SAVING FOR RETIREMENT: THE BENEFITS OF SUPERANNUATION FOR INDIVIDUALS AND THE NATION

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This paper analyses the effects of retirement income policies on individuals (and couples) and on national savings and Commonwealth tax expenditures using the current computer models of the Retirement Income Modelling Task Force.

The analysis of individuals (and couples) at differing income levels and work histories shows the increase in disposable income in retirement as a percentage of age pension and in comparison to pre-retirement disposable income. The associated savings gains and offsets, net policy gains and accruing tax expenditures are presented and explained using seven hypothetical cases. The income maintenance approach to retirement incomes is contrasted to the poverty alleviation approach.

The paper demonstrates how the tax expenditure estimate for superannuation is not appropriate for long term analysis. New data on the distribution of non-superannuation assets are used in an analysis of the likely level of household savings if compulsory superannuation were paid as wages.

An aggregate projection model is used to examine the possible impact of superannuation policy on national saving out until 2056 and how this is sensitive to plausible alternative non-superannuation savings patterns and other assumptions. The impact of the SGC policy and its possible extensions on total age pension outlays and, total tax expenditures, is explored.

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The Task Force is equally financed by the Departments of Treasury, Finance and Social Security from the reallocation of existing resources.

The views expressed in this paper are those of the authors and do not necessarily reflect the views of the Departments financing RIM or of their Ministers or advisers.

INTRODUCTION

The philosophical foundations for the Commonwealth Government's current approach to retirement income policy were set out in the 1989 Statement by the Honourable Brian Howe, (then) Minister for Social Security entitled ***Better Incomes: Retirement Income Policy into the next Century***. The foreword gives the following rationale for the Government's policy:

> *" . . .At the beginning of the next century the "baby boom" generation will begin retiring if current early retirement patterns persist. From 2011 the demand for age pensions will increase rapidly.*
>
> *It will be possible to meet the needs of an ageing population better by increasing the level of saving and by expanding labour market opportunities. However, future generations will probably expect higher levels of income and services. Consequently,* ***a flexible and sustainable retirement income policy which delivers fair and adequate incomes needs to build on the twin pillars of the age pension system and private saving such as superannuation.***
>
> *The policy framework detailed in this statement recognises the very close links between retirement income policy, as a key element of the Government's social Justice Strategy, and macroeconomic and microeconomic reforms. Increased saving for retirement not only improves retirement income adequacy but also improves investment and future economic growth and hence our capacity to finance retirement income outlays. Changes to superannuation will also assist labour market reform by promoting greater mobility and flexibility in working patterns. Award restructuring will also improve women's labour market opportunities and, together with improved access to superannuation, will enhance their capacity to save for retirement.*
>
> *The issues confronting our retirement income system are well known and the solutions are generally agreed even though there may be some differences about details.*
>
> *It is critical that we as a community implement the goals of this retirement income policy.* ***The goals need to be translated into action over the next decade to ensure that future retirees, as well as those who are already retired, have better and more adequate income in retirement.***"

The themes of adequacy, coverage and savings were also stressed by the Treasurer, the Honourable John Dawkins in his June 1992 Statement on ***Security in Retirement: Planning for Tomorrow Today***. His foreword states:

> *". . .This package reflects the importance with which the Government views long term financial security and stability in retirement. It streamlines the rules for superannuation. It makes it easier to understand, much fairer for low income earners, and more certain in its effects.*
>
> *Over the long term, our measures will also generate a larger pool of investible funds - Australian funds for investing in Australia. It will diminish our need for foreign borrowings and enhance Australia's capacity to develop industry and create employment."*

The *Security in Retirement* statement added a major support for the second pillar of retirement income policy - compulsory superannuation in private funds enforced through the Superannuation Guarantee Charge. The SGC schedule of minimum contributions from employers is set as shown below.

Period	Employer's Payroll $1m or less	Common Rate	Employer's payroll Over $1m
1/7/92 - 31/2/92	3%		4%
1/1/93 - 30/6/93	3%		5%
1993-94	3%		5%
1994-95	4%		5%
1995-96	5%		6%
1996-97		6%	
1997-98		6%	
1998-99		7%	
1999-2000		7%	
2000-01		8%	
2001-02		8%	
2002-03		9%	

The Statement also said that "*The Government also envisages a taxation trade-off to allow for a universal employee contribution of 3% later in the SGC implementation period."* (p3) The SGC both would raise retirement incomes and would also give low income earners greater access to concessionally taxed savings. The complex Reasonable Benefits System which had been based on final average salaries was also simplified to flat lump sum limits of $400,000 and $800,000 in total. Combined with the highly progressive age pension, the Treasurer concluded that "*Taken as a whole, the Government's retirement income policy is progressive."*

The Government has established the Retirement Income Modelling Task Force to analyse the long term effects of retirement income policy on individuals and the economy. The Task Force's Terms of Reference are at Appendix A. This paper analyses new evidence from the existing models of the Task Force on the adequacy, intragenerational equity, and effects on national saving of the Government's retirement income policy.

The results on national saving were published on 29 June 1993 in the FitzGerald Report on **National Saving**. Dr FitzGerald has stressed the importance of the Government's retirement income strategy as a major component in recovery of Australia's saving and investment performance.

Measuring the Benefits and Costs of the SGC Policy for Individuals

Cost-benefit analysis provides an appropriate methodology for assessing Government investment projects which occur at different points in time (see Department of Finance 1991). The methodology requires the quantification of costs and benefits in dollar terms and their conversion to net present values using an appropriate discount rate. As part of the RIM project, Colin Brown (1993) has devised a methodology for doing this for retirement income policy using the INDMOD computer model to give appropriate estimates for individuals, and the National Mutual Retirement Income Policy Model (RIP) to obtain aggregate results.

The Government's statements on the goals of retirement income policy show that it has decided that an income maintenance approach is more appropriate in the longer term than a policy which aims only at poverty alleviation. That is, the Government has decided that the appropriate goal of retirement income policy is to improve the replacement percentage that disposable retirement incomes are of pre-retirement disposable incomes. This policy operates in concert with an underlying objective of maintenance and improvements to the age pension which will prevent poverty in retirement. This suggests that the best way to measure the **benefits** of retirement income policy is by the improvement in disposable retirement incomes as a percentage of pre-retirement disposable incomes.

The costs of the Government's retirement income policy are the costs of its tax concessions and of its age pension outlays (both Age Pension and Service Pension). The most often used estimate of the costs of the Government's retirement income tax concessions, that in the **Tax Expenditures Statement** (TES) (Treasury, 1992), is not appropriate for assessing the **long term** costs of tax concessions for three main reasons (see Brown 1993 for a full analysis, Brown notes that it is still appropriate for short term costs):

- The TES estimate follows international practice in estimating revenue forgone as though each year is the first year of the policy, rather than differences in the net present values of accruing costs. In particular, the accrual of counterfactual savings diverges sharply from their first year relativity with superannuation because the higher taxation of interest leads to lower accumulations of counterfactual savings and therefore to lower estimates of tax on interest forgone.

- The TES estimate assumes that all superannuation saving would otherwise have been received, in the absence of superannuation saving, as wages and that all of the increase in disposable income would be saved and taxed at marginal rates. The fact is that all available evidence suggests that increases in disposable income are largely spent rather than saved. FitzGerald and Harper (p28, 1991) argue that **more** than half of SGC compulsory savings would be net additions to savings. Conversely, they believe that **less than 50% of any increase in disposable income would be saved in a fully taxed form**, and hence have used a conservative saving offset factor of 0.5 in their analysis. Most RIM analysis also uses this 50% saving offset rather than the 100% saving offset assumed in TES. However, our analysis of financial assets presented in the next section appears to confirm Fitzgerald and Harper's hypothesis that the saving offset factor (on our converse definition) is less than 50%. **The practical importance of this 50% saving offset assumption is that compulsorily preserved superannuation will be modelled as adding to the stock of private savings as well as changing its form when compared to the counterfactual policy scenario of wage rises and investment of 50% of the resulting increase in take home pay in ordinary savings accounts.**

- The TES estimate treats the superannuation fund earnings taxation rate at its nominal rate of 15%. INDMOD and RIP assume an effective tax rate on fund earnings of 7% which allows for the effects of dividend imputation and the taxation of only real, realised capital gains.

Correcting for these deficiencies in the TES estimates of tax concessions leads to the following **measure of the annual costs to Government of retirement income policy**:

1. Tax on non-concessionally taxed superannuation contributions and earnings in the year
2. *less* Tax on concessionally taxed superannuation contributions and earnings in the year
3. *plus* Tax on retirement income in the year with non-concessionally taxed accumulation
4. *less* Tax on retirement income in the year with concessionally taxed accumulation
5. *plus* The age pension payable in the year with a concessionally taxed accumulation
6. *less* The age pension payable in the year with a non-concessionally taxed accumulation

Projected Outcomes for Individuals

Table 1 presents the benefits to a single male and costs to government of the SGC policy under seven scenarios designed to show sensitivity to key long term policy assumptions in the modelling. These **scenarios** are:

A. Current legislated schedule of minimum employer contributions for the SGC for a male who is 25 in 1992 and who retires at 65, investing all superannuation benefits in a rollover annuity. The estimates are based on an age pension indexed to AWE, CPI growth at 4% pa, AWE growth at 5.5% pa, and a 50% saving of counterfactual increases in disposable income. The Government bond rate used as the discount factor is set at 8%. The fund earning rate is set equal to the bond rate. Brown (1993) discusses the sensitivity of this analysis to the bond rate. Administrative charges are set to $1.70 per week.

B. Employee co-contributions to superannuation in addition to employer contributions (this hypothetical policy is one way for the Treasurer's envisaged long-term policy to be implemented). Employee contributions are set at 1% of gross income in 1998-99 rising to 3% in 2000-01. Otherwise as for Scenario A.

C. 30% savings of counterfactual increase in disposable income. Otherwise as for Scenario B.

D. All benefits taken as a lump sum and invested at simple interest, rather than being rolled over into an annuity. Otherwise as for B.

E. All benefits taken as a lump sum of which 50% is dissipated. Otherwise as for Scenario B.

F. Age Pension indexed to CPI rather than AWE giving real age pension levels which are substantially lower after 40 years. This Scenario corresponds to current social security legislation but not to current Government policy which is to adjust the single rate pension to 25% of AWE on an ad hoc basis. The most recent increase to this AWE benchmark was on 28 January 1993. Otherwise as for Scenario B.

G. An employee born in 1950, rather than 1967, receiving SGC minimum employer contributions from 1992 and making employee co-contributions from 1998-99. This baby-boomer retires in 2014-15 rather than 2031-32 as in the rest of the scenarios. Because the retirement is far earlier the real values of retirement income for this example are considerably lower than for the other scenarios.

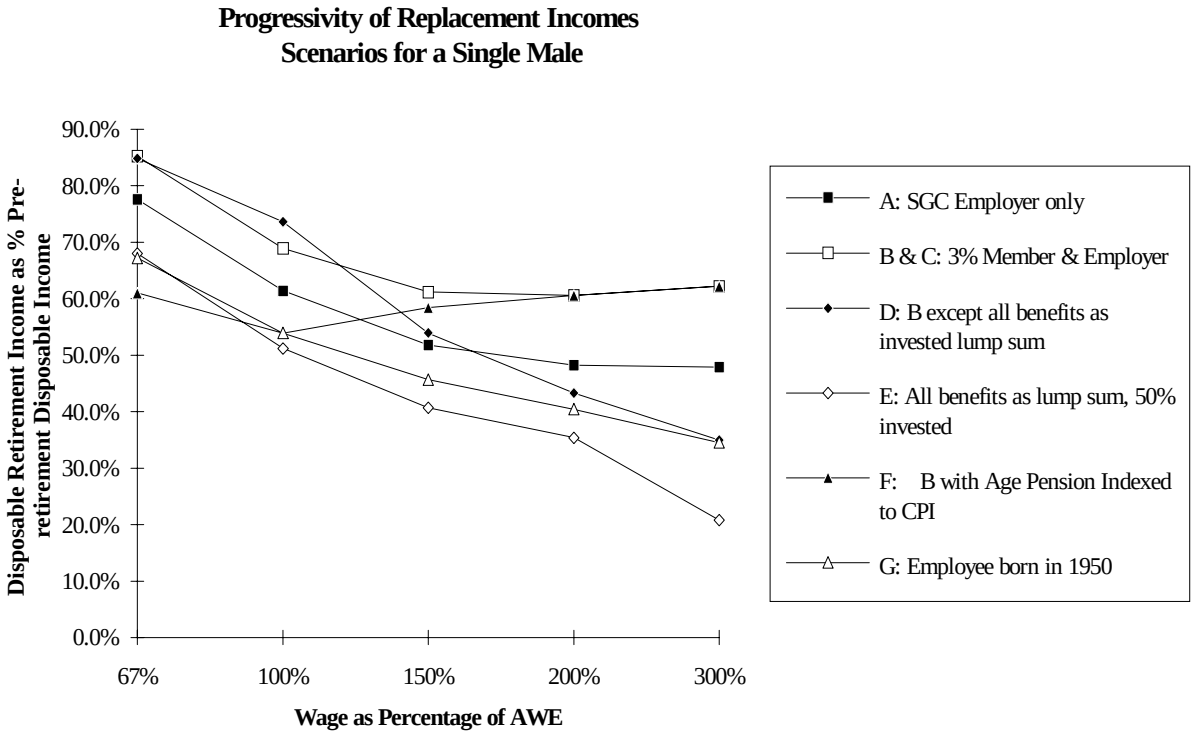
TABLE 1: GAINS IN REPLACEMENT INCOMES AND COST-BENEFIT ANALYSIS OF SGC POLICY SCENARIOS FOR A SINGLE MALE (a)

SCENARIO / MEASURE	WAGES AS PERCENTAGE OF AWE 67%	100%	150%	200%	300%	WAGES AS PERCENTAGE OF AWE 67%	100%	150%	200%	300%
	(1992 $ Values)					*(% of pre-retirement disposable income)*				
Scenario A Employer Only Contributions at SGC Minimum, 100% of Benefits Converted to Rollover Annuity, Age Pension indexed to AWE, 50% Savings Offset										
NPV of Net Gain to Members Retirement Income	$6,222	$8,669	$12,037	$15,315	$26,223	20 0%	19 7%	20 0%	20 5%	25 2%
NPV of Net Cost to Government	($332)	$148	$602	$119	$3,504	-1 1%	0 3%	1 0%	0 2%	3 4%
NPV of Net Policy Gain from Tax Concessions	$6,555	$8,521	$11,435	$15,196	$22,719	21 1%	19 4%	19 0%	20 3%	21 8%
NPV of Disposable Retirement Income	$24,112	$26,966	$31,139	$36,001	$49,817	77 6%	61 4%	51 8%	48 2%	47 9%
Percentage of Age Pension Received	96 3%	76 0%	40 1%	11 7%	0 0%					
Scenario B Phased 3% Employee Co-contribution & Employer Contributions at SGC Minimum, 100% of Benefits Converted to Rollover Annuity, Age Pension indexed to AWE, 50% Savings Offset										
NPV of Net Gain to Members Retirement Income	$7,009	$9,924	$14,972	$21,238	$36,687	22 5%	22 6%	24 9%	28 4%	35 3%
NPV of Net Cost to Government	($1,584)	($2,371)	($2,121)	($1,502)	$2,653	-5 1%	-5 4%	-3 5%	-2 0%	2 5%
NPV of Net Policy Gain from Tax Concessions	$8,593	$12,295	$17,093	$22,740	$34,034	27 6%	28 0%	28 4%	30 4%	32 8%
NPV of Disposable Retirement Income	$26,486	$30,282	$36,802	$45,307	$64,745	85 2%	68 9%	61 2%	60 6%	62 2%
Percentage of Age Pension Received	85 6%	55 9%	16 1%	0 0%	0 0%					
Scenario C 30% Savings Offset, Phased 3% Employee Co-contribution & Employer Contributions at SGC Minimum, 100% of Benefits Converted to Rollover Annuity, Age Pension indexed to AWE										
NPV of Net Gain to Members Retirement Income	$9,148	$12,387	$17,954	$24,939	$41,563	29 4%	28 2%	29 9%	33 4%	39 9%
NPV of Net Cost to Government	($3,035)	($4,709)	($5,743)	($6,583)	($5,611)	-9 8%	-10 7%	-9 6%	-8 8%	-5 4%
NPV of Net Policy Gain from Tax Concessions	$12,183	$17,096	$23,697	$31,522	$47,174	39 2%	38 9%	39 5%	42 2%	45 3%
NPV of Disposable Retirement Income	$26,486	$30,282	$36,802	$45,307	$64,745	85 2%	68 9%	61 2%	60 6%	62 2%
Percentage of Age Pension Received	85 6%	55 9%	16 1%	0 0%	0 0%					
Scenario D All benefits taken as lump sum and invested, Phased 3% Employee Co-contribution & Employer Contributions at SGC Minimum, Age Pension indexed to AWE, 50% Savings offset										
NPV of Net Gain to Members Retirement Income	$7,236	$10,377	$14,842	$19,601	$18,690	23 3%	23 6%	24 7%	26 2%	18 0%
NPV of Net Cost to Government	($1,832)	($1,882)	($1,415)	($1,391)	($5,495)	-5 9%	-4 3%	-2 4%	-1 9%	-5 3%
NPV of Net Policy Gain from Tax Concessions	$9,068	$12,259	$16,257	$20,992	$24,185	29 2%	27 9%	27 1%	28 1%	23 3%
NPV of Disposable Retirement Income	$26,984	$30,899	$36,651	$43,419	$46,485	86 8%	70 4%	61 0%	58 1%	44 7%
Percentage of Age Pension Received	84 8%	73 6%	53 9%	43 3%	35 0%					
Scenario E All benefits taken as lump sum and 50% invested, Phased 3% Employee Co-contribution & Employer Contributions at SGC Minimum, Age Pension indexed to AWE, 50% Savings offset										
NPV of Net Gain to Members Retirement Income	$3,849	$4,719	$5,908	$6,688	($245)	12 4%	10 7%	9 8%	8 9%	-0 2%
NPV of Net Cost to Government	$328	$1,256	$3,246	$3,545	($1,213)	1 1%	2 9%	5 4%	4 7%	-1 2%
NPV of Net Policy Gain from Tax Concessions	$3,521	$3,463	$2,662	$3,143	$968	11 3%	7 8%	4 4%	4 2%	1 0%
NPV of Disposable Retirement Income	$21,121	$22,472	$24,466	$26,446	$21,648	68 0%	51 2%	40 7%	35 4%	20 8%
Percentage of Age Pension Received	96 5%	91 5%	83 2%	74 7%	59 3%					
Scenario F Age Pension Indexed to CPI, Phased 3% Employee Co-contribution & Employer Contributions at SGC Minimum, 100% of Benefits Converted to Rollover Annuity, 50% Savings offset										
NPV of Net Gain to Members Retirement Income	$6,579	$10,485	$20,563	$28,812	$45,344	21 2%	23 9%	34 2%	38 5%	43 6%
NPV of Net Cost to Government	($2,013)	($1,809)	$3,470	$6,073	$11,310	-6 5%	-4 1%	5 8%	8 1%	10 9%
NPV of Net Policy Gain from Tax Concessions	$8,592	$12,294	$17,093	$22,739	$34,034	27 7%	28 0%	28 4%	30 4%	32 7%
NPV of Disposable Retirement Income	$18,954	$23,654	$35,080	$45,307	$64,745	61 0%	53 9%	58 4%	60 6%	62 2%
Percentage of Age Pension Received	45 1%	2 3%	0 0%	0 0%	0 0%					
Scenario G Employee born in 1950, Phased 3% Employee Co-contribution & Employer Contributions at SGC Minimum ONLY, 100% of Benefits Converted to Rollover Annuity, Age Pension indexed to AWE, 50% Savings Offset										
NPV of Net Gain to Members Retirement Income	$838	$1,289	$1,885	$2,173	$2,813	12 6%	13 7%	14 7%	13 6%	12 7%
NPV of Net Cost to Government	$133	$306	$546	$394	$153	2 0%	3 3%	4 3%	2 5%	0 7%
NPV of Net Policy Gain from Tax Concessions	$705	$983	$1,339	$1,779	$2,660	10 6%	10 4%	10 4%	11 1%	12 0%
NPV of Disposable Retirement Income	$4,461	$5,052	$5,863	$6,456	$7,665	67 2%	53 9%	45 7%	40 4%	34 5%
Percentage of Age Pension Received	100 0%	99 1%	93 2%	74 8%	37 5%					

(a) Unless stated otherwise, these scenarios assume a male commencing superannuation at age 25 and retiring at 65, the minimum SGC employer contribution rate for large companies, an employee co-contribution of 3% in 2000-1 phased in from 1% in 1998-99, a constant CPI of 4% and AWE growth of 5 5%, a bond rate of 8 0%, an effective tax rate on the superannuation fund of 7% and weekly fees of $1 70

The results of the analysis are best presented graphically. **Graph 1** shows the replacement income resulting from the different policy scenarios. In all scenarios where the age pension is indexed to AWE the policies lead to higher replacement income ratios for those on low income rather than for those on high incomes. The combination of the age pension income tests and superannuation tax concessions is highly progressive. When the pension is indexed by the CPI, a single male on AWE for his working life will receive negligible age pension. In the other AWE indexation scenarios, age pension is received by those with higher pre-retirement incomes. In scenario F, the overall progressivity result is less affected by the age pension income test. At higher incomes, the flat rate reasonable benefit limits announced in *Security in Retirement* have also improved progressivity.

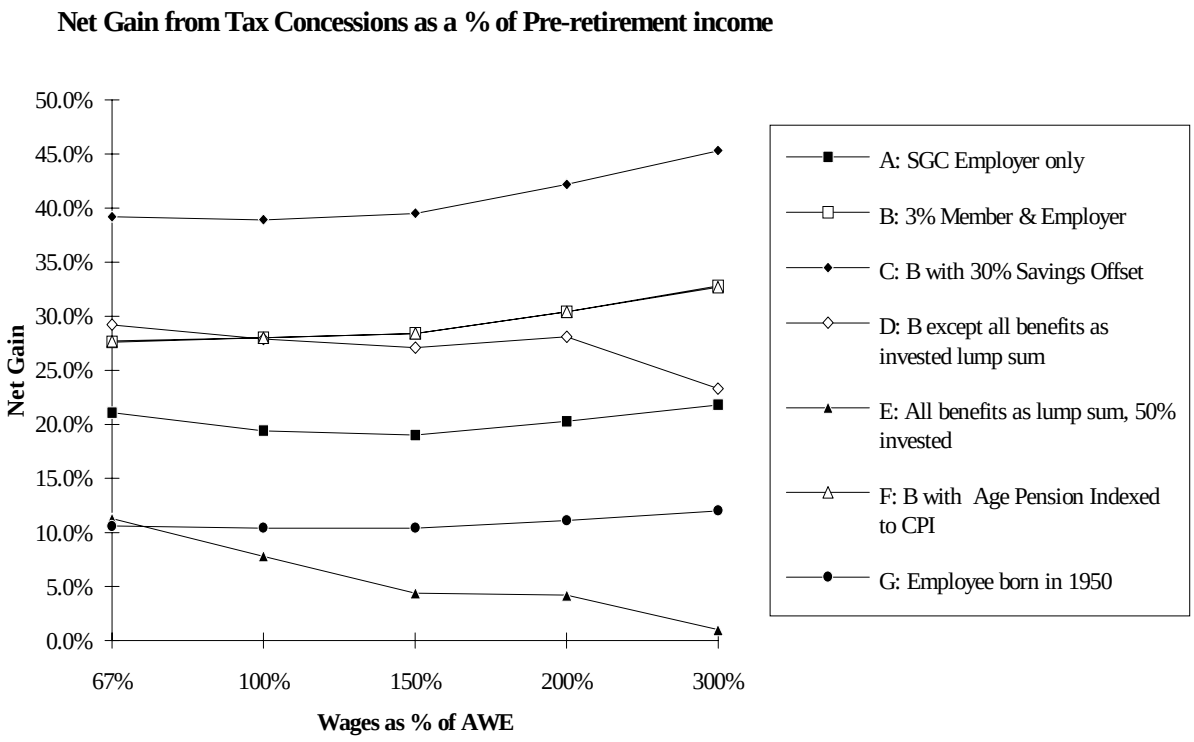
GRAPH 1:



Graph 2 shows that the gain to the individual from the retirement income policy exceeds the cost to Government in all scenarios. This is because the compounding earnings in concessionally taxed superannuation funds yield greater benefits to individuals, than the tax concessions (less reduced age pension outlays) are costs to government. Scenario C shows the largest net gain because it has the lowest estimated tax concessions cost from the 30% offset factor. The 50% lump sum dissipation scenario shows the lowest gains in retirement incomes and the worst net cost-benefit because the reduction in age pension outlays raises the cost to government. Analysts such as Knox (1991) and Piggot and Bateman (1993) have commented on the potential for double dipping to undermine the Government's retirement income policy. However, Kalisch (1992) comprehensively

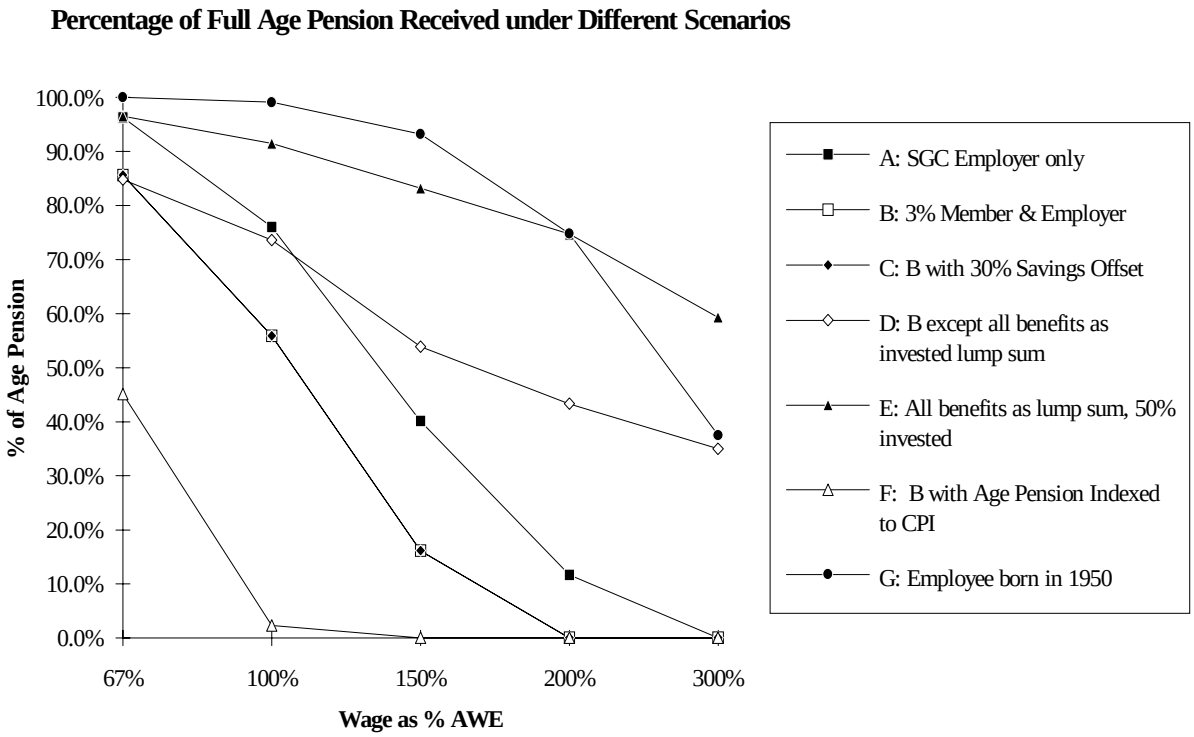
reviewed the data on use of lump sum superannuation payments and concluded that they were largely used for income generating investments or housing and that there was no evidence of former high income earners restructuring financial arrangements to withdraw the pension. Partly as a pre-cautionary measure, the Government has implemented full preservation of SGC contributions, and announced full preservation of all superannuation benefits from 1 July 1996 (less an amount which broadly equates to what can now be taken on resignation) and raising the preservation age to 60 by the year 2025.

GRAPH 2



Graph 3 shows the effect that the different scenarios have on receipt of age pension. Obviously, with only SGC contributions, the 1950 baby boomers will receive higher percentages of age pensions than cohorts born in 1967 or subsequently. The aggregate results later in the paper demonstrate that the major effects of current SGC policies on age pension outlays will be after 2015. The result suggests that policy measures which raise superannuation contributions sooner could improve the capacity of the government in twenty years' time to absorb the cost of the baby boomers. If earnings grow faster than consumer prices, indexing the pension to CPI only could produce age pension savings. Such a policy would be a break with current Government policy of keeping the value of pensions stable relative to community living standards (as measured by AWE). Increased superannuation could make the age pension, maintained at 25% of AWE, more affordable and sustainable.

GRAPH 3



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n summary, this hypothetical analysis has shown that the long term benefits to the individual from the SGC-induced increase in the adequacy of retirement incomes exceeds the long term costs from the tax concessions and age pensions (when the bond rate is used as discount factor for the cost-benefit analysis. Brown (1993) has shown that this positive cost benefit applies to a number of bond rate and fund earnings rate assumptions. He has also shown that the use of the Department of Finance's 8% real discount rate (4% above the real fund earning rate) leads to zero net present values, ie costs equalling benefits. The SGC policy appears to be a sound long term investment but it may well be challenged by those concerned at the short term costs. Later sections of this paper will examine the relevant aggregates.

Measured by replacement rates, the SGC policy is progressive (see Graph 1) and may well assist the maintenance of age pension relative to community living standards. That is, the income maintenance policy reflected in the SGC may well be necessary to maintain the poverty alleviation policy.

The Distribution of Superannuation and Non-Superannuation Savings

The previous section has demonstrated the importance of estimates of the rate of saving from disposable income for estimating the tax expenditures arising from superannuation tax concessions. This section analyses the distribution of non-superannuation financial savings for individuals in the SGC target population in order to test the FitzGerald and Harper (1991) hypothesis that less than 50% of marginal increases in disposable income from wage rises in lieu of superannuation would be saved. Plans for extending this distributional analysis are presented.

The section goes on to examine whether it is likely that the net additions to national savings from the SGC will be from all of those in the SGC population or whether it is likely that they will be mainly from lower income groups.

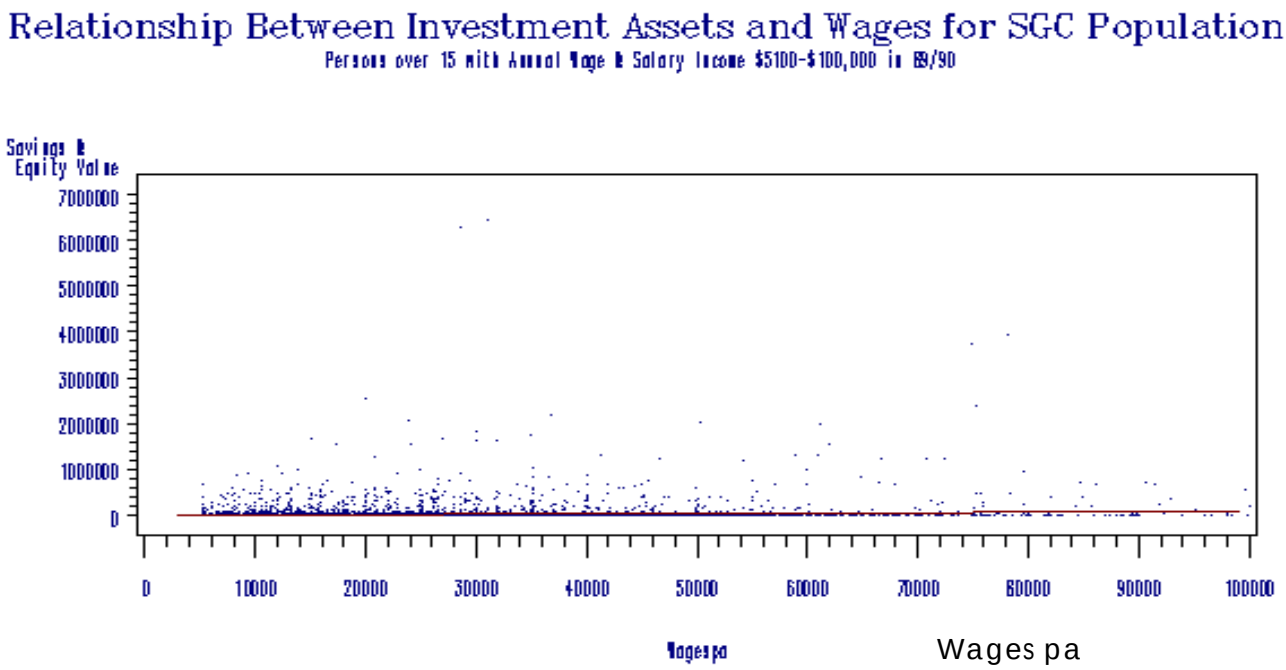
FitzGerald and Harper based their hypothesis on Andrew Dilnot's (1990) distributional analysis of wealth from the 1986 Income Distribution survey. This section updates that analysis by using results derived from the ABS 1989-90 Income and Housing Survey (IHS) unit record data (Australian Bureau of Statistics Cat. No. 6543.0, 1991). The scope of the analysis is the SGC population which has been defined as persons with wage and salary income over the 1989-90 tax threshold of $5100 who are under 65 years of age and who are not part-time workers under 18 years of age. The survey does not have data on superannuation coverage and cannot be used to directly study the substitution between superannuation and other forms of saving nor the population who would actually rather than potentially have increased superannuation under the SGC policy.

The value of non-superannuation financial assets must be imputed from the income and housing survey. Following Dilnot, the value of interest bearing deposits has been estimated by dividing annual interest income by the bond rate then current of 13.2%. The value of shares has been imputed by dividing dividends by a then current average yield rate of 6.10%. The attempt to impute the value of rental property was discarded because of the widespread incidence of rental losses. The IHS data yield estimates that there were 211,500 persons in the SGC population with rental losses with an average loss of $4477 pa. In contrast, there were only 184,000 with rental property profits at an average of $698 pa, but with a median value over $2000 pa. This suggests that many of those making profits had substantial deductions. The survey cannot give estimates of financial assets which do not yield current income such as insurance and accruing superannuation.

The estimate for interest income from the Income and Housing Survey appears reasonable. The survey estimates total interest income at $14,292m for 1989-90 for the whole population whereas Income Tax Statistics for 1989-90 estimates $12,628. The higher estimate in the IDS is consistent with pensioners earning interest but not submitting tax returns. The dividend income estimate from the IHS appears too high. The IHS estimate is $6,533m whereas Income Tax Statistics estimates $2,036m. This suggests that the dividends item in the survey is capturing some other income sources. Although the financial asset incomes appear to extend beyond interest and dividends, the completeness of this analysis of fully taxed financial assets is uncertain - it does appear to be a reasonable guide to the likely distribution.

Graph 4 shows the immense variation of the imputed value of financial assets (imputed interest bearing deposits) by wage income within the SGC population and **Graph 5** shows the same distribution by age of individuals. Although the regression lines in both graphs show positive slope it is clear that current wage income and age in isolation do not explain much of the variation in financial assets. This has been confirmed by a regression analysis which showed that current wage, current age and gender only explained 1.6% of the variation in financial assets in the SGC population. Although the estimates of the beta coefficients were highly statistically significant and positive, the highly skewed distributions of financial assets make simple parameter estimates of dubious use.

GRAPH 4



GRAPH 5:

The variation in financial assets and the skew in their distribution are also highlighted by the percentile distributions of financial assets shown in **Table 2**. The mean estimates of financial assets are between the 80th and 90th percentiles for the SGC population and for each of the sub-populations shown. The standard deviation for each sub-population is many times greater than the mean.

This table shows how most of the SGC population have quite small financial assets. Fifty per cent of the SGC population have imputed financial assets less than $454, sixty per cent have less than $1,136 and seventy per cent have less than $2,272. If the bulk of the SGC population have very low financial assets, this suggests that less than 50% of any increase in take-home pay in lieu of superannuation would be saved. Only 30% of the SGC population would appear to have financial assets in excess of that taken to pay a quarterly electricity bill and a large bankcard debt. And there is no evidence that the top 30% of savers save all increases in their disposable income. If the 50% savings replacement factor used by RIM and by FitzGerald and Harper might be too high, then the 100% estimate used in the Tax Expenditures Statement methodology looks untenable. The TES estimates are far too high in their first year, as well as in out years.

TABLE 2: DISTRIBUTION OF IMPUTED FINANCIAL ASSETS (a) IN THE SGC POPULATION(b) IN 1989-90.

	PERCENTILE (c)										
POPULATION	**25%**	**50%**	**60%**	**70%**	**75%**	**80%**	**90%**	**95%**	**MEAN**	**Standard Deviation**	**Estimated Persons**
	(Value of Financial Assets that Stated Percentage of Population is below)										
Total SGC (b)	$0	$454	$1,136	$2,272	$3,598	$5,522	$18,939	$50,136	$18,958	$142,372	6,304,947
INCOME GROUPS											
Below $20,000pa	$0	$189	$576	$1,515	$2,273	$3,788	$13,705	$39,371	$12,583	$68,930	2,414,886
$20K - $35K pa	$0	$477	$1,038	$2,083	$3,030	$4,545	$15,152	$37,288	$15,615	$138,988	2,715,587
$35K - $50K pa	$91	$1,136	$1,992	$3,788	$5,886	$8,530	$28,788	$75,758	$21,462	$91,374	838,120
Above $50,000 pa	$492	$3,788	$8,333	$16,393	$25,758	$41,667	$115,795	$350,924	$85,476	$405,284	336,354
AGE GROUPS											
17 - 24 YEARS	$0	$98	$326	$758	$1,136	$1,515	$3,788	$7,576	$2,180	$13,201	1,167,418
25 - 34 YEARS	$0	$379	$758	$1,515	$2,273	$3,598	$11,334	$25,417	$12,646	$133,669	1,833,742
35 - 44 YEARS	$0	$606	$1,439	$3,030	$4,545	$7,576	$25,076	$84,866	$23,944	$118,451	1,710,734
45 - 54 YEARS	$0	$1,136	$2,273	$4,848	$7,576	$12,121	$37,879	$122,164	$34,327	$240,976	1,111,607
55 - 64 YEARS	$91	$2,727	$5,303	$9,697	$15,152	$22,871	$60,606	$136,364	$30,478	$106,968	481,446

SOURCE: Analysis of the Unit Record Data of the 1989-90 ABS Income & Housing Survey

(a) Financial assets are ordinary savings plus shares. The value of ordinary savings was imputed by dividing interest income by the bond rate of 13.2%. The value of shares was imputed from dividends using a yield of 6.10%.

(b) Persons whose 1989-90 wage and salary income was over $5100 excluding those over 65 or under 18 years and part-time.

(c) This analysis was performed using PROC UNIVARIATE in SAS with the frequency of each observation set to the integer part of its weight. The analysis would vary slightly if full weights were used in a user written procedure.

Table 2 also shows that there are appreciable rises in decile and quartile boundary values with rising income and with rising age. Further analysis will try to estimate slopes of these increases. It seems likely that both inheritance and accumulation explain the observed differences. The RIM Task Force will try to estimate accumulation using factors such as income, age (or years since started work), gender, housing equity, income of spouse, variations in income from sources other

than wages and investments, public/private sector, occupation, education, marital status and number of children. Inheritance is more difficult to isolate using proxies on the data set. Immigration status might be one proxy but we welcome suggestions for any others. It could be argued that the extreme values of financial assets may well have arisen from inheritance or Lotto wins. They may add no insight into accumulation processes and could be excluded. The analysis might also be conducted within (say) quintiles of financial assets or for other sub-populations to prevent heterogeneity bias. In analysing the data, interactions will be tested but polynomials and exponentials might only be fitted when suggested by theory or by the pattern of the single factor residuals. We welcome comments on how this analysis might be done appropriately.

The relationship between wage income and superannuation coverage is stronger than between wages and non-superannuation financial assets. **Table 3** shows superannuation coverage as a function of wage income in 1989. The probability of being covered by superannuation increases with income and full-time work. Within the employed population, coverage is not predicted by gender once pay rate and full-time status are taken into account. However, much of the existing coverage (about 30%) will be at the award superannuation level (3%) and it seems likely that the rise in the SGC contribution rate will elicit new savings from a broad range of private sector workers.

The interim conclusion from the analysis above is that net additions to investment funds are likely to come from the increased superannuation coverage of part-time workers and those on lower incomes and from the increase in contributions for those workers with low levels of contributions. These wage and salary earners would not have saved in fully taxed forms a major portion of any wage rises received in the absence of superannuation. The Treasurer's 1992 envisaged increase in contributions to 12% (note: FitzGerald 1993 advocates 18%) is likely to draw additional savings from a wide range of the wage and salary earner population if the superannuation is fully preserved. If non-means tested withdrawals of vested superannuation for purposes such as housing occurs, then there is not likely to be significant additional saving. Further analysis is needed to determine the extent of substitution in untaxed savings in the form of housing.

The effects of this increased saving on aggregate tax concessions, age pension outlays and private savings available for investment are the subjects of the next section.

TABLE 3: PROBABILITY OF HAVING SUPERANNUATION COVERAGE
BY USUAL WEEKLY PAY, FULL-TIME / PART-TIME STATUS AND GENDER
ABS Superanuation Survey, November 1991

	Usual Gross Weekly Pay in Current Job ($)						TOTAL	Average
	Under 200	200 - <400	400 - <600	600 - <800	800 - < 1000	1000 and over	PERSONS	Pay $pw
Part-Time Males								
Covered ('000)	28.7	34.1	10.80	5.7	2.2	1	82.5	$307
Total ('000)	149.1	74.1	18.7	6.7	2.2	1.9	252.8	$217
Percentage Covered	19.2%	46.0%	57.8%	85.1%	100.0%	52.6%	32.6%	
Part-Time Females								
Covered ('000)	216.5	265.9	55.4	13.9	3.9	0.3	555.9	$256
Total ('000)	560.0	377.3	71 1	15.2	4.9	0.6	1,029.0	$206
Percentage Covered	38.7%	70.5%	77.9%	91.4%	79.6%	50.0%	54.0%	
Part-time Persons								
Covered ('000)	245.2	300.0	66.3	19.6	6.1	1.2	638.4	$262
Total ('000)	709.1	451.4	89.8	21.9	7.1	2.5	1,281.8	$209
Percentage Covered	34.6%	66.5%	73.8%	89.5%	85.9%	48.0%	49.8%	
Full-Time Males								
Covered ('000)	74.7	516.3	1,100.7	612.8	315.7	188.3	2,808.5	$607
Total ('000)	139.5	676.7	1,245.8	659.9	342.9	205.1	3,269.9	$586
Percentage Covered	53.5%	76.3%	88.4%	92.9%	92.1%	91.8%	85.9%	
Full-Time Females								
Covered ('000)	50.9	402.2	621.7	229.4	60.2	15.4	1,379.7	$488
Total ('000)	90.0	536.3	710 1	248.8	67.2	16.1	1,668.6	$468
Percentage Covered	56.6%	75.0%	87.6%	92.2%	89.6%	95.7%	82.7%	
Full-time Persons								
Covered ('000)	125.6	918.5	1,722.4	842.2	375.9	203.7	4,188.2	$568
Total ('000)	229.5	1,213.0	1,955.9	908.7	410.1	221.2	4,938.5	$546
Percentage Covered	54.7%	75.7%	88.1%	92.7%	91.7%	92.1%	84.8%	
Employed Males								
Covered ('000)	103.4	550.4	1,111.5	618.5	317.9	189.3	2,891.0	$598
Total ('000)	288.7	750.8	1,264.6	666.6	345.1	207.0	3,522.6	$421
Percentage Covered	35.8%	73.3%	87.9%	92.8%	92.1%	91.4%	82.1%	
Employed Females								
Covered ('000)	267.4	668.1	677.1	243.3	64.1	15.6	1,935.7	$421
Total ('000)	650.0	913.6	781 2	264.1	72.1	16.7	2,697.6	$368
Percentage Covered	41.1%	73.1%	86.7%	92.1%	88.9%	93.4%	71.8%	
Employed Persons								
Covered ('000)	370.8	1,218.5	1,788.6	861.8	382.0	204.9	4,826.7	$527
Total ('000)	938.7	1,664.4	2,045.8	930.7	417.2	223.7	6,220.2	$477
Percentage Covered	39.5%	73.2%	87.4%	92.6%	91.6%	91.6%	77.6%	

Aggregate Modelling

Earlier in this paper we demonstrated the capacity of individual or hypothetical modelling to address issues of intragenerational equity and the likely increases in retirement incomes for postulated individual situations. As a significant part of the policy context is the changing age structure of the Australian population, it is clear that in order to adequately assess in a comprehensive way the relative merits of current and possible alternative retirement income policies, aggregate models are also needed. Specifically, these can inform the assessment by giving information for each year of the projection period on:

- the aggregate costs of Age and Service pensions for the particular policy being evaluated;
- the estimated total annual costs of tax concessions given to superannuation savings using an appropriate long term conceptual framework (see discussion in earlier Section and Brown 1993); and
- the overall change in national savings from the policy, being the sum of net increases in private savings arising from extra superannuation and associated earnings together with any increase in public savings arising from reduced pension costs offset by any increases in tax concessions (see further discussion below).

We noted in the introduction that the stated objectives of retirement income policy include increasing national saving and equity and security considerations. This information from aggregate modelling enables a direct assessment of the impact on national savings of one policy scenario compared with another. It also provides an indirect assessment of the affordability of pensions and tax concessions over time in different policy contexts.

The Retirement Income Policy (RIP) Model

The aggregate model used by the task force is an adaptation of the National Mutual Retirement Income Policy Model. It projects age by sex cohorts covering the full Australian population and estimates aggregates for superannuation and retirement incomes by modelling the accumulation and payout phases for each major type of superannuation and the interaction with the tax and age pension systems.

While in essence this aggregate model seems to represent only a totalling over the population of an individual model such as used in the above analysis, in fact the model is large and intricate. This arises because of complexity in the Tax and Social Security systems and because of the need to handle additional transitions like premature death and disability, early payouts of superannuation on changing jobs, less than full vesting of benefits, the fact that a cohort may have more than one superannuation accumulation, labour force participation issues and so on. The strengths and weaknesses and key assumptions of RIP are discussed below and in Attachment B. The results of sensitivity analyses to assess the robustness of the model are also presented.

National savings

An important objective of Australia's retirement incomes policy is to increase the level of national savings.

Increased national savings will play an important part in maintaining living standards in the face of an ageing population. Increased aged dependency will mean that Australia will have a potentially diminishing labour force with which to produce the goods and services necessary to maintain its living standards. Maintaining Australia's living standards will therefore require a combination of

- a substantial change in workforce participation patterns, for instance a movement to later retiring ages or further increases in the workforce participation of women;
- substantial increases in labour productivity; or
- substantial earnings from foreign investments.

Increased national savings through superannuation provides an avenue for financing the investment in Australia and to reduce our reliance on foreign savings to finance such investments. Investment is an important means of raising the productivity of Australian industry, thereby compensating for a diminishing proportion of the population of working age. Further if some of the extra savings were to be invested overseas this would assist Australia to maintain its living standards by giving us an extra claim over foreign production.

Results

The analysis of results presented here follows the broad framework of Chapter X of the Government's *Security in Retirement* (Dawkins, 1992), that is the changes in private savings and changes in public savings are separately accounted for in each of the policies being compared. However, in deriving the results there has some clarification of the concepts used in specifying alternative savings that would have taken place in the absence of superannuation and more complex analysis to overcome some structural limitations of RIP. The principal differences are:

- an improved calculation of tax expenditures is incorporated to overcome the overstatement in standard RIP output of the accumulation of funds which in the absence of compulsory and concessional superannuation would have been saved and taxes paid on the interest;
- while the 0.5 (private) savings replacement assumption continues to be used, this is treated as an input savings assumption. It is not assumed (as in *Security in Retirement* following Harper and FitzGerald, 1991) that notwithstanding the different tax treatments of savings, an offset of 50% of gross private savings will be the outcome; rather the accumulation of 50% of available funds as an input is calculated separately in an additional RIP run;
- the counterfactual used for the evaluation of policy impact is the continuation of the pre SGC situation with award and voluntary superannuation; an equivalent retirement income counterfactual is not used (thereby reducing the scope for debate);
- foreshadowed extensions of the policies are explicitly modelled; and

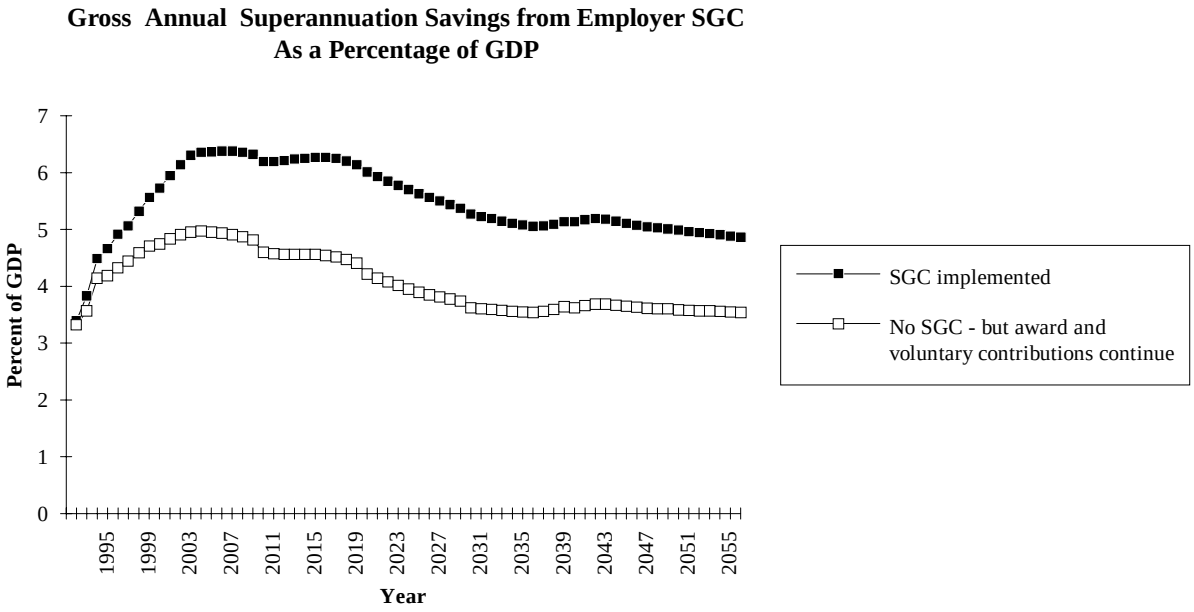
- the analysis is continued out some 60 years, allowing the system's stabilised characteristics to be more easily discerned.

The results of the base runs at **Graphs 6 and 7** indicate the components of the net impact of the Superannuation Guarantee Charge on annual national savings as a percentage of GDP in the particular year. The results support the beneficial impact on national savings of compulsory superannuation. There is a rapid build up of private savings (both gross and net) which continues on. The modelling indicates no significant savings in net pension costs for many years but after some 30 years, net public savings become positive (as significant net savings in the pension system continue to grow and eventually outweigh the costs of the tax concessions). There is an indicated long term annual increment to net national savings of about 1 1/4 percent of GDP.

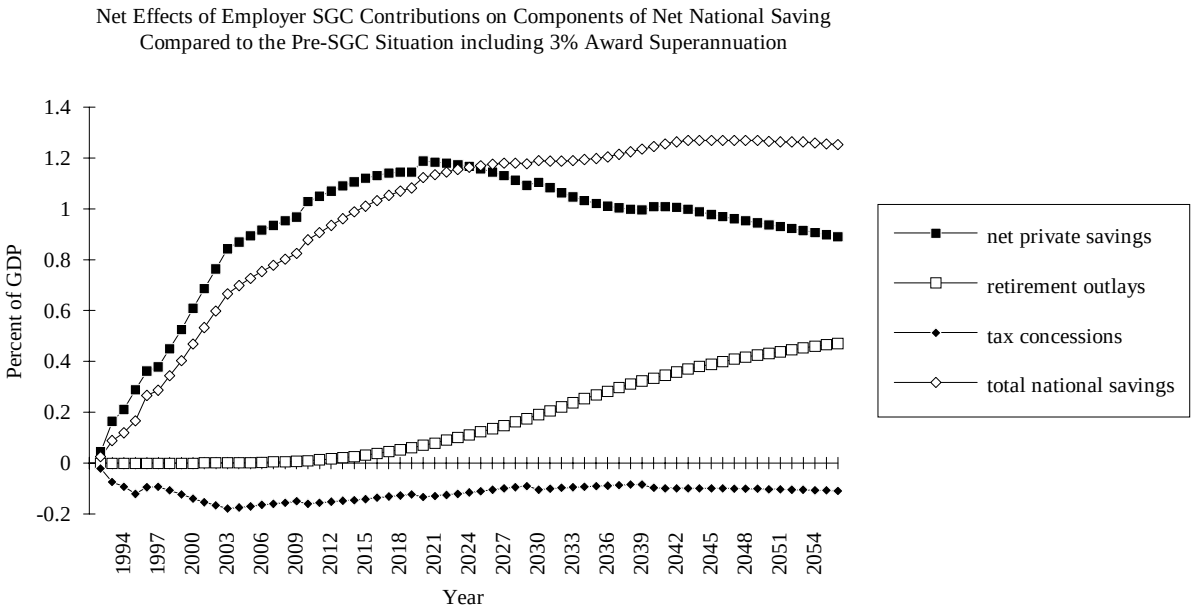
At **Graph 8** we present similar summary information on the net impact of the proposed 3% compulsory co-payment by individuals, with those already paying 3% or more paying no extra. A <u>further</u> net addition to total annual national savings is indicated of over 1 percent of GDP upon full build up of the policy.

Similarly **Graph 9** shows the net impact of a measure canvassed in FitzGerald (1993) requiring the self employed to contribute at SGC plus individual co-contribution rates. This analysis indicates a <u>further</u> additional positive impact on net annual national savings of about 0.4% of GDP over the longer term.

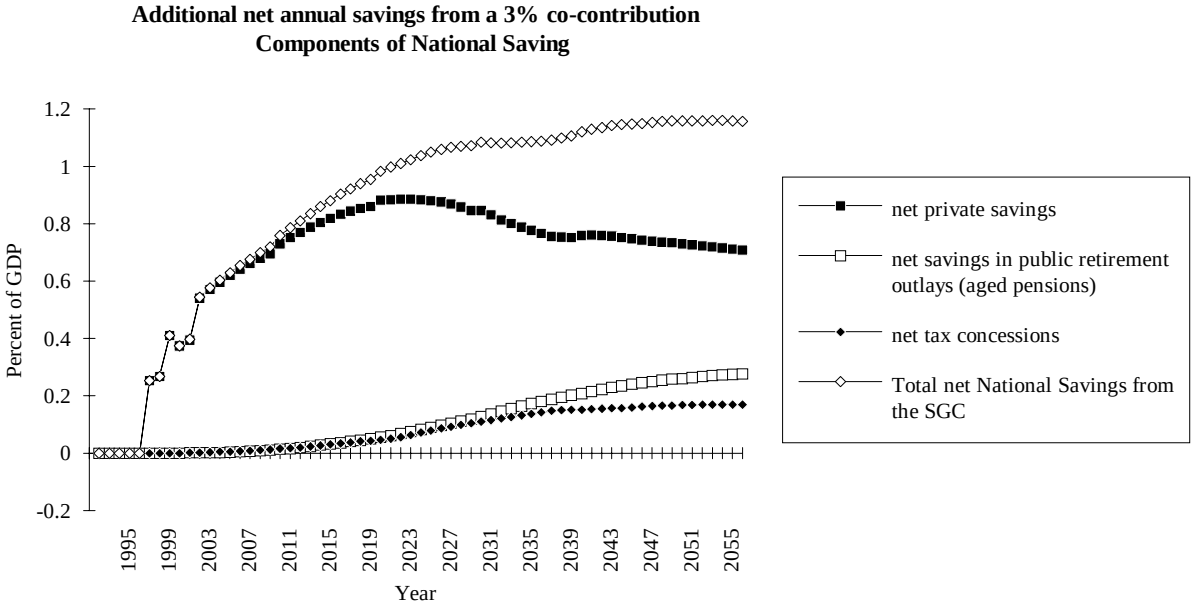
GRAPH 6



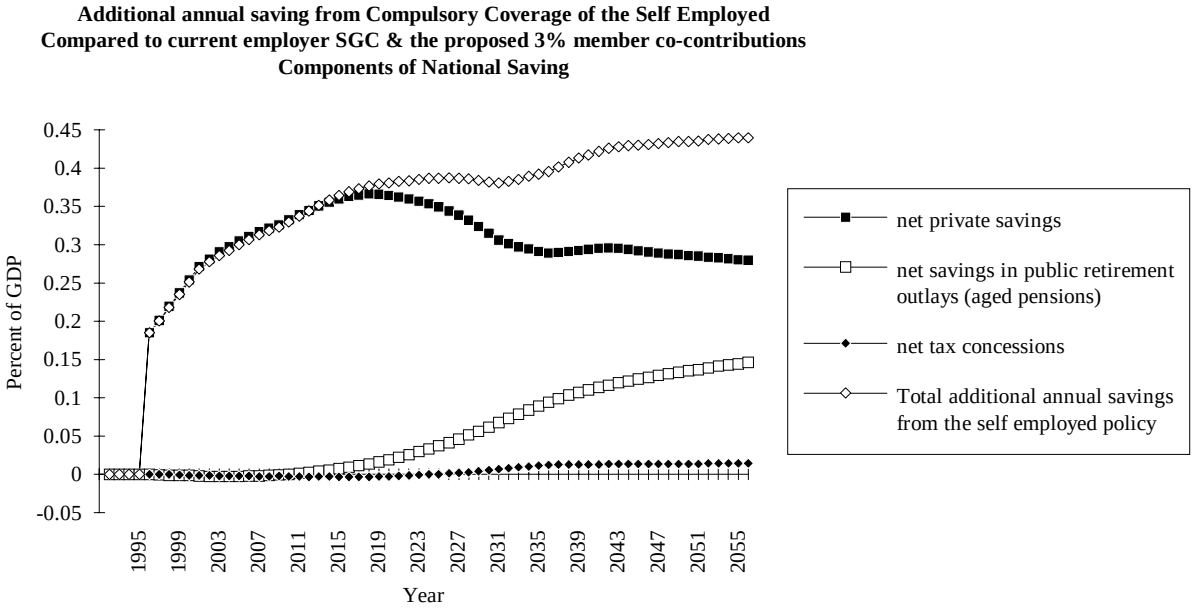
GRAPH 7



GRAPH 8



GRAPH 9



A number of caveats need to be borne in mind with the analysis:

- the analysis is only a partial one in that consequential flows through to the economy are not specifically modelled; for example, we do not model tax concessions for superannuation leading to higher other taxes or higher costs to employers of superannuation possibly reducing

their capacity to reinvest capital. Nor do we model the moderation of earnings growth because of higher superannuation or the additional productivity likely to flow from the increase in net national savings.

- the results are for a plausible set of economic parameters but of course are not forecasts and there is sensitivity to various assumptions, including:

- the savings replacement ratio mentioned above (the analysis is clearly sensitive to the 0.5 savings offset assumption-see below);

- the real earning rate of super funds (4% above CPI, 2 1/2% above AWE)

. the assumed growth of GDP (3-4% medium term, 2% from 2010 as the growth in population of working age slows down)

A more extensive statement on the RIP model and its strengths and weaknesses is at Attachment B**.**

Sensitivity Analysis

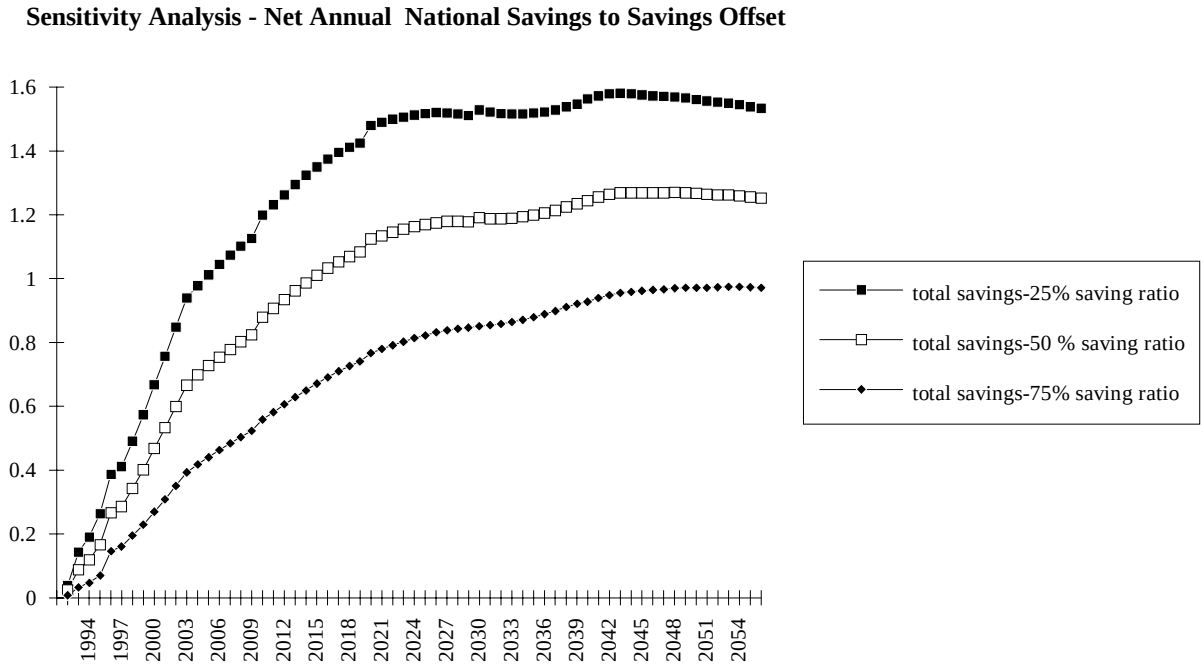
Using the updated analysis of the impact of the SGC on national savings and tax expenditures as the base case, sensitivity testing has been carried out using the RIP model to assess the impact of variations in important variables which have significant uncertainty in their values. In some cases this uncertainty may be reduced by further research; in other cases, given the time scale of the modelling, significant residual uncertainty will remain.

Savings Replacement Rate

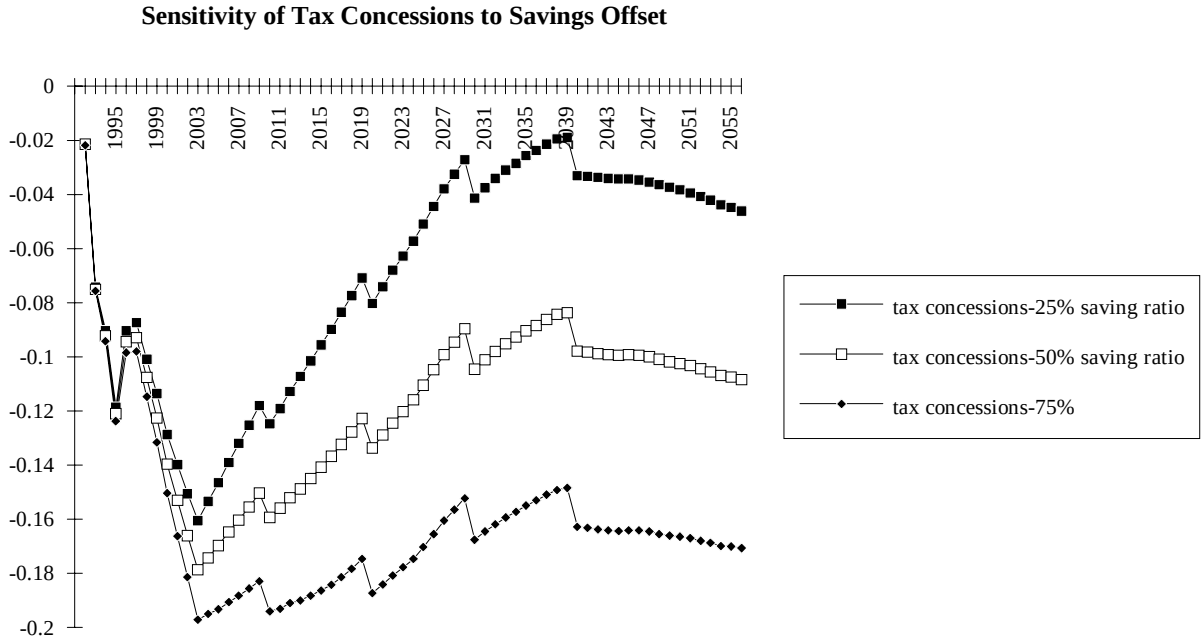
In the absence of compulsory and concessional superannuation, monies that would otherwise be invested in superannuation are available (after tax) to individuals to either invest or consume. The proportion that they would invest is termed the 'savings replacement ratio' and is clearly very difficult to determine precisely. The analysis in the preceding sections of this paper can be interpreted as justifying a relatively low value. The principal runs assume a ratio of .5 and sensitivity analyses have been carried out using ratios of .25 and .75. Some graphical results are in **Graph 10**. The level of overall national savings varies by some plus or minus 20% of the 0.5 outcome in the long term (a little more in the shorter term). The earlier analysis suggests that the .25 ratio which gives the more positive impact is more likely than the .75 ratio.

The impact on tax expenditures is shown at **Graph 11** and is very pronounced in the longer term. There is clearly a data irregularity which has been shown to come from 5 year grouping in our population model (PEOPLE-1990); this does not destroy principal findings but is untidy and a remedy is being investigated.

GRAPH 10



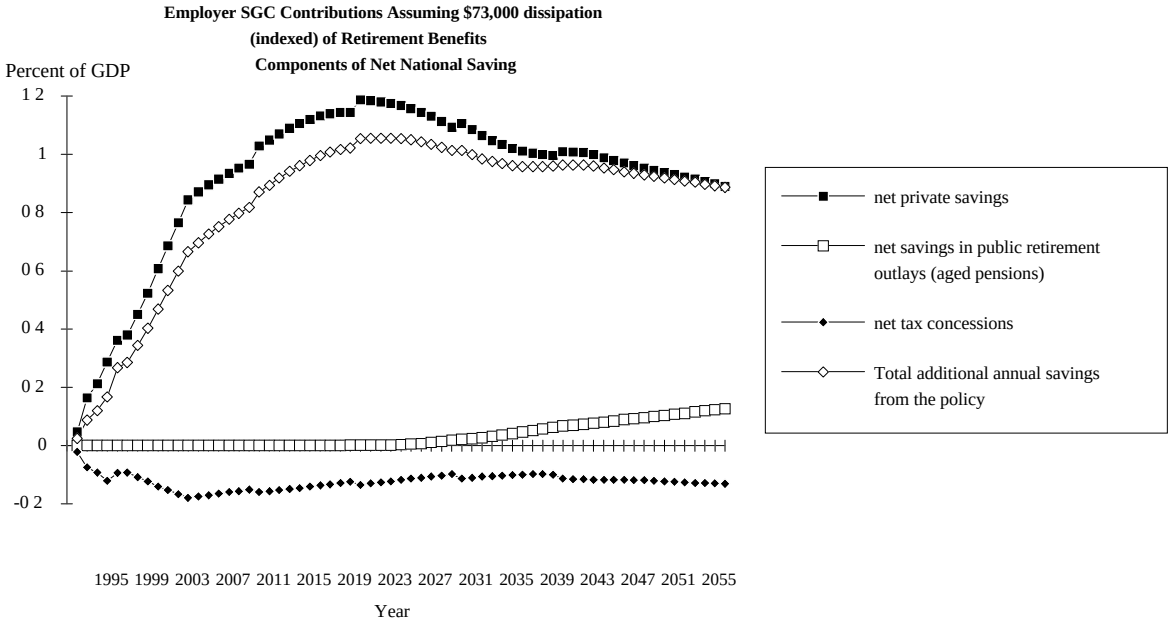
GRAPH 11



Lump Sum Dissipation

At retirement some individuals will use some of their accumulated savings for immediate consumption rather than income generation. Kalisch (1992) has concluded that there is little evidence of inappropriate dissipation now but estimating future trends when superannuation accumulations will be bigger remains uncertain. Changing the assumptions in RIP from an assumption of zero dissipation to $30,000 indexed to AWE reduces the value of national savings in the longer term by some 12% of the zero dissipation outcome. **Graph 12** shows the impact of an assumed dissipation of $73,000 indexed (compare with Graph 7). The build up of national savings remains very similar to the zero dissipation case, but the savings in pension payments over the longer term are much lower to the extent that public savings remain negative throughout. Over the longer term, original national savings are reduced by 28%.

GRAPH 12



Interest Rates

Opinions will vary about the most appropriate long term real interest rates to apply. One sensitivity run changing the real interest rate from 4% to 4 1/2% increased the overall national savings from the SGC by some 10%.

There remain further possible areas for sensitivity analysis. Nonetheless, taken together, these sensitivity tests show that the national savings impact of the SGC and related policies appears to be quite robust to reasonable variations in critical parameters. (The tax expenditures are somewhat more sensitive.)

Such a substantial ongoing increase in national savings (an annual increment of some 2 1/2% of GDP in the longer term following full implementation of current and foreshadowed policy) should make a valuable contribution to financing the investment necessary to maintaining Australia's living standards in the context of an ageing population. In particular, such additional national savings would help relax the current account constraint on Australia's economic growth performance, permitting faster economic growth without the build up of foreign debt that results from domestic

savings falling short of the levels necessary to finance investment in Australia. The FitzGerald Report on National Saving stated that the expected increases in savings are 'not simply a "by-product" but is crucial to its effectiveness as retirement incomes policy'. (p49, FitzGerald 1993)

SUMMARY AND CONCLUSIONS

This paper has used current and envisaged Government policies in the retirement income area to demonstrate how such policies can be assessed in detail in terms of their objectives such as adequacy, progressivity, positive cost-benefit, and additions to national saving. In this assessment some of the issues involved in setting up appropriate models and in estimating known critical parameters have been highlighted. The Task Force is using a methodology which differs significantly from that used in the Treasury's Tax Expenditures Statement. It is clear that despite the strengths of the current models it would be desirable to develop and expand them and also to refine our estimates of parameters through further research. The RIM Task Force will create a new aggregate group model which will model marginal as well as average policies and which will show the effects of different labour force experience for those on lower incomes.

A principal conclusion is that the benefits to individuals and the nation of compulsory superannuation including the envisaged extension to member co-contributions are supported by the analysis. The broad benefits, such as significant increases in individual retirement incomes and in national saving appear quite robust to reasonable variations in critical parameters. It is also the tentative conclusion that the savings offset factor used in estimating retirement income tax concessions should not be higher than 50% and that lower estimates appear justified. The distributional analysis of savings suggests that additional savings flowing from the SGC policy will come from the much greater coverage of lower income groups and part-time workers and also from workers over a relatively wide income range who currently have low levels of superannuation contributions from their employers or themselves.

REFERENCES

Australian Bureau of Statistics 1990, '1990 Survey of Income and Housing Costs and Amenities: Unit Record File on Magnetic Tape and Floppy Disk', Catalogue No.6543.0, Canberra.

Bateman, H. and Piggott, J., 1993, 'Australia's Mandated Private Retirement Income Scheme: An Economic Perspective', School of Economics, University of New South Wales.

Brown, C.L., 1993, 'Tax Expenditures and Measuring the Long Term Costs and Benefits of Retirement Incomes Policy', Paper to Colloquium of Superannuation Researchers, University of Melbourne.

Dawkins, J. 1992, 'Security in Retirement - Planning for Tomorrow Today', a statement delivered on 30 June 1992 by the Honourable John Dawkins, MP, Treasurer of the Commonwealth of Australia, AGPS, Canberra.

Department of Finance, 1991, 'Handbook of Cost-Benefit Analysis', AGPS, Canberra.

Department of the Treasury, 1992, 'Tax Expenditures Statement', AGPS, Canberra

Dilnot, A.W., 1990, 'The Distribution and Composition of Personal Sector Wealth in Australia', *The Australian Economic Review*, 1st Quarter, pp. 33-40.

FitzGerald, V.W., 1993, 'National Saving: A Report to The Treasurer', AGPS, Canberra.

FitzGerald, V.W. and Harper, I.R., 1993, 'Super Preferred or "Level Playing Field"?: Implications for Saving and the Financial System', in Head, J.G. (ed.) Fightback! An Economic Assessment, papers from a conference organised by the Public Sector Management Institute, Monash University, Australian Tax Research Foundation, Conference Series No. 12, Sydney, pp.123-170; revised version of paper presented to the Third Annual Melbourne Money and Finance Conference, Victoria, December 1991.

Kalisch, D. W., 1992, 'Interaction Between Age Pension and Superannuation', in Economic Planning Advisory Council, *Economic and Social Consequences of Australia's Ageing Population - Preparing for the 21st Century*, Background paper No 23, pp74-96, AGPS, Canberra

PEOPLE , 1990, 'User's Manual Version 2.0', prepared by Overseas Development Administration, United Kingdom and Economic Planning Unit Kuala Lumpur, Malaysia

APPENDIX A

TASK FORCE ON RETIREMENT INCOME MODELLING

TERMS OF REFERENCE

General

To develop a capacity for modelling the impact of retirement income policies over the next half century (see attached Press Release) and to provide advice to departments and Ministers as required on policy options affecting retirement incomes.

Specific

1. The RIM Task Force will construct state-of-the-art computer based dynamic simulation models, of both an aggregate and individual-based (hypothetical) type capable of providing quantitative answers to the following issues:

1.1 The impact over a fifty year time horizon of various retirement income policies (in the taxation, social security, labour market and superannuation regulation areas) on:

- the quantum and distribution of retirement benefits
- the age pension system and the social security system generally
- the quantum and distribution of superannuation tax concessions
- the fiscal balance
- superannuation assets
- private sector saving
- national saving
- workforce participation and retirement patterns

1.2 The sensitivity of model results to key parameters, including:

- demographic variables
- retirement benefits commutation patterns
- lump sum dissipation patterns
- fund earnings rates
- key macroeconomic and microeconomic variables
- the retirement age decision
- contribution/earnings patterns over the life cycle
- relevant tax, superannuation and social security parameters

2. The technical aspects of the construction of these models will be supervised by a RIM Steering Committee (comprising officers of the Treasury, the Department of Finance, the Department of Social Security, the Australian Government Actuary, Dr Vince FitzGerald and Professor John Piggott) which will approve model specifications and development timetables, and regularly review progress.

3. While the development of the models is proceeding, the Director of the Task Force will be required to ensure that each of the Departments referred to in 2. above has access to confidential advice on the longer term implications of policy options under consideration, on the basis of the models as they stand, together with adequate explanations of the capability and limitations of the models as at the time the advice is provided.

4. The models will be fully documented on an ongoing basis, and the Director of the Task Force will be required to ensure that at appropriate stages of the models' development, and on completion of the development work, each of the Departments referred to in 2. has full access to models and associated data and training in the use of the models.

5. The Task Force will have regard to the relevant academic and official work in the retirement incomes area. It will be expected to establish contacts with others working in the area, including overseas, and to publish details of modelling methodologies employed in its work.

6. The progress of the Task Force will be reviewed at the end of its first year of operation when these Terms of Reference may be amended.

Notes

It is noted that the Task Force will have access to the National Mutual retirement Income Policy Model on terms set out in an existing agreement of 1 May 1992 between National Mutual Life Association and the Department of Finance (copy attached) and will therefore be responsible for ensuring that the terms of the agreement with National Mutual are complied with.

Attachment B

The National Mutual Retirement Incomes Policy (RIP) Model

The Retirement Incomes Policy Model (RIP) is a model 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:

- 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;

- 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; and

- 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, benefit 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 the accumulated superannuation benefits of each age cohort up according to an 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.

Recent Developments

Key developments of the model have been:

- An improved estimation of tax expenditures, using extra model runs initially but upon further development through incorporation of additional accounts.

- The facility to model the accumulation of non superannuation assets endogenously, with accumulation rates as a function of age sex and time (good data for the rates is not yet available).

- A considerable extension of the time scale of the modelling to 2056 (rather than 2029).

Strengths and Weaknesses

The strengths of the RIP model are:

- its completeness, particularly the detailed modelling of superannuation processes including different account types and preservation and vesting rates and the modelling of disability and death benefits as well as age retirement.

- the very extensive parameter set which gives the facility to access a wide range of policy options without modifying the model's structure.

The weaknesses of the model are seen as:

- the very limited ability to allow for variation within an age, sex cohort:

    - Specifically there is only a limited 4 point, exogenously supplied, salary distribution which will give only a crude interaction with eg. the complex Social Security income and assets tests;

    - the model does not include a married, not married variable; and

    - similarly there is effectively no ability to allow for variability in labour force experiences.

- the 'tontine' effect: even if a member of a person cohort joins the group later e.g. a migrant, they share equally upon retirement with all others in the group. This can also be a significant problem, where for a new policy, a new group start contributions at a specified time and are mixed in with existing contributors (some development work is under way to try to overcome this.)

- the model is deterministic and does not allow for stochastic variations in outcomes (due to random fluctuations in, say, earning rates).

- the unusual object oriented language Smalltalk in which the code is written. While this is intrinsically a powerful and versatile modelling language it is:

- not well known and takes a lengthy period to master; and

- uses extensive computing resources and time.

Apart from the last point, the weaknesses of RIP are intrinsic to grouped models. Finer scale subdivision of the group is required and this is envisaged in a model being designed by the Task Force. Alternatively, dynamic microsimulation techniques can be made which focus on tracking the experiences of individuals or very small groups.

Base Parameter Assumptions

Population: Rates underlying ABS Series A (projected through PEOPLE model).

Economic: Current and recent rates projected from 1995 on at:

- 4% inflation;
- 8% earnings rate for superannuation funds (after costs but before tax);
- 5 1/2% growth in Salaries and AWE.

Taxation

- Current income taxation rates, changed in 1996 to Government indicated rates.
- 15% earning tax on superannuation funds - assumed to be an effective 7% rate.

Savings Replacement

- 50% of available funds released in the absence of compulsory and concessional superannuation would be saved;
- these alternative savings to superannuation taxed at 24% marginal rate .

Retirement

- Pension rates and tests for income and assets tests indexed to AWE
- Retirement stream comprises 20% non indexed annuity and 80% conversion of lump sum to simple interest income stream earning 7 1/2% pa. Nil dissipation of lump sums in base case.