RETIREMENT INCOME MODELLING TASK FORCE

The Distribution of Superannuation by Sector, Account Type and Personal Characteristics

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INTRODUCTION

This paper reports results for the distribution of assets and contribution rates for Australian superannuation funds on a highly disaggregated basis by

- sector (private, public, or self employed);
- broad classification of the type of superannuation account; and
- the characteristics of the persons holding the accounts in terms of gender age and (lifetime) income decile.

The paper also reports on the associated 'mapping' or disaggregation of the total numbers of working persons of a given gender age and decile (*gad*) onto the type of account which is their principal account.

The work described here has been developed as parameter research for the RIMGROUP project of the Retirement Income Modelling Task Force. This model which is currently being finalised is a comprehensive group projection model of the Australian Population which starts with a population and labour force model, tracks the accumulation of superannuation in a specified set of account types, accumulates non superannuation savings, and calculates tax payments and expenditures, social security payments including pensions and the generation of other retirement incomes. These projections are done for each year of the 60 plus years of the projection period *separately for each birthyear gender decile cohort*. The model projections begin in 1992 and the emphasis of the work reported here has been to obtain starting values for 1 July 1992 together with appropriate trend values for subsequent years. The RIMGROUP model builds upon and extends the task force's aggregate modelling capability which has used its enhanced version of the RIP model. The RIP based aggregate modelling has been of policy significance and the results have been reported earlier and at this Colloquium including in FitzGerald (1993), Gallagher et al (1993), Rothman and Bacon (1994), RIM Task Force (1994) and Gallagher (1995). More details on the RIMGROUP model are given in Gallagher and Preston (1993) and Gallagher (1995).

A brief summary is presented of the data sources used, some of which were developed specifically for this work. This is followed by a summary of the account structure used and the factors influencing the choice made. A new analysis of multiple accounts (using multiple data sources) is then developed as a necessary step towards the allocation of aggregate assets and contribution flows to particular account types and the estimation of the total numbers of persons with that account type as their principal account.

The assets and contributions for a specified set of account types are then allocated by gender age and decile. Given available data this process is not straightforward and usually involves the synthesis of multiple, incomplete and sometimes conflicting data sources, with different approaches needed for the private sector self employed and the public sector. In particular the public sector data should be regarded as preliminary estimates only.

Related processes are used to estimate a mapping of the total numbers of working persons of a given gender age and decile onto the type of account which is their principal account. Taken together the data synthesis methods create a full picture of superannuation assets, contributions and numbers by gad for each account type within sector. The distributional and equity aspects of these detailed results are discussed briefly together with indications of possible policy usefulness even outside the full RIMGROUP model.

DATA SOURCES

A principal data source has been two files made available by the Insurance and Superannuation Commission (ISC) as SAS data bases which provide key data items from their 1991/92 returns for both superannuation funds and ADF's aggregated by size of fund to preserve confidentiality.[1] Both files have both stock and flow information and importantly the superannuation file includes some differentiation by type of fund and public and private sector (as assessed by the ISC staff). There is some information on gender of the members but not on assets or contributions by gender, and no information on age or salary of members nor of the number of members who receive payouts. The data is known to exclude funds which have all their investments in insurance policies and this appears to exclude up to 50% of rollover funds. One unfortunate but apparently unavoidable aspect of the data is a large number of missing values (up to 20% or more for some variables), some of which really mean zero and some of which are really non zero and missing.

The Task Force also has available to it three further special files which expand its data base considerably further than published information. The first of these comprises a collection of files on individual private sector superannuation accounts and contributions prepared by Colin Brown and described in his paper (Brown, 1994). These files are unique in the detail of the information they hold being categorised by gender, age group and salary. However some limitations of the data remain, particularly in relation to comprehensiveness and accuracy of the salary information and the representativeness of the sample. These limitations will be discussed later in the paper in relation to aspects where they impact on this study.

The second of these is a file prepared for the Task Force from the ABS Superannuation Survey. This provides grouped data including most of the data items used to produce the ABS publication summarising the November 1993 Survey (ABS, 1994). This allows detailed computer analysis of aspects such as personal and member contributions to superannuation and lump sum payments received, allowing analysis by sector, sex, age and income and cross tabulations and detail not covered in the publication.

The third file is an extract of the data base of the Australian Taxation Office (ATO) providing grouped data detailed information on tax payments related to superannuation, ETPs, pensions and annuities together with a very rich set of classifying data by gender, age, income, occupation and whether or not the person is self employed. The data set is a powerful one for the areas covered as in contrast to the above two sets of files it is based on census data rather than survey samples. Attachment A provides a specification of the data items included in the ATO SAS data set.

Additionally a paper collection of information on Australian public sector superannuation has been assembled which, despite its limitations, is likely to be broader in scope than any other collection in Australia. All major States have kindly responded to initial telephone inquiries and provided useful published material mainly at the aggregate level; South Australia has also provided more detailed material on an age/sex/income basis. Limited information on Public Trading Enterprises (such as Australia Post and Telstra) has been obtained while literature searches and searches for experts in this field have had extremely limited success.

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[1] The provision of these files by the ISC's Statistics Unit is greatly appreciated.

CHOICE OF THE ACCOUNT STRUCTURE

Separate account types were considered appropriate where:

- the taxation treatments are different, eg for the self employed;
- where the size, contribution rate and/or nature of the benefit are markedly different and therefore significant in terms of level of benefits received and possibly in terms of modelling approaches eg public sector vis a vis the private sector (see below) and those receiving benefits at the SGC schedule level compared with the sub group who at the start of the model have been members of established, more generous schemes for many years;
- where there is significant public and /or industry interest in tracking the separate account stocks and flows; and less importantly
- where there are differences in preservation rules.

The desire to meet these criteria must be tempered by paying due regard to the known limitations of the available data bases and the obvious desirability of keeping the number of accounts to be used in a large and complex model to a cost effective set.

The ISC file shows clearly that Public Sector superannuation is markedly different from Private Sector superannuation in terms of higher average contributions both for member and employer and the sharply different make up by defined benefit (db) vis a vis defined contribution (dc) schemes; in the public sector 85% are members of db, in private only 15%. Additionally defined benefit schemes are very different to defined contribution schemes in the level of contributions and assets per member. More details of these differences is shown in Table 1 below.

Within this framework and considering these facts the following account structure was selected:

Private Sector

1. Accounts for those with substantial longer term pre SGC superannuation coverage provided by their employer under a **defined benefit** scheme. Call this the private defined benefit established **PRDBE sub group.**

2. Accounts for those with substantial longer term pre SGC superannuation coverage provided by their employer under a **defined contribution** scheme. Call this the private defined contribution established **PRDCE sub group.**

3. Accounts for those with only award and/or SGC superannuation coverage provided by their employer. Call this the private defined contribution SGC **PRSGC sub group.**

Self employed

4. Accounts for those who are **self employed or employers**. Call this the self employed **PRSEL sub group.**

Public

5. Defined benefit funds analogous to Account 1. Accounts for those with substantial longer term pre SGC superannuation coverage provided by their employer under a **defined benefit** scheme. Call this the public defined benefit established **PUDBE sub group**.

6. Defined contribution funds which are analogous to Accounts 2 and 3. Accounts for those with only award and/or SGC superannuation coverage provided by their employer **and** those with longer term defined contribution coverage. Call this the public SGC **PUSGC sub group.**

Personal/Rollover

7. Accounts to represent the total coverage of rollover funds including both ADFs and DAs together with the substantial funds in personal superannuation. Call this the **ROLL sub group.**

The following should be noted in relation to this structure:

- The structure allows a relatively simple mapping of individuals to schemes: persons are a member of only one of subgroups 1 to 6 - their principal account, together with a share of the group's (ie cohort/decile's) personal/rollover fund.

- Employer and member monies are not separated in this account structure and this reflects the way data is normally kept. However, information on (post 1983) initial balances of undeducted contributions will be estimated and kept.

- The public sector analogue of subgroup 2 (**PRDCE sub group)** has been joined with the analogue of sub group 3 (**PRSGC sub group**) as the data shows a negligible level of funds in established public sector defined contribution schemes.

- The creation of a joint account consisting of personal monies together with rollover monies is partly for the sake of simplicity as there is no reliable basis for allocating the aggregate of personal funds over the other principal accounts and partly because recent changes have made rollover funds much closer in character to personal funds.

ESTIMATION OF MULTIPLE ACCOUNTS

To allocate superannuation aggregates to individuals in accordance with the above framework consideration has to be given to the apparent existence of multiple accounts per person. Past attempts (Brown, 1994 and ISC, 1993) to estimate the number of multiple accounts have used the aggregates provided by the ISC and ABS to obtain ratios of about two accounts per person for both the public and private sector. No attempt has been made to subdivide the ratios, other than by Sector, and in the absence of better information the ratios obtained have been used to multiply up the information on account based aggregates and contribution rates as in Brown (1994). My work, reported in more detail in a working paper (Rothman, 1995a), extends the earlier approaches to consider the question of multiple accounts on a more detailed basis having regard to the type of superannuation coverage of the member, whether there is more than one account contributed to by the employer or more than one account contributed to by the member and how the number of multiple accounts may vary by defined benefit or defined contribution type. However it is still not

possible to obtain multiple account information by age and sex because the ISC database which plays an important part in the exercise has no data available on this basis.

General Approach

The broad approach taken has been to use:

- the detailed cross classifications available in the ABS file to the maximum extent possible-(by type of superannuation cover, by sector, provider of scheme and whether more than one personal contribution made);
- use some judgement in allocating member/personal multiple accounts across type of superannuation coverage;
- then use the ISC file to indicate the number of employer multiple accounts from the number of extra accounts still outstanding (after the member/personal accounts have been identified); and
- use judgement in allocating those additional accounts across superannuation coverage groupings.

An important part of the methodology is to consider **only accounts to which current contributions are being made** (call these **current** accounts) as this is the basis of the ABS file and it is also reasonable to assume that much less money is held in inactive accounts than in current accounts; the calculations of earlier broad ratios included both current and inactive accounts and pensioner accounts.

Some Results

While accepting that the results cannot be precise because incomplete data are available and judgement has been used, some interesting deductions can be drawn and patterns seen. These include:

- while only some 138,000 people have superannuation coverage **solely** through personal accounts, some 1,200,000 personal accounts exist in addition to the accounts for the self employed. This derives from ABS data but lines up very well with the ISC data on numbers of various account types.
- individuals making more than one member/personal contribution represent only about 12 per cent of the group making some member/personal contribution; therefore the multiplier to be used in, for example, calculating contribution rates for member/personal contributions from account based data is less than 1.2 rather than the earlier ratios of over 2 (which did also cover inactive accounts, but these are not relevant for contribution rates).
- the extent of multiple accounts is higher for employer accounts; the detailed allocations in the Working Paper (Rothman, 1995a) show that the estimated level does not exceed about 60 per cent, ie an implied multiplier of 1.6, still significantly lower than the ratios of over 2 that have been used earlier.

- the number of multiple accounts is much lower for the public sector vis a vis the private sector.

What are the underlying causes for multiple current employer accounts?

As just stated, there are apparently many multiple **current** employer accounts. This is to some extent counter intuitive: many employers resent paying even for the SGC ; why would they want to pay several times for one employee? The principal reasons are believed to be:

- multiple jobs held by employees; however this is not a dominant effect as the ABS reports that only some 4% of workers have multiple jobs (ABS, 1991);

- unusual arrangements, such as in the Commonwealth where if superannuation associated with performance pay is requested it must go into a separate (employer and member supported) superannuation account;

- importantly, situations where an existing scheme was in place when the **award** arrangements were implemented and required that monies to be paid to a different fund, and so two separate active accounts were created for the one employee;

- a **period reporting** effect where some of the accounts reported to the ISC as current are in fact inactive. The employee has left one job but has continued to be recorded as active because of infrequent communications between the employer and the fund and/or fund rules which keep someone as active if any amount has been paid in the past year or several years. The ABS file is strictly about superannuation coverage at a point of time (although some additional questions are asked about previous cover if there is no current cover). As almost 20% of workers change jobs in a year this could possibly be a significant effect. A related effect which can be included under this heading would be where an employee has several, say seasonal, jobs over the course of each year in different industries and therefore has several accounts, active in the sense of receiving a contribution at least once a year but with no more than one contribution at any point of time.

The last two effects are likely to be the most significant and may have interesting consequences as will be explored in the next Section. If the ***period reporting*** effect is dominant, then pro rata fitting (across account types) of ISC accounts to ABS numbers seems appropriate. If the *extra account to meet **award** requirements* mechanism is dominant, then most of the extra accounts must be award/SGC accounts and a typical situation will be one generous account plus say half of an SGC account.

AGGREGATE ALLOCATIONS

Two aggregate allocations have been made:

- Assignment A (left hand side of Table 1) takes out personal accounts for employees (as prima facie multiple accounts) and then separately for the public and private sectors makes a pro rata downward adjustment to fit the ABS numbers.

- Assignment B (right hand side of Table 1) also takes out all personal accounts for employees (as prima facie multiple accounts) and also considers separately the public and private sectors.

However in this case almost all the additional active employer accounts are taken as SGC/award accounts. In the average assets calculations a person who has a generous account as their principal account is assigned one generous account together with typically, in the private sector, 0.45 of an SGC/award account; for those with an SGC account as their principal account, a lower ratio of multiple SGC accounts is assigned, with the ratio calculated to balance the assets in aggregate.

For both assignments, average assets and contribution rates are estimates based on the above analysis using the ISC and ABS files as revised in the light of additional material, including some new estimates on industry funds. The self employed are based on an individual analysis which allows for multiple accounts -see section below. Apart from the self employed, in Assignment A there are fewer members of the generous accounts with higher starting assets but little difference in contributions. Table 1 below presents some summary results. The differences appear acceptable given the overall level of uncertainty and Assignment B will be used for the remainder of the allocation process.

Table 1 Australian Superannuation Aggregates, July 1992

		Assignment A		Assignment B	
	Adjusted assets $b	ABS adjusted no of members millions	$ average assets per member	ABS adjusted member millions	average assets adjusted for multiple
1.PRDBE	35.98	0.69	52089	0.78	47632
2. PRDCE	16.83	0.94	17877	1.05	17538
3. PRSGC	10.23	2.21	4631	1.94	3855
4. PRSEL	11.00	0.36	30564	0.36	30564
5. PUDBE	37.85	1.09	34883	1.15	33015
6. PUSGC	1.10	0.42	2646	0.42	2344
7. ROLL	33.00				
8. Pensioners	8.00				
Total	**154.00**	**5.70**		**5.70**	

1.PRDBE	Private Sector	Defined Benefit	Established
2. PRDCE	Private Sector	Defined Contribution	Established
3. PRSGC	Private Sector	SGC/Award only	
4. PRSEL		Self employed	

5. PUDBE	**Public Sector**	**Defined Benefit**	**Established**
6. PUSGC	**Public Sector**	**SGC/Award and other DC**	
7. ROLL	**Personal/Rollover**		

	Assignment A average annual contribution		Assignment B average annual contribution	
	employer	mem	employ	memb
1.PRDBE	$2,843	$1,042	$2,868	$953
2. PRDCE	$2,437	$122	$2,535	$140
3. PRSGC	$1,076	$59	$896	$78
4. PRSEL	$0	$1,417	$0	$1,417
5. PUDBE	$4,230	$1,631	$4,009	$1,541
6. PUSGC	$640	$58	$584	$53

It should be noted that in adjusting to ABS data on assets, an allowance has been made for capital in the superannuation system, mainly in the public sector, which produces income used to pay current pensioners - Account 8: Pensioners. This is necessary because the RIMGROUP model calculates accumulations for those in the labour force and then allocates retirement income based on accumulations at retirement.
The estimates are self benchmarked to the extent that key totals have already been adjusted to align with ISC and ABS data. Greater difficulty lies in the disaggregation where comprehensive data does not exist. Similarly the data synthesis to allow for multiple accounts has a reasonable basis but is not unique. Accordingly the above data seems plausible but is not definitive.

ASSET DISTRIBUTIONS FOR THE PRIVATE SECTOR

Assignment B aggregates have been used in conjunction with the Brown study to estimate superannuation asset balances for the private sector on a detailed basis by gender age decile and account type. The steps are:

- split the aggregate for a given account by gender using the Brown gender relativities for average assets;
- map the Brown data which is by dollar based income groups into deciles;
- scale the results to match the overall numbers and assets derived earlier; and
- allocate multiple accounts.

The methodology is described in more detail in a working paper (Rothman 1995b). The balances calculated include balances built up from employer and member contributions and an allowance for multiple accounts. Table 2 below is an extract from this analysis and shows the account balances for the age range 55-59 years separately for the principal account types - defined benefit established,

defined contribution established and SGC/Award - and for men and women using the deciles 1, 4, 7 and 10 to show the distribution over lifetime income groups.

Table 2. Private Sector Asset Balances July 92

men		Decile			
account	age	1	4	7	10
dbe	55-59	14749	26386	56162	188712
dce	55-59	19385	19385	33096	91716
sgc	55-59	3777	5249	10106	12602
women					
account					
dbe	55-59	4808	33720	33720	76277
dce	55-59	3102	26454	26454	46952
sgc	55-59	2670	4391	4391	6935

The table shows the wide dispersion of asset balances between deciles particularly for the established accounts and the much higher balances for men compared with women[2].

PRIVATE SECTOR SUPERANNUATION CONTRIBUTIONS

Using the same methodology, employer and member contributions have been derived by gender age and income decile for each private sector account type. In line with usual practice they are presented as percentages of salary. Illustrative data for one age group is presented in the following two tables. It should be noted that Table 4 setting out member contributions does **not** include personal contributions (as made to private institutions such as the AMP or National Mutual and not put into the same account as the employer contributions). However all contributions do include allowance for multiple accounts as appropriate.

Table 3 Employer Contributions as percentages of salary

men		Decile			
account	age	1	4	7	10
dbe	35-39	2.8	5.3	7.2	16.1
dce	35-39	2.4	4.5	6.2	13.9

[2] Some asset values are the same for different deciles because the mapping process cannot distinguish and smoothing has not been applied

sgc	35-39	1.0	1.9	2.6	5.7
women					
account					
dbe	35-39	5.4	10.3	10.8	16.9
dce	35-39	4.7	9.0	9.3	14.7
sgc	35-39	1.9	3.6	3.8	5.9

Table 4 Member Contributions as percentages of salary

men		**Decile**			
account	**age**	**1**	**4**	**7**	**10**
dbe	35-39	1.9	2.7	2.8	2.9
dce	35-39	0.2	0.3	0.3	0.3
sgc	35-39	0.2	0.2	0.2	0.3
women					
account					
dbe	35-39	2.0	2.6	3.1	4.1
dce	35-39	0.2	0.3	0.3	0.5
sgc	35-39	0.2	0.2	0.3	0.4

It is noticeable that percentage contributions for women are mostly higher than for men in complete contrast with the asset balances. The higher employer percentages for women is likely to be an artificial result of the methodology. Reflecting data availability and also the concept that being a part time worker is a temporary state not a lifetime one, part and full time workers are considered as one group and consequently women's decile salaries are lowered more because of the higher proportion of part timers; the most likely actual situation is that the percentage employer rates are the same for men and women.
There is wide dispersion in employer contribution rates across deciles, even expressed as a percentage of salary. On the other hand there is very little dispersion in member contribution rates as a percentage of salary across deciles. It should be noted that the member contributions are averaged over all members of the group even though only one half or less of the group may actually be making a member contribution. This is a 'pooling' effect which is a feature of group models such as RIP and RIMGROUP.

ESTIMATING SUPERANNUATION PARAMETERS FOR THE SELF EMPLOYED

The estimation of the superannuation contribution rates, assets and the mapping of people to accounts for the self employed group (defined as including employers) has required a different approach because:

- the Brown Study (Brown, 1994) does not separate out the self employed from the general private sector data;

- the ABS file does not give any income information for the self employed;

- assessing lifetime income deciles for the self employed as part of the general decile study has proved to be very difficult reflecting the highly variable income of this group; and

- the ISC file aggregates assets and contribution rates for the self employed with personal assets and contribution rates for other sectors.

Contributions

The best information on the self employed comes from the revised and extended ATO file enhanced by the inclusion of information on the self employed who **do not** contribute to superannuation to complement the data on those who do contribute. There is no direct specification on the ATO master file of self employment so the derivation of this data required a complex selection from the ATO master file. This file was then adjusted to use the data on tax deductions in respect of superannuation paid by the self employed to give an estimate of the **actual amounts contributed**; this adjustment has to be made as only 75% of amounts above $3000 contributed to superannuation by the self employed are allowable deductions and there is accordingly a one to one mapping from deduction to contribution (based on the average contribution for each group). This latter adjustment gives the aggregate amounts contributed by the self employed in 1992-93 as $m 927.

From the adjusted file, tables were directly obtained by gender, age, and taxable income group on the number of self employed contributing to superannuation and the amounts contributed together with the numbers choosing not to contribute. This data was then mapped into decile groups within each age and sex category on the basis of 1992-93 taxable income and the material summarised in our standard gender, age and decile basis in terms of:

- the proportion of each group making a contribution;

- the average dollar contribution made by those contributing in each group; and

- the percentage of income contributed (for those contributing).

Table 5 Proportion of Self Employed Making Contributions

men

	decile			
Age	1	4	7	10
25-29 years	0.22	0.14	0.41	0.47
35-39 years	0.31	0.56	0.55	0.66
45-49 years	0.35	0.45	0.56	0.66
55-59 years	0.24	0.28	0.65	0.61

women

	1	4	7	10
Age				
25-29 years	0.05	0.11	0.29	0.30
35-39 years	0.07	0.43	0.36	0.40

45-49 years	0.13	0.42	0.23	0.41
55-59 years	0.09	0.15	0.20	0.37

Table 6 Dollar Value of contributions for the Self Employed who make Contributions

	men decile			
Age	1	4	7	10
25-29 years	868	897	941	1427
35-39 years	1167	1138	1470	5259
45-49 years	1972	1464	1651	10043
55-59 years	2058	2253	2697	14319

	women			
	1	4	7	10
Age				
25-29 years	750	703	838	1707
35-39 years	979	924	1103	3388
45-49 years	1364	1351	1706	4565
55-59 years	2473	1873	2598	6470

The abbreviated results of this analysis are presented in Tables 5 and 6. Full results are in a working paper (Rothman, 1995c). The results look sensible and plausible. Inter alia, the data shows a much higher proportion of men contributing than women, the proportion contributing peaking in the age range 45-49 years and rising generally with income decile. A cross check with the ABS data of the dollar amounts contributed shows broad compatibility but with higher averages in the ATO data as the ABS top grouping for superannuation contributions is 'above $70 per week' and this is too broad a group when contributions for some groups are over $400 per week (according to the ATO).

The results showing the proportion of salary contributed are not presented here; they appear somewhat extreme and erratic, reflecting the fact that many self employed persons have zero taxable income but nevertheless pay superannuation contributions. Accordingly RIMGROUP modelling will use the proportions of each group who are making contributions and the dollar amounts that they contribute as more stable parameters to work with than percentage of income. It should also be noted that this contributions data automatically allows for multiple accounts, as the ATO data is based on individuals, not accounts, and gives the total contributions made by individuals.

Assets

While the ATO file has extensive information on contributions it has no specific information on assets, except to the extent that some information may be gleaned about final accumulations before retirement by studying the ETP information on the file. Accordingly the basis for the detailed distribution by age, sex and decile of assets for the self employed has been taken to be the Brown data on DC established accounts. The specific calculation proceeds from an estimate of the

aggregate assets for both sexes made on the basis of the ISC file but with the ratio of male to female account numbers based on the ATO contribution data, ie about 3:1. Table 7 sets out the accumulation for those 55-59 years old, allowing comparison with Table 2.

Table 7. Asset Balances for the Self Employed with Superannuation

		Decile			
	age	**1**	**4**	**7**	**10**
men	55-59	44692	44692	75163	223761
women	55-59	5716	68649	68649	122770

A significant issue faced in arriving at the above results is the apparent conflict between the 292,000 self employed indicated as making contributions in 1992-93 according to the ATO file and the 460,000 self employed contributors according to the 1993 ABS survey. It can be argued that the ATO data is better given that it is a census not a sample and that some of the ABS respondents may in fact be working for themselves through their own small company, considering themselves to be self employed, but legally being employees and therefore subject to the SGC. On the other hand not all the self employed will contribute in any given financial year. Accordingly a compromise figure of 360,000 has been adopted in this analysis as the aggregate number of self employed contributing to superannuation.

PUBLIC SECTOR SUPERANNUATION

Public sector superannuation in Australia is significantly different from private sector superannuation and warrants special attention for a number of reasons:

- public sector superannuation is mostly unfunded and there has been a high level of interest in the level of unfunded liabilities and the trends in these liabilities;
- the public sector has had a higher level of superannuation coverage and generally higher benefits paid to its staff than in the private sector;
- the schemes are mostly defined benefit (DB) compared with the private sector which has mostly defined contribution schemes (DC). According to the ISC data base, in 1991-92 98% of public sector superannuation assets were related to defined benefit schemes with the corresponding figure for the private sector being 38%; in the public sector 85% are members of DB schemes compared with only 15% in the private sector;
- the taxation treatments can be different with 'constitutional protection' or substantial pre 1988 tax credits applying to some funds; and
- the sector is undergoing rapid change with many States closing off their generous defined benefit schemes and offering only Superannuation Guarantee Charge (SGC) type defined contribution schemes for new entrants.

Modelling Approaches

SGC type schemes in the public sector can be readily modelled as defined contribution fully funded schemes fully analogous to those in the private sector. It is much more difficult to develop an adequate model of largely unfunded public sector defined benefit schemes. For example, the flow of employer 'contributions' as measured by the ISC relates only marginally to accumulating funds for current employees; it reflects to a much higher extent the flow of monies to pay those leaving, including retrenchments as well as retirees with some flow to existing pensioners. One modelling approach would be to construct, hopefully, a handful of 'typical' schemes which are broadly representative and to model these using the usual actuarial approaches. A very extensive data collection on contributions and entitlements by gender, age and income decile (and by length of service) would be required as well as information on scheme rules, promotional increases, rates of exit, preservation choices and so on. Such a project was agreed to be beyond the resources and timescale of the Task Force.

As a simpler more practical approach RIMGROUP will model public sector payouts as a multiple of final average salary for any given **age sex and income cohort**. This hinges on information on:

- public sector contributions by gad ;
- the level of payouts for public sector staff in terms of final salary for typical schemes by gad; and
- the percentage of public sector contributions which are unfunded.

This information is needed for all years modelled. This approach is necessarily more limited than the possible 'actuarial' approach outlined above and in particular is unlikely to give reliable estimates of changes in unfunded liabilities.

As indicated in an earlier section only limited data has so far been obtained on public sector superannuation. Even for the limited modelling approach, it is very desirable that this body of material be supplemented by more disaggregated data on a gad basis on :

- contributions
- payouts
- initial distribution of contributors across schemes
- the growth of DC compared with DB schemes
- levels of funding; and, importantly,
- expectations about likely future trends in these quantities.

Appendix 1 sets out the detailed information needs of the modelling of the public sector together with **initial rough** estimates based on the limited data available. Views on the plausibility or any other aspect of these initial estimates and /or offers of additional data to improve the estimates are requested.

MAPPING PEOPLE TO ACCOUNTS

In principle the methodology developed for calculating the assets and contributions distributions for the private sector should automatically provide a mapping of numbers of people into different superannuation accounts at the decile level. Adding up the numbers for a given gad group across the accounts within a sector, we can derive the proportion of each group which owns any particular type of superannuation account. Apart from the self employed, where the ATO file provides a separate and apparently reliable approach set above, there are significant difficulties:

- the methodology relies on the distributional data provided by the Brown study which covered only some 23% of the private sector and, despite best intentions, included only very limited salary data some of which was almost certainly well out of date; and
- uncertainties in the mapping of fuzzy decile boundaries onto this data.

In obtaining average assets and contributions the same mapping is used for both money and people and dividing one by the other, to some extent, the errors cancel out. The mapping of people onto accounts is a much more demanding test of the quality and representativeness of the data and the methodology and the results from the initial mapping process were not good. In particular there appeared to be too many people mapped into the bottom 2 deciles and too few into the middle deciles. Another mapping was attempted which assumed that the Brown salary data was more out of date - particularly for males. This mapping provided much more plausible decile proportions while being reasonably robust in relation to assets and contributions. It has therefore been adopted and the resulting proportional distribution for the private sector (summed over ages) is seen in Table 8.

Table 8
Percentage Allocation of those with Superannuation to particular private sector account types

	men	Percent		
	decile			
	1	4	7	10
DBE	6.8	20.3	30.4	35.0
DCE	30.8	33.1	38.9	52.1
SGC	62.4	46.6	30.8	12.9
	100	100	100	100
	women	Percent		
DBE	4.9	8.0	13.0	28.7
DCE	3.4	4.0	8.1	17.6
SGC	91.7	87.9	78.9	53.7
	100	100	100	100

In RIMGROUP these percentages are applied at the end of a long chain. RIMGROUP produces a population of given age in each year of the model. A labour force module allocates these persons to

the workforce or otherwise and those working to private, public or self employment by income decile. For those working within the private or public sectors[3], a filter is then applied as to the proportion of that group which has superannuation cover (using data from the ABS file). Finally the more detailed version by age group of Table 8 for the particular year of the modelling is applied to map these people onto given account types, which have their own assets and superannuation contributions as estimated above (and also other savings, housing assets and so on).

ISSUES

The most obvious issue arising from the work presented above is the incompleteness of the data sources on Australian superannuation even after the work the RIM task force has done to extend them. This is perhaps most obvious in relation to the public sector but it remains generally true that there is very limited interest from the data providers in extending the sources to include personal characteristics; for example the possible inclusion of more personal data in the redevelopment of the ISC statistical collections was raised by the Task Force but rejected as being of insufficient general interest. In a similar vein the issue has been raised with ABS of extending the usefulness of their Superannuation Survey by including questions on employer contributions or by including a second stage which samples employers as well as people and links the data to the individual. The ATO extract file obtained by the Task Force has proven to be a very powerful data source.

The other important dimension to the above work is the difficulty of projecting forward when trends are far from clear and the policy interventions of the government themselves have a major influence on the way the superannuation will behave. For example, to what extent will private superannuation follow the public sector trend to close off the more generous existing schemes to new entrants and provide only SGC level support? Will the lower proportion of self employed women with superannuation increase over time to approach the proportion of men? What will happen to personal superannuation contributions? The difficulty of answering such questions is considerably compounded in the full RIMGROUP model where many further questions on trends and interactions must be addressed.

CONCLUSIONS

This paper has demonstrated how appropriate data synthesis can provide a plausible and comprehensive picture of the assets, contributions and fund membership of Australian superannuation, both at the sector and fund type level and on a highly disaggregated basis by personal characteristics. The underlying data sets remain incomplete and to some extent inconsistent, despite the work the RIM task force has done to extend them. Accordingly, while the picture developed is considered plausible and is benchmarked at the aggregate level to the extent possible, it cannot be definitive.

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[3] But not for the self employed where the ATO file based methodology provides a direct estimate of the proportion of those in the self employed workforce who are contributing to superannuation .

As part of this process, detailed information from the ABS and ISC superannuation data sets and comparison between these sets has been used to improve our understanding of how many multiple accounts there are and how they are distributed (but still not on an age, income, and gender basis). Again the mapping derived is not unique but appears consistent. The finding that there are relatively few member/personal multiple accounts and many more employer multiple accounts facilitates a better estimation of contribution rates and asset allocations than the previous single multiple method. The relative importance of possible causes of multiple active employer accounts influences the estimation of how many persons have the more substantial established accounts and the estimation of their account balances.

The distribution of assets and contribution rates is fairly robust to the mapping of original distributional salary data into income decile groups. The mapping of people onto accounts proved to be a more demanding test of the quality and representativeness of the data and of the methodology. However after some trial and error and sensitivity analysis a reasonably consistent set of results has been obtained.

New data analysis for the self employed based on the ATO file appears to have produced reliable results for the contributions, assets and proportions contributing for this group and certainly much more comprehensive results than have been obtained previously.

A preliminary analysis is presented of the public sector. It is hoped that this can be developed further as this will improve the adequacy of RIMGROUP modelling and because there is clearly interest in, and unsatisfied demand for, a good consolidated picture of asset levels and trends in public sector superannuation.

Taken together the above approaches provide a comprehensive picture of Australian superannuation in terms of sector, gender, age and income decile which should help to inform the debate on the equity of the distribution of superannuation by gender, income and sector[4]. In the course of the study some new and useful data sets have been created; the data derived can provide a basis for policy consideration even outside the full RIMGROUP model. For example, the ABS dataset on personal contributions and the new data on the self employed were inputs to policy consideration and costing of the new member contributions policy announced in the 1995-96 Commonwealth Budget.

Obtaining a reliable detailed picture of Australian superannuation for the recent past or the present is hard. Projecting this into the future is even harder. There are no easy solutions to the difficulty of preparing projections where past trends are unlikely to be a reliable guide, and it seems that one must rely on expert opinion and the judicious use of sensitivity analysis.

[4]The detailed picture is of the situation as at June 1992, prior to the implementation of the Superannuation Guarantee Charge. How the distributions have changed since then will be addressed in the full RIMGROUP model but is not specifically addressed in this paper.

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Attachment A

ATO FILE DATA ITEMS

Classification	Gender		
	Age (Single years from age 16)		
	Band of taxable income		
	Whether or not self employed		
	Occupation		
	Tax Status (Taxable and non taxable individuals)		
Aggregates	Number of individuals	(N)	
	Sum of taxable income of group	($)	
	Sum of gross income of group	($)	
	Sum of tax paid by group	($)	
	Sum of superannuation rebate	($)	
	Number with superannuation rebate	(N)	
	Sum of self employed superannuation contributions	($)	
	Number with self employed superannuation	(N)	
	Sum of termination rebate	($)	
	Number with termination rebate	(N)	
	Sum of salary and wages	($)	
	Number with salary and wages	(N)	
	Sum of Australian Government pensions	($)	
	Number with Australian Government pensions	(N)	
	Sum of Annuities, other pension, superannuation	($)	
	Number with annuities etc	(N)	
	Sum of ETP 5% assessable	($)	
	Number with ETP 5% assessable	(N)	
	Sum of ETP concessionally taxed	($)	
	Number with ETP concessionally taxed	(N)	
	Sum of ETP taxable - other rates	($)	
	Number with ETP taxable - other rates	(N)	
	Sum of gross dividends received	($)	
	Number with dividends		(N)
	Sum of gross interest received	($)	
	Number with interest	(N)	
	Sum of net rents	($)	
	Number with net rents	(N)	

Appendix 1

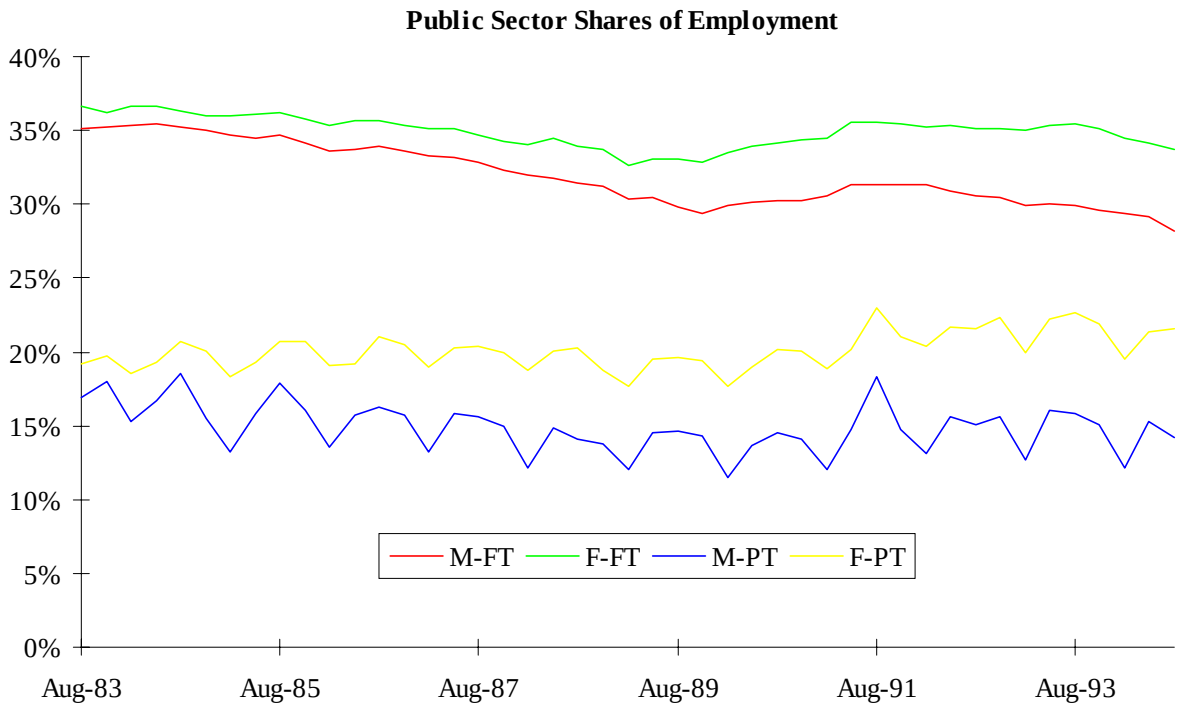
PRELIMINARY PUBLIC SECTOR SUPERANNUATION PARAMETERS

Parameter	1st Round Approach	Suggestion/Comment
1) Relative public sector share of employment over time	Extrapolate recent trends (ABS data)	Some further downward trend must take place with privatisation. ABS trends show some decline in in public share for men working full time- see Attachment A.
2) Relative membership of defined benefit to SGC funds: proportion of members belonging to each fund by age sex income at the starting point and changes over time in the proportions.	Starting point analysis require information on numbers of members for a sample of each type of fund by age sex income at the starting time point. Changes analysis requires in principle a detailed model of both closed and open funds having regard to losses from the funds, including retrenchments etc. As a first brush use available data on changing size of closed funds eg in NSW	A rough starting point distribution is at Attachment B based on private sector age sex decile distributions. Detailed change analysis has not been done . What is recent experience on changing size of closed funds ?
3) Contributions to DB schemes.	Some sample information available from public sector superannuation study of state schemes etc. Try to weight according to size of scheme and compare with the private sector corresponding figures from (Brown) private sector study . So far public sector study provides very little detail on age, sex and income basis.	Rough estimate is that employer contribution may average about 14.5% of earnings, member 4.5% A trial distribution based on some S.A. data is at Attachment C.

Parameter	1st Round Approach	Suggestion/Comment
4) Trends in db contribution rates	Assume contributions as a percentage of salary is constant over time	
5) SGC contributions	Use SGC schedule and assume no extra above schedule	
6) Per cent of employer contributions that are funded and trends in this proportion.	Use indicative information available from considering the relative size of current unfunded liabilities compared with actual funds held. Limited information on liabilities and trends is available in the ABS publication 5513.0, Public Sector Financial Assets and Liabilities. No information is available on age sex income.	Difficult to estimate - some contradictory data but overall aggregate data suggests about 30% of employer c**ontributions** are currently funded. This is broadly comparable to the ratio of estimated **accumulated** unfunded liabilities compared to actual funds. Assume that this ratio will continue to rise but at what rate and with what ceiling, noting that the Commonwealth is likely to continue to be unfunded.
7) Public sector payouts	Very similar situation to 3) above. Some very broad information available from public sector study but lacks age sex income detail.	Using data on distribution of Commonwealth pensions and private sector distributional data for cash part of payout some rough payout multiples have been estimated - see Attachment D. Better data is very desirable.

Parameter	1st Round Approach	Suggestion/Comment
8) Trends in public sector payouts	Assume constant payout multiples (of final salary) over time: more generous schemes are being phased out but level of preservation is increasing.	
9) Taxation parameters	Assume nil taxation of both employer contributions and earned interest (on both employer and member funds) for State funds for the foreseeable future given the large amount of pre-1988 credits and the 'constitutional protection' decisions. Estimate a rough proportion for the percentage of payouts to be considered derived from untaxed funds vis a vis taxed funds.	Base proportion for the percentage of payouts to be derived from untaxed funds vis a vis taxed funds simply on the numbers in each class of funds.
10) Starting distributions for SGC/Award assets	Use private sector distribution from Brown study and reweight by ISC.	Exact distribution is not very important because of the low level of current assets per person.
11) Starting distribution of defined benefit scheme assets (actual not unfunded)	Use Brown private sector asset distribution	Exact distribution is not very important because payouts are based on private sector payouts and the relative payout ratios (see 7 above). An initial distribution based on private sector data is at Attachment E.

Attachment A to Appendix1



Attachment B

Mapping of public sector persons to superannuation accounts

	men			decile							
	Dec-01	2	3	4	5	6	7	8	9	10	total
number with sg/award	35628	25149	26471	27992	19019	17225	17125	15061	14133	10222	208026
number with established super	18892	14293	46758	59160	59161	60144	81837	88995	126723	134036	690000
total with super	54520	39442	73229	87153	78181	77370	98962	104056	140855	144258	898026
percent with sg/award	65.3	63.8	36.1	32.1	24.3	22.3	17.3	14.5	10.0	7.1	23.2
percent with established super	34.7	36.2	63.9	67.9	75.7	77.7	82.7	85.5	90.0	92.9	76.8
total with super	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

women

	decile										
	Dec-01	2	3	4	5	6	7	8	9	10	total
number with sg/award	24034	20206	18463	23035	23239	19170	18366	19175	22690	23598	211974
number with established super	15625	13329	16331	25830	26457	34535	37094	51530	84724	154546	460000
total with super	39658	33535	34794	48865	49696	53705	55460	70704	107414	178143	671974
percent with sg/award	60.6	60.3	53.1	47.1	46.8	35.7	33.1	27.1	21.1	13.2	31.5
percent with established super	39.4	39.7	46.9	52.9	53.2	64.3	66.9	72.9	78.9	86.8	68.5
total with super	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Attachment C

Trial Contribution Rates-Member

4.5 **men**

Age		Decile										
		1	2	3	4	5	6	7	8	9	10	total
15	19	3.4	3.4	3.5	3.5	3.6	3.6	3.7	3.7	3.8	3.8	3.6
20	24	3.6	3.6	3.7	3.7	3.8	3.8	3.9	4.0	4.0	4.0	3.8
25	29	3.7	3.7	3.8	3.8	3.9	3.9	4.0	4.1	4.1	4.1	3.9
30	34	4.0	4.0	4.0	4.1	4.2	4.2	4.3	4.4	4.4	4.4	4.2
35	39	4.1	4.1	4.1	4.2	4.3	4.3	4.4	4.5	4.5	4.5	4.3
40	44	4.4	4.4	4.4	4.5	4.6	4.6	4.7	4.8	4.8	4.8	4.6
45	49	4.4	4.4	4.5	4.6	4.7	4.7	4.8	4.9	4.9	4.9	4.7
50	54	4.5	4.5	4.5	4.6	4.7	4.7	4.8	4.9	5.0	5.0	4.7
55	59	3.6	3.6	3.7	3.7	3.8	3.8	3.9	4.0	4.0	4.0	3.8
60	64	2.8	2.8	2.8	2.9	2.9	2.9	3.0	3.0	3.1	3.1	2.9
65 and		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
average ex 65		4.0	4.1	4.2	4.4	4.6	4.7	4.8	5.0	5.2	5.3	4.1

4.5 **women**

Age		Decile										
		1	2	3	4	5	6	7	8	9	10	total
15	19	3.2	3.2	3.2	3.3	3.4	3.4	3.4	3.5	3.5	3.5	3.4
20	24	3.3	3.3	3.4	3.4	3.5	3.5	3.6	3.7	3.7	3.7	3.5
25	29	3.3	3.3	3.4	3.4	3.5	3.5	3.6	3.7	3.7	3.7	3.5
30	34	3.4	3.4	3.5	3.5	3.6	3.6	3.7	3.7	3.8	3.8	3.6
35	39	3.8	3.8	3.9	4.0	4.1	4.1	4.1	4.2	4.3	4.3	4.1
40	44	4.3	4.3	4.3	4.4	4.5	4.5	4.6	4.7	4.7	4.7	4.5
45	49	4.7	4.7	4.8	4.9	5.0	5.0	5.1	5.2	5.2	5.2	5.0
50	54	4.7	4.7	4.8	4.9	5.0	5.0	5.1	5.2	5.2	5.2	5.0
55	59	4.4	4.4	4.5	4.6	4.7	4.7	4.8	4.9	4.9	4.9	4.7
60	64	4.4	4.4	4.5	4.6	4.7	4.7	4.8	4.9	4.9	4.9	4.7
65 and		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
average ex 65		4.1	4.2	4.3	4.5	4.7	4.8	5.0	5.2	5.3	5.4	4.2

Contribution rates Employer

men

Age		Decile										
		1	2	3	4	5	6	7	8	9	10	total
15	19	10.3	10.3	10.4	10.6	10.8	10.8	11.0	11.2	11.3	11.3	10.8
20	24	10.9	10.9	11.0	11.2	11.5	11.5	11.7	11.9	12.0	12.0	11.5
25	29	11.2	11.2	11.3	11.5	11.7	11.7	12.0	12.2	12.3	12.3	11.7
30	34	11.9	11.9	12.1	12.3	12.6	12.6	12.8	13.1	13.2	13.2	12.6
35	39	12.3	12.3	12.4	12.7	13.0	13.0	13.2	13.5	13.6	13.6	13.0
40	44	13.1	13.1	13.2	13.5	13.8	13.8	14.0	14.3	14.5	14.5	13.8
45	49	13.3	13.3	13.5	13.8	14.0	14.0	14.3	14.6	14.7	14.7	14.0
50	54	13.5	13.5	13.6	13.9	14.2	14.2	14.5	14.7	14.9	14.9	14.2
55	59	10.9	10.9	11.0	11.2	11.5	11.5	11.7	11.9	12.0	12.0	11.5
60	64	8.3	8.3	8.4	8.6	8.8	8.8	9.0	9.1	9.2	9.2	8.8
65 and		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
average ex 65		11.9	12.2	12.6	13.1	13.7	14.0	14.5	15.1	15.5	15.8	12.2

4.5

women

Age		Decile										
		1	2	3	4	5	6	7	8	9	10	total
15	19	9.6	9.6	9.7	9.9	10.1	10.1	10.3	10.5	10.6	10.6	10.1
20	24	10.0	10.0	10.1	10.3	10.5	10.5	10.7	11.0	11.1	11.1	10.5
25	29	10.0	10.0	10.1	10.3	10.5	10.5	10.7	11.0	11.1	11.1	10.5
30	34	10.3	10.3	10.4	10.6	10.8	10.8	11.0	11.2	11.3	11.3	10.8
35	39	11.5	11.5	11.7	11.9	12.2	12.2	12.4	12.6	12.8	12.8	12.2
40	44	12.8	12.8	13.0	13.2	13.5	13.5	13.8	14.0	14.2	14.2	13.5
45	49	14.2	14.2	14.4	14.7	15.0	15.0	15.3	15.6	15.7	15.7	15.0
50	54	14.2	14.2	14.4	14.7	15.0	15.0	15.3	15.6	15.7	15.7	15.0
55	59	13.3	13.3	13.5	13.8	14.0	14.0	14.3	14.6	14.7	14.7	14.0
60	64	13.3	13.3	13.5	13.8	14.0	14.0	14.3	14.6	14.7	14.7	14.0
65 and		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
average ex 65		12.2	12.5	13.0	13.5	14.1	14.4	14.9	15.5	15.9	16.2	12.6

Attachment D

Ratio of Payouts as proportion of final average salary

		Decile									
		1	2	3	4	5	6	7	8	9	10
est payout (cash equiv)	men	40000	89000	130000	163000	175000	203000	230000	273000	326000	474000
	women	21000	55000	74000	89000	95000	109000	122000	144000	170000	263000
average payout ratio at retirement	men	2	4	5	6	6	6	6	6	6	6
as multiple of final average salary	women	1.2	2.5	3	3.7	3.7	3.7	3.7	3.7	5	5

Attachment E

Estimated Funded starting value of Superannuation assets for members of Established (non SG/Award) Funds

men

		decile										
		1	2	3	4	5	6	7	8	9	10	total
15	19	716	1128	1128	1128	2599	2599	4010	4010	3894	3894	2407
20	24	2126	3750	4416	4416	4416	6041	6041	6041	10486	14190	8494
25	29	4781	4781	6308	7969	7969	7969	14929	14929	22910	22811	16136
30	34	5045	6791	9081	9081	17189	17189	17189	28652	31131	42877	24221
35	39	5276	7453	10356	10356	18901	18901	31802	37777	44809	60148	31113
40	44	6022	8182	11689	11689	21295	21295	35188	39523	52442	83157	39619
45	49	8654	11219	14640	14640	26491	26491	41002	44785	64132	106116	48848
50	54	7382	12064	12064	18708	18708	32562	39208	52547	73085	141030	58206
55	59	10698	19559	19559	19559	26009	26009	41927	54874	68107	146834	64687
60	64	10714	2214	21990	21990	29884	29884	46128	46128	60747	134615	66457
65 and		10347	7283	29264	29264	41752	41752	70349	70349	115108	235781	11661
											average	40680

women

		1	2	3	4	5	6	7	8	9	10	total
15	19	831	831	1215	1215	840	840	840	840	2407	2407	1623
20	24	2026	2745	3707	3707	3707	7491	7491	8820	8820	13781	8979
25	29	4669	5964	5964	10777	10777	12205	12205	18407	19713	24789	17107
30	34	3308	8535	8535	8535	8535	8535	10630	10630	20055	35701	22025
35	39	2239	4211	4211	7980	7980	11284	11284	11284	20046	43091	23502
40	44	2313	4873	4873	8743	8743	14371	14371	14371	24471	46618	25996
45	49	2516	5482	10316	10316	10316	17450	17450	28544	28544	50442	29105
50	54	2777	6677	19645	19645	19645	19645	24991	38352	38352	59481	36285
55	59	3528	29269	29269	29269	29269	29269	29269	29269	29269	67156	49111
60	64	4959	8835	8835	8835	27807	27807	27807	43407	55921	111883	65575
65 and		8086	22816	22816	22816	44162	44162	44162	68581	93577	201503	11309
											average	26281