of annuities in payment. After the specified purchase of income, choice is given as to how much of the balance may be invested in a 'cash account', and the balance is spent.

During retirement, account is taken of any age pension and associated rebate which arise, and rebates arising from superannuation contribution tax and undeducted purchase price of annuities. It is assumed that no savings are made in retirement and any amount invested at retirement is consumed until some specified age, accruing interest as defined until then. In the case of death before this age the residual estate is calculated as the balance remaining in the bank account. A figure representing mortality profit is also calculated, being the present value of the cost of the retirement annuities, less the value of payments actually made until death.

Various output files are constructed, which can provide results of the required level of detail. The level of detail available ranges from year by year values of numerous items for individuals in a cohort, to overall totals of a limited number of items and statistics for the cohort. Thus the model enables examination of the relative costs and benefits of superannuation and savings patterns under a considerable variety of conditions, and the relative sensitivity of these to a wide variety of changes in those conditions.

Earnings profiles

A salary stream X(t) is constructed to represent the working life of the individual, using a stochastic model. Earnings in the first year are obtained by taking a random drawing from a lognormal earnings distribution with mean and variance of logarithms of μ_1 and σ_1^2. Mean log-earnings at time t, $\mu(t)$, are a quadratic function of age and are given by

$$\mu(t) = \mu_1 + (\theta + g_r)t - \delta t^2$$

where g_r is the nominal growth rate of earnings. The simulation process used to produce the profile X(t) can allow for various types of process of relative income change. There may be 'regression towards the mean' where the relatively richer people experience, on average, relatively lower percentage increases (when $\beta<1$). Furthermore, there may be dependence on the past, where each individual's relative change depends on previous changes (depending on the paramater ρ). The process is described by the following equations:

$$X(t) = \left\{\frac{X(t-1)}{m(t-1)}\right\}^{\beta} \exp\{\mu(t) + u(t)\}$$

$$u(t) = \rho u(t-1) + e(t)$$

where e(t) is a random normal variable with mean 0 and variance σ_u^2, $m(t) = e^{\mu(t)}$. The parameters of the model can be estimated using income distribution data.

Age at Death

The number of years the individual survives after retirement, DIE, is obtained using the following formula:

$$DIE = AVD + B \log\frac{\overline{X}}{RM} + v$$

where $\overline{X}$ is the individual's annual average real earnings, RM is the geometric mean value of the $\overline{X}$s, AVD is the average number of years individuals in the general population survive after retirement, and v is random normal variable with mean 0 and variance SUU.

Appendix 4: Assumptions used for simulations

Results are obtained using LITES for the current system of superannuation and taxation by comparison with the proposals put forward by the Institute of Actuaries for Australia. The systems compare as shown in the following table:

Table 4.1

Item	Current Structure	IAA proposals
Contribution rates	Empoyer 9% Employee 3%	Employer 6% Employee 3%
Contribution tax	15% on all deductible contributions	15% on Employer contributions
Employee contribution rebate	10% of employee contributions, income tested subject to age related maxima on total contributions	16.4% of employee contributions are refundable, subject to the same age related maxima
Lump Sum Tax	Undeducted contributions not subject to Lump Sum tax. 16.4% on amounts in excess of 77796. Excessive* amounts taxed at 48.4%	Tiered tax rates of 0%, 20%, 35%, on approved** Lump Sum, additional 20% tax on Lump Sum in excess of approved.
Surtax	None	Applies to any annuity purchased in excess of approved level**. 10% of cost of unapproved amount payable at retirement.
Age pension	Payable subject to income and asset tests. Attracting pension rebate.	Universal pension. No rebate.
Annuity in payment	UPP not taxable. Excessive proportion* taxed at 48.4%	Tax refund of 10% of approved annuity**

Notes:
*The Excessive proportion of Lump Sum is that proportion in excess of a maximum benefit level $400,000. If less than 50% of the super fund is taken as a lump sum, the maximum benefit level is $800,000.
**Approved Retirement benefits: Lump Sum not more than 25% /75% of cost of approved annuity,
where: Annuity level falls within limits relating to final average salary (best 3 consecutive years in last 10)
where Final average salary has minimum value of 50% AWE and maximum of 4xAWE
and Approved annuity is not more than 50% of the final average salary.
AWE is average weekly earnings.

The options at retirement which are examined are described in Table 4.2.

Table 4.2 Retirement Options

Options at retirement	No savings	Savings 5% of disposable income
(i)	All super devoted to annuity	All super and savings to annuity
(ii)	50% super to annuity Balance of cash to bank	50% super to annuity Balance of cash to bank
(iii)	50% super to annuity Balance of cash to consumption	50% super to annuity Balance of cash to consumption
(iv)	All super to lump sum All funds to bank	All super to lump sum All funds to bank
(v)	All super to lump sum All funds to consumption	All super to lump sum All funds to consumption

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