EXPLORATION OF APPLICATION OF ACTUARIAL ACCOUNTING METHODOLOGY TO THE NZ FLAT RATE SOCIAL SECURITY PENSION

Abstract

Explores applying the actuarial accounting methodology as used in the Swedish pension automatic balancing system (and elsewhere) to the New Zealand flat rate universal pension scheme. The NZ scheme is financed entirely from tax revenues and hence application of the method requires ascertaining a long term notional contribution rate and determination of what is meant by “accrued benefit” in this particular case. The full usefulness of the approach is found to be negatively affected by the relative immaturity of the ageing of the NZ population, but the approach produces valuable insights into policy issues around the design and resultant fiscal outcomes of the scheme.

1 BACKGROUND

1.1 New Zealand Superannuation (NZS)

NZS is a flat rate pension payable to any NZ resident aged 65 or over provided that they have completed 10 years residence in NZ, 5 years of which must be after attaining age 50. A person emigrating to NZ at age 66 for example will become eligible for NZS at age 76. The basic policy principle underlying NZS is that retired persons should have sufficient income not just to be kept out of poverty but to be in a position to belong and be able to participate in their society to at least some extent.

The basic rate of benefit to each eligible member of a married couple under current legislation is a net of tax rate of not less than 32.5% of the net of tax annual average wage. The rate payable to single people sharing accommodation with others is 1.2 times this, and for single persons living alone is 1.3 times the basic rate. These differentials are based broadly on living standards work. Net pension rates are grossed up for tax assuming no other income; pensioners with other taxable income pay a higher average rate of tax.

The pension is adjusted each year in a two step process. Firstly, the net of tax married couple pension rate is increased by the increase in the Consumer Price Index (CPI) over the preceding 12 months. Secondly, this figure is compared to 32.5% of the most recent annualised average ordinary time weekly earnings (AOTWE), net of tax (and accident compensation earner levy). If it is below that amount, it is increased. The single sharing and

single living alone rates are then adjusted pro rata, and all are grossed up for tax (but not for the ACC levy, which is not payable on NZS) assuming no other income[1].

The pension is not means-tested, and hence has little effect on decisions to retire from the work force, other than the "signalling" effect of the eligibility age 65. Living standards surveys carried out by the Ministry of Social Development report some 8% of the 65+ population in some degree of hardship, compared to 19% of the whole population. In terms of conventional income poverty measures, NZ ranks very highly for the 65+ group at the 50% of median income level, but very poorly at the 60% level; NZS is the major source of income for people over 65, and has a cliff-like effect[2]. In general, for those who own their own homes, NZS is adequate; but for those with no or little other resources and who rent, or have significant other expenses, supplementary means-tested benefits are needed.

To project NZS rates into the future requires estimates of future levels of CPI, AOTWE, and ACC earner levy rates. It also requires a view to be taken on the extent to which tax scales will be altered as wages increase, because of the net-of-tax definition and progressivity in the tax scale. If tax scales do not change, fiscal drag will act to reduce costs, but no change in scales is unlikely in reality for political reasons, amongst others. Another political issue is whether or not the effective current "floor" of 33% of average wage will remain or revert to 32.5%. Cost will also be affected by any change in the proportions of married couples, singles sharing accommodation, and singles living alone.

1.2 NZS cost issues

The cost of NZS for the year ending June 2008 net of tax recoveries is 3.3% of GDP. Assuming no fiscal drag, this has been projected by the NZ Treasury to rise to 6.9% of GDP by 2058, driven by population ageing (as baby boomers make their way through), and taking into account projections of longevity improvement as determined by Statistics NZ[3]. Figure 1 below shows the central population estimates; assumed fertility and migration rates are such as to hold the population aged up to 65 relatively steady over time, but the increase in those

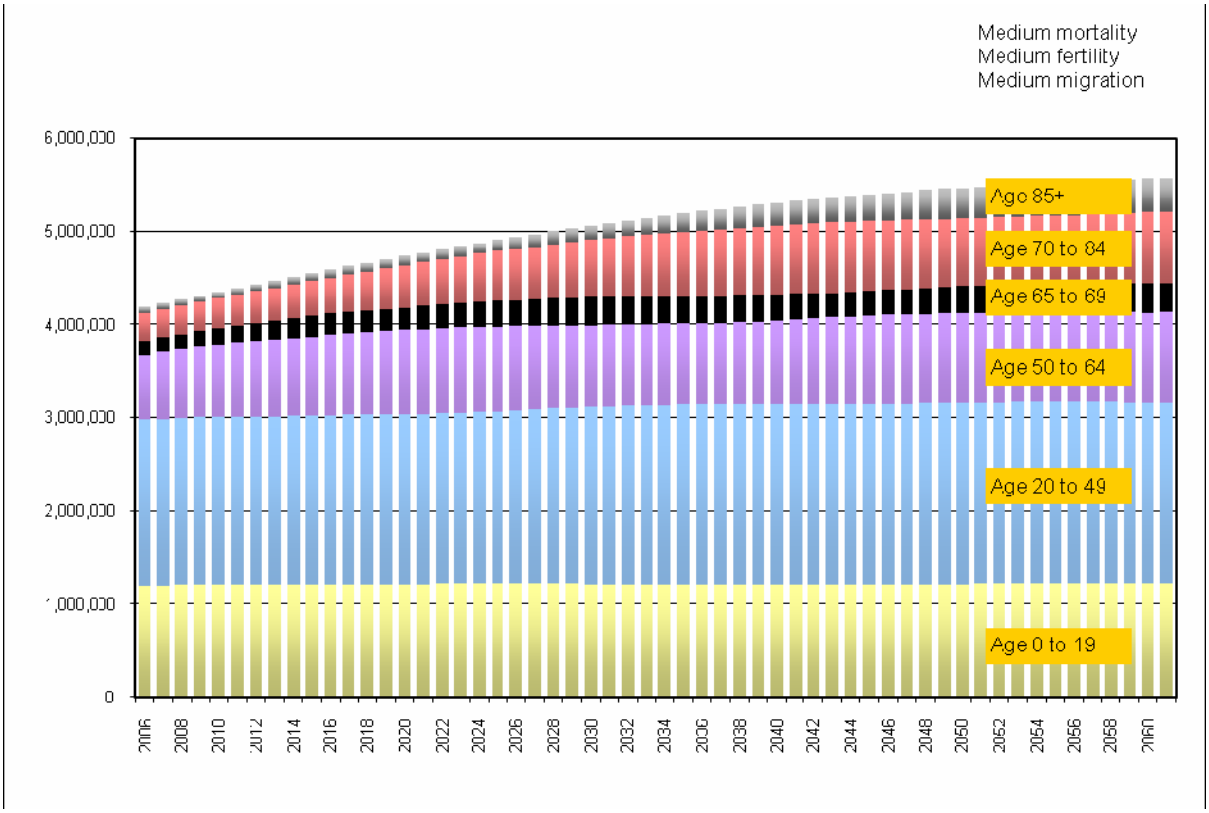
[1] At the time of writing, a Confidence and Supply agreement between the government and another political party requires the floor to be 33% rather than 32.5%. Unless renewed, this will cease after the next election, due October 2008.

[2] There is no mandatory pension saving in NZ. Most voluntary private retirement savings schemes provide lump sum benefits, and annuity purchase is not required; there is no "deferred income" tax treatment. Coverage of occupational schemes has been very low in any case. There is accordingly relatively little private pension provision compared to nearly all other developed countries.

[3] Calculations that assume tax scales remain unchanged (ie full fiscal drag) indicate a lower 2058 cost by about 1% of GDP, due to the pension rate being set net-of-tax.

aged 65 and over is substantial. Continuing the projection to the turn of the century, 2100, gives a rate of 7.3% of GDP – while this figure of itself does not have a great deal of meaning, considering the span of the projection, it nonetheless identifies that costs are expected to continue to grow, albeit slowly.

Fig.1 NZ population projection, series 5 (central estimate)



Source: Statistics NZ

The New Zealand Superannuation Fund (NZSF) has been established with the intention of smoothing the rise in expenditure, using a 40-year rolling average approach. This requires Government to assess the average cost of NZS over the next 40 years. If this average exceeds the current cost – as it is expected to in the next 18 years – the Government makes a capital contribution to the NZSF to make up the difference. From 2026 onwards, on current projections, it is expected the average will be less than the current cost, and hence there will be a sum drawn out of the NZSF to defray higher NZS costs.

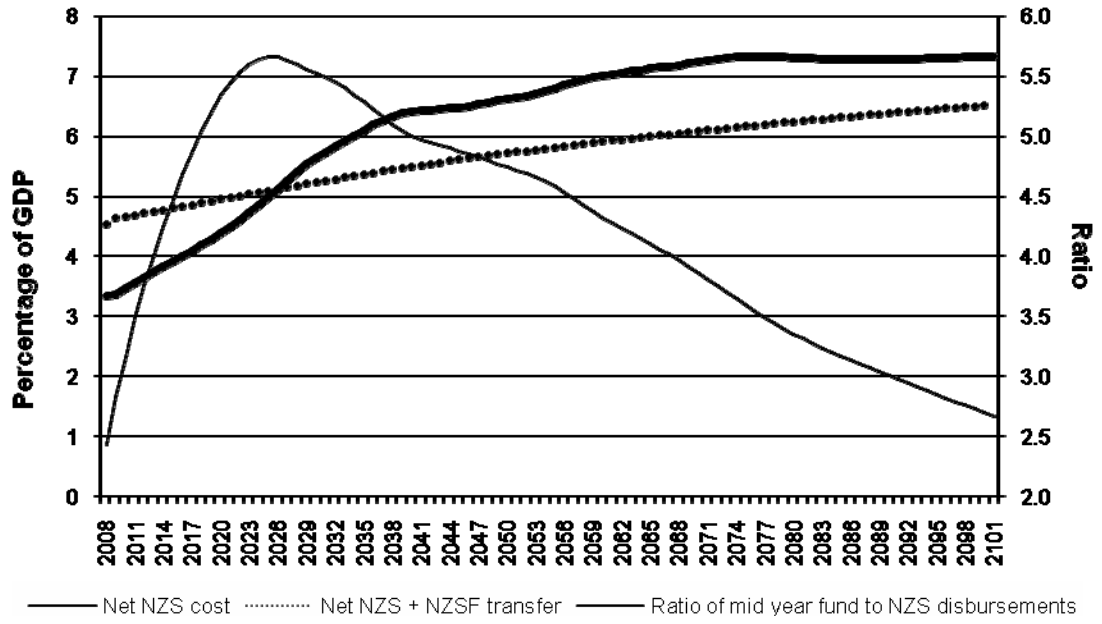
Contributions are invested at arms length by the NZSF Board; their only restriction is to invest in such a way as to avoid damage to NZ's reputation as a responsible member of the world community. (The Minister of Finance may give directions as to the Crown's expectations as to performance, including expectations as to risk and return; but such

direction must not be inconsistent with the duty to invest on a prudent, commercial basis. Any direction must be reported in the Annual Report.)

The latest annual report, as at 30 June 2007, shows 7.3% in NZ equities, 42.3% in Global Large Cap equities, 6.9% in Global Small Cap equities, 3.4% in Emerging market equities, 6.9% in Property, 10.8% in Private Markets, 5.1% in Commodities, and 17.3% in Fixed Interest. For more information, refer www.nzsuperfund.co.nz.

Current projections of NZS expenditure incorporating NZSF payments give a 2008 net of tax cost of 4.5% of GDP, rising to 5.9% of GDP by 2058, and 6.5% by 2100. This approach thus expects to reduce the cost some 100 basis points of GDP by 2058, in return for an extra 120 basis points of GDP currently. The figure below shows the year on year projections.

Fig. 2 NZ Superannuation Fund projections 2008



Source: Treasury NZSF model v 14, plus own calculations

The solid line broadly follows the effect of population ageing. The dashed line shows how the NZSF smoothes the annual cost, although the cost still increases gradually.

The light line, whose values are given on the right hand axis, shows the ratio of the fund to the pension expenditure each year. Currently about two and a half times, the ratio is expected to increase to a little over five times by 2025 and then decline as the fund starts to be drawn on to supplement NZS costs.

Although these costs appear very reasonable compared to projections for many countries, nonetheless there is concern being expressed about the impact in respect of the

government's overall long term fiscal position, particularly in the light of uncertainty as to future increases in longevity. For example, both the OECD and the IMF have recently suggested that NZ consider parametric reforms, such as increasing the age of eligibility, and/or changing the basis for the annual adjustment to something less than net-of-tax wage indexation.

It is arguable that such suggestions do not fully comprehend the underlying principle of the NZS scheme; the existing indexation basis, for example, is essential to maintain the "belong and participate" objective. While increasing the age of eligibility might be seen as being appropriate, since for many people increased education and training may be bringing them into the work force later and advances in health will give them longer in retirement than current older people, nonetheless some people are physically worn out earlier than others, and significant disparities in longevity expectations are observable. The Maori population, for example, evinces longevity at age 65 some four years below that of non-Maori. Research has indicated that up to three-quarters of this difference may be explained by socio-economic factors, but there remains an unexplained residual (Blakely et al, 2007).

Parametric reforms, in addition, address only one side of the equation. While an ageing population certainly will place strains on the revenue that can be raised from a static work force, investments made now can ease that strain. In addition, NZ currently has no capital gains tax, no inheritance tax, and permits homes to be put into trusts thereby creating wide eligibility for government long term care subsidies; hence there is scope to obtain higher revenues from those who enter retirement in a financially well off situation. With the introduction of KiwiSaver, a state-subsidised auto-enrolment national retirement savings scheme, it would not be absolutely impossible – albeit politically unpopular, and detracting from its solidarity aspect – to eventually introduce some form of resource testing for NZS. In other words, while parametric reforms can address inter-generational issues, a focus only on this may be at the expense of ignoring sensible increases in intra-generational transfers.

The problem then is how to put in place a way of measuring the pay as you go cost of NZS in a manner that gives some reasonable degree of stability, while allowing adjustments to be made transparently if and as when needed, with the negative effects and costs of those adjustments on specific members of the population made plain.

A possible solution that suggests itself is to apply double entry accounting. The benefit of double entry bookkeeping is that both financial position and the causes of the change in position since the previous balance date are made apparent. This approach is used in the Swedish automatic balancing system, described briefly in the next section.

1.3 The Swedish automatic balance system

The description here relies principally on Lundberg et al (2007), together with Settergren and Mikula (2005) and Scherman (2007).

The Swedish *inkompstpension* is in most respects a defined benefit, earnings related pension financed on a pay as you go basis. However, unlike conventional defined benefit schemes, the contributions are intended to be fixed and the pension indexation can be altered if the scheme goes out of balance. Risk has therefore been transferred to scheme members, the trade-off being that the contribution rate will not be increased. Also, although there is the possibility of indexation of pensions and notional accounts being less than average wage growth, members benefit from the upside, in that if surplus assets develop in the scheme, higher indexation applies.

Contributions to the scheme are 16% of pensionable earnings up to a ceiling of 1.2 times the average full time salary. The pension is calculated by accumulating, on a notional basis, the contributions in respect of each contributor with notional interest equal to the increase in average pensionable income. At retirement – which can be at any time after age 61 – the notional accumulation is converted to a pension, on a basis which takes into account the most recent estimates of population mortality and a discount rate of 1.6% pa. It is intended, provided the scheme stays in balance as described below, that pensions will be increased with average wage growth less 1.6%. There is some discussion as to what replacement rate this will provide; it appears that originally something of the order of 55-60% was envisaged at age 65 for somebody on the average wage, but Scherman (2007) suggests that it may well be less than that, perhaps closer to 40% for those born in 1990.

At the heart of the accounting system is the concept of turnover duration, namely the difference between the weighted average age of pensioners and the weighted average age of contributors – the weights are pension amounts and contributions respectively. In an ideal steady state position, discounting at the expected future increase in pensionable wages, the turnover duration times the annual contribution, called the “contribution asset”, is equal to the value of future contributions less the value of pensions arising from those contributions.

At a balance date, the accrued liabilities for the *inkompstpension* are calculated in two parts: for the contributors as the accrued notional accounts, and for the pensioners as the amount of the pensions times the expected number of payments based on the scheme experience. The effective discount rate is the indexation rate of average wage growth, so only the pension valuation needs to incorporate the 1.6% discount rate. The balance sheet is

completed by the market value of the buffer fund, plus the contribution asset, representing the value of future contributions less pension benefits arising from those contributions. The balancing item is the surplus of assets over liabilities.

The scheme aims to have a balance ratio of assets to liabilities of at least 1; if the ratio falls below 1, the indexation factor applied to notional contributions and pensions is reduced proportionately in order that balance be restored. If the ratio exceeds 1.1, then indexation is increased to restore the balance to no more than 1.1.

There is literature on this general approach which notes some difficulties and proposes a more detailed methodology, particularly in relation to the calculation of the contribution asset, and the indexation rate – refer Robalino and Bodor (2006). The turnover duration calculation that lies at the heart of the contribution asset calculation for the Swedish system requires a steady state situation in relation to those contributing and those in retirement, which is not the case in NZ as Figure 1 above demonstrates. A particular value of the method however lies in the information that is presented in respect of the causes of changes in financial position. For the *inkompstpension* the change in funded assets shows the traditional items, ie contributions, disbursements, earnings on the buffer fund, and costs of administration. The change in contribution assets splits the change between the change in contribution revenue and the change in turnover duration. Finally, the change in pension liability shows the increase in notional accounts, the increase in pensions in payment, the effect of indexation, the effect of the change in life expectancy, the fall-in due to contributor deaths, the extent of distribution of that fall-in, and deductions from notional accounts for administration costs.

While some of this information is fairly standard, the indication of the effects of indexation and change in life expectancy in a standardised format gives valuable management information on trends affecting the financial position in the same way that accounting for conventional fully funded schemes does.

It will be noted that the Swedish system has been designed from a “mark to market” perspective. It is claimed no actuarial calculations involving estimates of future outcomes are required, but not only does the design itself, and investigations of its practicality, have benefited from actuarial insight, it also appears there remains some need for actuarial methods in determining some valuation factors. It is the use of turnover duration to simplify the calculation of the contribution asset that presents the principal simplification.

2 APPLICATION TO NEW ZEALAND SUPERANNUATION

2.1 Estimating the notional contribution rate

There is no identified contribution rate as such for NZS. The scheme is not earnings-related, and there is no nexus between paying tax and entitlement; the only requirement to qualify for the full benefit is 10 years residence[4]. This fits with the "belong and participate" goal.

For intergenerational equity, however, it might appear fairer were current and future workers to have the same implicit deduction from their wages to finance the scheme. The lump sum contributions being made to the New Zealand Superannuation Fund do redistribute the generational burden to at least some extent, but in an opaque fashion in that regard. It is not currently clear as to what (if any) extent the current generation of workers are contributing at a lower rate of their income than would actually be required to support the level of NZS payments they are expecting to receive in due course.

Answering that question requires calculating a notional contribution rate. If one takes the discount rate for a pay-as-you-go scheme as equal to wage inflation, then the value equation to determine the contribution rate CR(x) required to support an individual entering the work force at age x is given by:

$$CR(x) \xi \sum s(x,t) \xi {}_tP'_x \xi p(x,t) = MC \xi \sum la(x,t) \xi {}_tP'_x \xi r(x,t) \xi (1+k)^{t-x}$$

where:

- summation on the LHS is from t=0 to t=64-x, with x starting at age 20
- summation on the RHS is from t=0 to oldest age (where la(x,t) =0 for x+t <65)
- s(x,t) is salary at time t
- ${}_tP'_x$ is the probability of survival to midpoint of time t
- p(x,t) is the probability of participating in paid employment at time t
- MC is half the net-of-tax married couple rate
- la(x,t) is the living arrangement multiple at time t, reflecting the different mix of married couple rate, single sharing rate, and single living alone rate by attained age
- k is the discount rate applicable to annuity payments; see discussion below

[4] Note however that immigrants to New Zealand are required to claim any social security pension they may be due from countries where they have previously worked, and such pensions are offset against NZS entitlement.

- r(x,t) is the eligibility discriminant, equal to 0 if at time t the person aged x initially has not completed 10 years residence, otherwise 1
- each gender is treated separately, and results combined by population weights, since s(x,t), tP'x, p(x,t), and la(x,t) are all gender dependent.

Conceptually there are three ways in which the contribution rate might be determined. To begin with, one might consider a full time worker following the average age related pattern of salary. However, this is not practicable because those who are inactive still qualify for NZS under the "belong and participate" principle based on residency. While one could in theory assume the latter are paid out of general tax revenue, there is no way of distinguishing the pensions in payment by work history, and hence separation for valuation purposes would not be possible. The second approach then, and the one principally followed here, is to include a non-unitary participation factor with the effect that an average salary for the whole of each age group is applied. However, by setting p(x,t)=1 for all x and t, the notional contribution rate assuming a worker paid for themselves alone can be calculated.

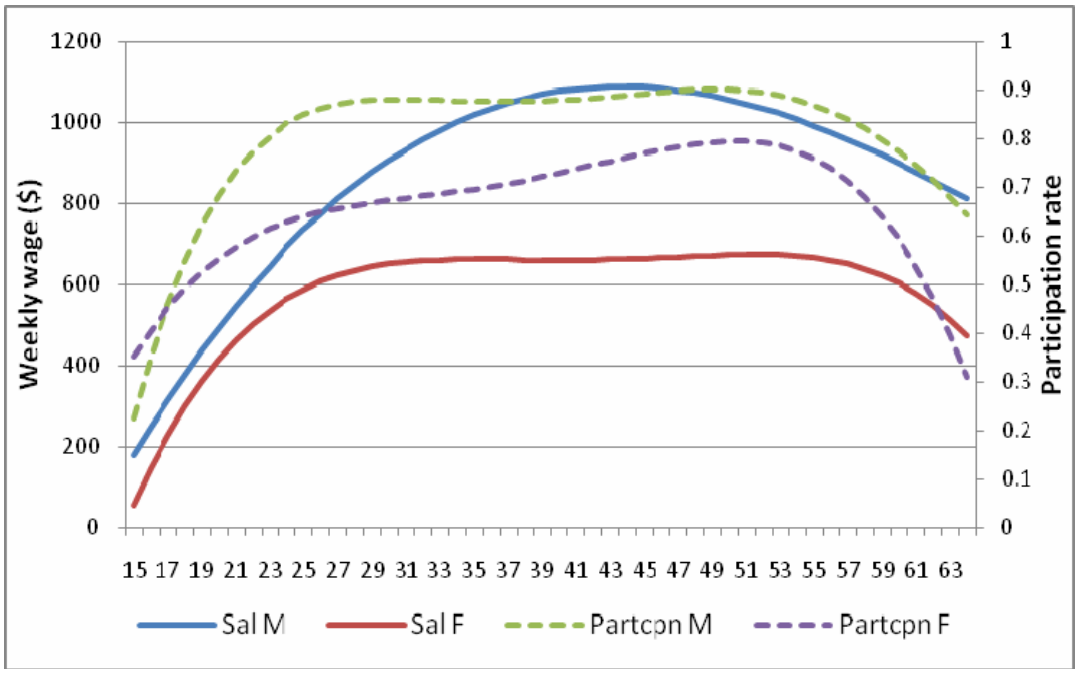
The third approach recognises that as a small country, migration flows have the potential to have a marked effect on a benefit with eligibility dependent on a relatively short time scale, ie 10 years. Accordingly a proportional benefit approach (as distinguished from the full benefit approach outlined above) can be taken, under which a person entering NZ accrues benefit in proportion to the period that they have been in residence prior to age 65. For the proportional case, age 20 has been taken as the start point, with contributions accruing $1/45^{th}$ for each year. Other ages could also be chosen; but as can be seen in Figure 3 below, the period from age 20 to age 64 captures by far the major part of the working lifetime in terms of salaries and participation.

The base point for calculations has been taken as June 2006. This is the most recent census date, and a range of population projections forward to 2056 have been made by Statistics NZ based on the 2006 population.

Salary scales for males and females have been taken from the NZ Income Survey (NZIS) as at June 2006. This is a different survey to that from which the Average Ordinary Time Weekly Earnings (AOTWE) figure used in setting NZS levels is derived; however, Statistics NZ advise that the NZIS gives a less volatile picture of average wages than the AOTWE due to compositional effects, and it also has more detail. The NZIS provides 5 yearly participation rates by gender as well as weekly earnings levels.

Figure 3 below shows smoothed rates of weekly earnings in $NZ (LH axis) and participation rates (RH axis). The average salary for those aged 20 to 64 is, in fact, very close to the corresponding AOTWE figure.

Fig. 3: weekly salary rates, participation rates, June 2006



Source: NZ Income Survey June 2006, Statistics NZ

The disparity between male and female weekly rates is clear; this comes in part from greater part-time work by women, although there are also differences in average hourly earnings. Participation shown here by older women falls off markedly compared to men; this is believed to be in part a cohort effect, as female participation rates at younger years are trending more closely to those of males.

These rates have been used for s(x,t) and p(x,t), except that in recognition of the cohort effect noted above, female participation rates are kept the same level relative to males from age 55 onwards.

For mortality, male and female whole population mortality from NZ Life tables 2000-2002 updated to 2006 is used. The central assumption used by Statistics NZ for projections is broadly equivalent, over the projection period, to a compound annual decrease in mortality rates of 1% at all ages, and this is applied here for all calculations (ie the improvement is assumed to be continual). Since NZS covers 96% of the 65+ population (those not covered are either recent immigrants or those who choose not to apply), population mortality would seem generally appropriate; however, experience by benefit rate (married couple, single sharing, single living alone) may show some differences, and may be worth exploring.

The table below shows the expectation of life in 2006 by age attained assuming both no mortality improvement and 1% pa improvement..

Table 1: cohort e_x

	e_x, no improvement							
Age	***20***	***30***	***40***	***50***	***60***	***70***	***80***	***90***
male	59.1	49.6	40.1	30.8	22.0	14.3	8.2	4.1
female	62.9	53.1	43.4	33.9	25.0	16.8	9.7	4.7
	e_x, 1% pa improvement							
Age	***20***	***30***	***40***	***50***	***60***	***70***	***80***	***90***
male	64.3	53.9	43.4	33.1	23.4	15.1	8.5	4.2
female	68.0	57.3	46.7	36.3	26.5	17.7	10.1	4.8

The multiple of half the married couple net-of-tax rate was derived from various sources. It is a broad estimate, and would benefit from being reviewed, although adequate for the purposes of exploratory work. Sample rates are given in Table 2.

Table 2: living arrangement ratios

Age	65	75	85	95
Males	1.0664	1.0703	1.1053	1.1650
Females	1.0944	1.1470	1.2124	1.2298

These rates reflect that older women tend to live on their own, whereas older men tend to be partnered until death, as a result of women's greater longevity.

The need for a discount rate for the pension payment arises because the NZS level is set net of tax. Over time, if tax scales are not altered, the increase in NZS will be less than before-tax earnings. Some indicative calculations suggest this could average out around 0.5% per annum as a result of progressivity in the tax scale. However, it seems unrealistic to assume that no changes will be made to tax brackets. Assuming tax brackets adjusted by price inflation every three years suggests a discount of around 0.2% pa, which is used here. Note that in contrast to the Swedish system, no other discount to wage growth is applicable.

For the proportional benefit approach, linear accumulation over 45 years to age 65 is assumed. This might not be appropriate were there a discount rate other than wage growth being utilised.

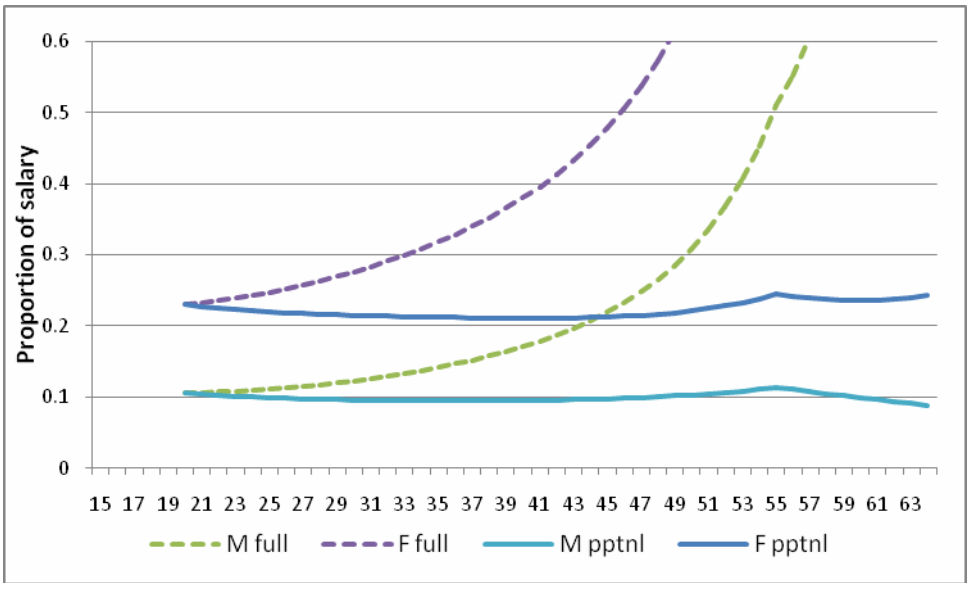
The weekly married couple rate net-of-tax as at June 2006 was $203.00 each. However, value-added taxes on all goods and services in NZ are levied at 12.5% and the only exemption is for certain financial transactions. Since most pensioners seem likely to spend

most of their income locally (despite some overseas travel), the actual net cost to the State of providing NZS will be rather less than the quoted net-of-tax rate. Making the broad assumption that 80% of NZS is spent each year in a manner that attracts value-added tax, the benefit valued is taken as 90% of $203, or $182.70.

2.2 Notional contribution rate results

Theoretical rates were calculated for people entering the work force from age 20 to age 64 on both the full and proportional benefit bases. Figure 4 below presents the results.

Fig. 4 Theoretical contribution rates, full and proportional



The increase in full rates by age of entry is what one would expect; a shorter period of work to age 65 still attracts the same full benefit. Rates for a proportional benefit are conversely relatively level; there would be some increase from age 55 were it not for the fact that the eligibility for the pension is delayed until 10 years residence is completed.

The rates for women are over twice those for men, reflecting (1) lower salary levels at all ages (2) lower participation rates at all ages except the youngest (unsurprisingly, as women are more likely than men to be engaged in unpaid care duties) (3) relatively higher benefit levels as a result of living arrangement differences (associated, of course, with greater living expenses) and (4) greater longevity.

To calculate a population weighted rate in the proportional benefit case, allowance has to be made for residency. From a variety of information a rough distribution by age of period of residency has been constructed; as for the living arrangements multipliers, it is fit for the purpose of an exploratory paper, but would need some checking before taking this aspect of the work further. At the present time, broadly 30% of those aged 20 to 64 were born

overseas; however, many came to NZ at young ages, so the effect is muted. There is some suggestion that the proportion of those born outside NZ is increasing, so this seems likely to become a more important feature.

Using this data, population weighted results suggest a notional contribution rate of **18.3**% for the full benefit rate. The proportional benefit rate result is **16.7**%; as noted above, the flow through of emigration (at least as estimated for this exercise) is relatively muted, although 160 basis points is still a significant difference.

The quantum of the rates is comparable with, say, Sweden and the Netherlands. It will be noted the rate reflects the population-based rather than individual basis of estimation; effectively each notional contributor is paying not only for themselves but also for a proportion of those not in the paid labour force.

If the calculations are made assuming there is total participation of everyone aged 20 to 64 in the paid labour force (an admittedly extreme case!), the notional contribution rates fall to **13.8**% (full) and **12.6**% (proportional). These give an idea of the extent to which greater paid labour force participation would reduce the required notional contribution rate – at the extreme, by a quarter.

If no mortality improvement were assumed, then the notional contribution rates would fall to **14.6**% (full) and **13.2**% (proportional). However, as noted previously, Statistics NZ have as their central assumption something of the order of a 1% pa decrease in mortality rates over the 55 year projection period, and this is a not unreasonable assumption by current standards. One might in fact propose a higher rate of longevity improvement than 1% pa; but while the impact of improved longevity may be more pronounced in schemes where the benefit is more earnings-related, since improvements in longevity are more likely amongst those on higher incomes, the flat-rate nature of NZS mitigates against that particular point.

There is one further step. The above notional contribution rates do not take into consideration the effect of additional contributions being made to smooth NZS costs, as shown in Figure 2 above. The impact of these savings is uneven; they begin from 2027 on the latest estimates, but do not rise to 10% of NZS net-of-tax payments until 2033. For 20 years from 2036 to 2055 the saving is around 13-14%; it then rises to 15-16% for the 25 years to 2080, before declining to 11% by the end of the century.

These estimates are dependent on an average return on funds invested of 6.57% net of tax. The long term rate of nominal wage growth underlying the projection of NZS costs is 3.53%, hence the margin expected over wage growth is broadly 3% pa. If the actual return after tax

was only wage growth, the saving after 2027 from NZS cost smoothing would be a maximum of 6% of the net-of-tax NZS cost.

For this paper it is assumed that the notional contribution rates derived above can be "trimmed" by 15% to allow for the effect of the NZSF. (Given the impact of the NZSF in this regard is uneven, however, further work to refine this may be worthwhile.) This leads to a notional contribution rate of **15.6**% for the full benefit case, based on current (modified) participation rates, and **11.7**% based on 100% participation. The corresponding rates for the proportional benefit case are **14.2**% and **10.7**% respectively.

The actual contribution rate being paid to support NZS in the 2006 year can be estimated as follows. For the 2006 year, payments net of tax were of the order of $5.7 billion; the contribution to the NZ Superannuation Fund was of the order of a further $2.3 billion, making $7.4 billion in all after deducting 10% of the NZS payments by way of recovery through value-added tax. In terms of total annual salaries of $79.9 billion, the effective contribution rate is therefore **9.3**%.

If the "fair" contribution rate is 15.6% (the full benefit rate), or even 14.2% (the proportional benefit rate), then current generations may be said to be paying rather less than they are expecting future generations to be paying. This has implications for the financial stability condition, ie the notional contract that those in the work force pay a contribution that will not change over time in relation to their income. This point is discussed further in the final section.

2.3 Valuation of liabilities and assets

The valuation of the pension liabilities is effected by calculating age (and gender) related annuity factors on the same basis as used in calculating the notional contribution rate.

The value of the liability for those aged 20 to 64 is similarly effected by calculating deferred annuity factors. The accrued liability is obtained by multiplying the deferred annuity value by the number of years from age 20 divided by 45.

In each case, residency information is needed to adjust results for a 10 year wait from entry into NZ before eligibility.

The above is the basis for the full benefit approach. This should be offset by the amount recovered by the direct deduction policy – that is, the amount collected by way of social

security pension entitlements from other countries in which a person may have worked[5]. While it is believed there is a reasonably good identification of such pensions in the cases where NZ has a social security agreement with the countries in question, there is an obvious incentive not to declare entitlements. Forecast recoveries for the 2006 year were $0.167 billion, around 3% of net NZS outgo of $5.7 billion. Forecasting recoveries is not without its problems, as amounts fluctuate with currency exchange rates.

If entitlements were to accrue in proportion to residence, then the annuity factor for pensions in payment must be adjusted to reflect the period actually completed between ages 20 and 65; for example, a pensioner who had entered NZ at age 40 would have 25/45ths of a pension valued. (This is not suggesting that payment would be proportional; only valuation). Similarly, a person in the 20-64 age group who entered NZ at age 50 is valued at age 60 as having accrued 10/45ths of a full pension.

For the proportional case, direct deductions would not be a scheme asset; they would instead be an offset against the cost of topping up the pensions to the full amount, assuming the "belong and participate" principle continues to be applied.

2.4 Liability valuation results

Table 3 shows the results obtained by valuing the liability in respect of those age 65 and over (pensioners) and those aged 20 to 64 (contributors) based on 2006 population numbers and under the assumptions as used to derive the contribution rates. Although the requirement of 10 years residency is applied, this assumes that all the remainder of people age 65 and over will receive a benefit. A brief check indicates that the residency assumption made here would give about 2% not eligible, whereas in practice the rate is nearer 4%. The difference may reflect inaccuracy in the residency profile derived for this paper, but is also likely to incorporate some degree on non-claiming, particularly by those who continue in work past age 65.

The table shows results both under the full approach and the proportional approach, as explained in section 2.3. No allowance is made here for recovery of direct deductions arising from overseas social security pensions.

[5] Any person applying for NZS is legally obliged not only to declare any overseas social security pension, but also to take active steps to claim any such benefit to which they may be entitled.

Table 3: valuation liabilities, 2006

	Full (bn)		Proportional (bn)
Pensioners	$72.8		$65.8
Contributors	$237.2		$212.1
Total	$310.0		$277.9

The difference between the full and the proportional benefit approach can be seen to make a significant difference. This is discussed further in the final section of this paper.

2.5 Calculation of the contribution asset

Referring back to Figure 1, it will be apparent that the condition for the turnover duration approach to be viable, ie a broadly steady state population, is not going to apply in NZ for a considerable number of years. Clearly there is going to be a significant change in the ratio of people aged 65 and over to the number of people aged 20-64. The existing number of pensioners therefore is much less than that anticipated by the derived notional contribution rate. In the Swedish case, although there is still some population ageing to occur, much of the maturing has already happened. The following calculations show this clearly.

For 2006, the contribution-weighted average age of those aged 20-64 is calculated as 41.9 years, and the pension-weighted age of the pensioners as 75.0, giving a turnover duration of 33.1 years. Total salaries are $79.9 billion, and applying a contribution rate of 15.6 gives a contribution asset of $412.7 billion. The proportional benefit result is a little lower, at $375.5 billion. Clearly these results are much higher than the liability figures presented above, even before taking into account the balance of the NZ Superannuation Fund, which was $9.9 billion in 2006.

(One thing that can be noted from Figure 1 is that there is also some further increase in the age 20-64 population to come in NZ, although this is swamped by the growth in the 65+ population.)

At this point in time, therefore, any attempt at balancing liabilities with the existing fund and the contribution asset derived as for the Swedish model would require re-visiting the contribution rate, or re-defining the contribution asset concept. However, to do so would run some risk of over-looking the stability principle that tomorrow's workers may feel unfairly treated if they have to pay more than today's workers. The next section explores these issues further.

3 IMPLICATIONS

3.1 Review of results and data requirements for ensuring robustness

The results presented here are exploratory. They are however indicative of the degree to which the current generation of workers may be under-paying for the cost of NZS compared to what will be required from future generations. The results also show that it is possible to put a meaningful figure on the liabilities accruing under the scheme. Although a balancing approach as for the Swedish system is not immediately appropriate, because of the relative immaturity of population ageing in NZ, there is scope to make use of the methodology to report on emerging costs and analyse experience. These ideas are developed a little further below.

Before full use can be made of results using this methodology, however, there is a need to refine the data, and test the assumptions. The allocation of the population by years of residence would be improved by access to census data; and investigation of Ministry of Social Development administrative data in respect of NZS payments and experience is also desirable.

The assumption as to improving longevity needs testing for sensitivity, and the extent to which part of the benefit flows back into tax revenues through value-added tax needs verification. While movement in wage rates has little to no effect (since the benefit is tied to wage movement), the implications of changes in tax structure could also usefully be explored. Is the 0.2% pa discount used here to accommodate the net-of-tax rate setting appropriate? How sensitive are results to this assumption?

As discussed further below, assumptions as to participation in the paid work force are clearly critical. Further work is needed as to appropriate assumptions to be used.

In the following discussion, the results derived above will be used not as hard and fast numbers but as indicative guidelines. For sound policy development, attention to the data and assumptions points discussed above will be needed first to ensure a robust foundation.

3.2 Implications of formalising the notional contribution rate

The notional contribution rate required to support NZS benefits for current workers, assuming full benefits for migrants, has been estimated here as 15.6% of the salaries of those aged 20 to 64. The current level of payments to NZS recipients, plus the capital contributions to the NZ Superannuation Fund (designed to smooth the impact of population ageing) come to about 9.3% of salaries. This therefore suggests that the current working

generation is underpaying in comparison with what they will expect future generations to pay.

The 15.6% may be too high; improving paid workforce participation will reduce that figure, but the results here suggest that a significant disparity will remain. For 100% workforce participation the result was 11.7%, so the under-payment is between 2.4% and 6.3%; in 2006 terms, a minimum of $1.9 billion, but more like $5.0 billion per annum[6]. This under-payment will decrease over time, as NZS costs rise, but will remain significant over the next 10 years at a minimum.

One response would be to identify this difference as the amount to be used to defray other costs associated with the 65+ population, so that the future generations of contributors will not have to meet those costs in addition to supporting NZS. This means investing now in infrastructure, both physical (hospitals, housing, transport) and social (social networks, community volunteer organisations). Particularly important might be to address the ongoing costs of social dysfunction, such as family violence and financial abuse, debt accumulation, and so forth, in order to reduce Government costs in future.

Attention to ensuring as many citizens as possible benefit from education and training is also essential; such action may, of course, lead to increased average wages and hence not reduce costs per se of NZS itself, but will permit services to be delivered more productively and hence at lower cost, taking pressure off the benefit rate.

While discussion of population ageing issues frequently identifies the above topics as matters for attention, the focus here on the potential underpayment provides an actual figure as to what should be being budgeted for. It can be identified as the social investment that the current generation of workers need to make for their own future in order that future generations of workers remain comfortable meeting the net pay as you go cost of NZS.

If actual spending now is not appropriate, then additional contributions to either the NZ Superannuation Fund or a separate “futures fund” could be made. Note also that expenditure need not be carried out directly by Government; there may be advantage in funding the establishment and improvement of market-based solutions.

An interesting implication of this approach of holding a constant notional contribution rate is that because it addresses the age 20-64 workforce, those aged 65 and over might be considered not required to contribute, and hence be taxed at a lower rate. (I should declare an interest here – I am approaching 63 and expect to continue working past age 65!) A criticism of the age 65 eligibility for NZS is that it gives a strong signal that people should

[6] The level of improvement in participation possible would seem likely to be incremental, and far from 100%.

stop work. If a lower tax rate applied after age 65, perhaps capped or tapered since higher paid workers are already incentivised to continue in work, there would be likely to be higher participation rates in the age 60-64 group as well, since age 65-69 would become the tapering off age group instead of the 60 to 64 year olds.

3.3 Options for reducing the notional contribution rate

In the previous section the approach assumes that it will be necessary to maintain the notional contribution rate. One could however approach this problem instead by asking what future steps could be taken to reduce the notional contribution rate, in order that it not increase a great deal beyond the current level of 9.3%.

Two obvious options would be to reduce the level of benefit and reduce the indexation below net-of-tax wage increases. The difficulty with these options is that the objective of providing a benefit at the "belong and participate" level would not be met. With KiwiSaver people may in time have greater individual savings, but as annuitisation is not currently an option in NZ, then income -testing would be fraught, as well as introducing problems that the current universal system avoids[7].

Another option that has been suggested is to gradually increase the age of eligibility. This could be investigated using the methodology here, and would be a useful exercise. However, whether an acceptable eligibility age could be delivered for the current contribution rate is not immediately obvious; and whether it would be politically acceptable even less so.

The other side of the question is whether the additional sources of revenue that will be required could be obtained from other sources. As noted earlier, resource-testing of NZS is not impossible, but very much a last resort from a policy perspective in the current climate. However, possibly worth exploring would be gradual introduction of a capital gains tax, and looking to see what intra-generational transfers (other than resource-testing NZS) might be possible. The cost of long term care, the use of family trusts, and inheritance taxes, may all be topics of interest from this perspective. Whether this would be sufficient would need testing; but the methodology proposed here provides benchmarks as to what would need to be collected.

A third avenue to explore is the additional cost imposed by granting full benefit to immigrants after 10 years residence. This is a result of the desire that all older citizens should be able to belong and participate, and not just be kept out of poverty. However, it may be noted that

[7] What has been termed "affluence-testing" would be appropriate, but would face some opposition.

older immigrants who do not meet the 10 year residency requirement are instead eligible for a means-tested benefit set broadly at the poverty alleviation level once they satisfy general residency requirements.

The methodology presented here indicates that the notional contribution rate could be between 140 and 100 basis points lower if benefit accrual was based on residency between ages 20 to 65. This result, it should be emphasised, relies on the assumed residency distribution employed, but intuitively does not seem unreasonable.

In liability terms, the difference at June 2006 between full and proportional benefit liability as shown in Table 3 was $32.1 billion. Valuing current direct deductions (ie declared overseas social security pensions payable to NZ residents) as if they were similar to NZS payments gives an asset value of around $2.2 billion. Assuming that current contributors will also produce direct deductions equivalent to 3% of accrued benefits adds another $7.1 billion. Deducting these estimated recoveries from the total liability figure of $310.0 billion on the full basis leaves a net liability of $300.7 billion. Compared to an estimated liability of $277.9 billion were benefits to accrue in proportion to actual residence between ages 20 to 65, the deficit is $22.8 billion as at June 2006.

With increased migration, this deficit figure could increase. What might be done to reduce it, apart from greater policing of the direct deduction policy, is difficult to determine. Applying strict proportionality would be a distinct change in policy, although it perhaps should not be ruled out. Another approach might be to require from immigrants, except for refugees, a cash contribution towards the cost of NZS – in pension scheme terms, a buy-back of the missing residential period.

It should be noted that addressing the proportionality issue will not of itself solve the contribution rate issue; it would however be some contribution towards improving sustainability.

3.4 Using the methodology to report on emerging costs

The initial impetus for this paper was to investigate the use of the actuarial accounting methodology used for the Swedish system as a tool for investigating and managing the NZ scheme. While full application is unsuitable for reasons already gone into, the determination of a notional contribution rate in itself would appear to contribute significantly to the question of how we might manage NZS into the future.

Given that forecasts of expenditure on NZS and contributions to the NZ Superannuation Fund already exist, these could be used to draw up a picture of how the actual contribution rate will develop, depending on participation rates. The strength of the contribution rate as a measure is that it is largely independent of wage growth. It is not independent of changes to tax scales or brackets, and accordingly, when such changes are being considered, would provide useful information on the impact of those on Government finances.

Earlier in this paper mention was made of the improved reporting provided by the actuarial accounting methodology. Reporting the size of the liability may not of itself have a great deal of meaning (although it does give a focus on how it is to be financed); but reporting on the causes of the change in liability year on year would seem to be as valuable as it is for fully funded liabilities. It may be worthwhile investigating further how the contribution asset concept could be adapted for an immature population (in demographic terms!) in order to present the information obtained from applying this methodology in a coherent and useful fashion, both for fiscal reporting and for policy development.

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