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Exploration of application of actuarial accounting methodology to the New Zealand flat rate social security pension

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Exploration of actuarial accounting for the NZ social security pension

- Outline
  - Background
  - The approach
  - Method and assumptions
  - Results

Exploration of actuarial accounting for the NZ social security pension

- Background
  - Origin of this paper and disclaimer
  - NZ Superannuation
  - The NZ Superannuation Fund
  - Swedish automatic balancing mechanism

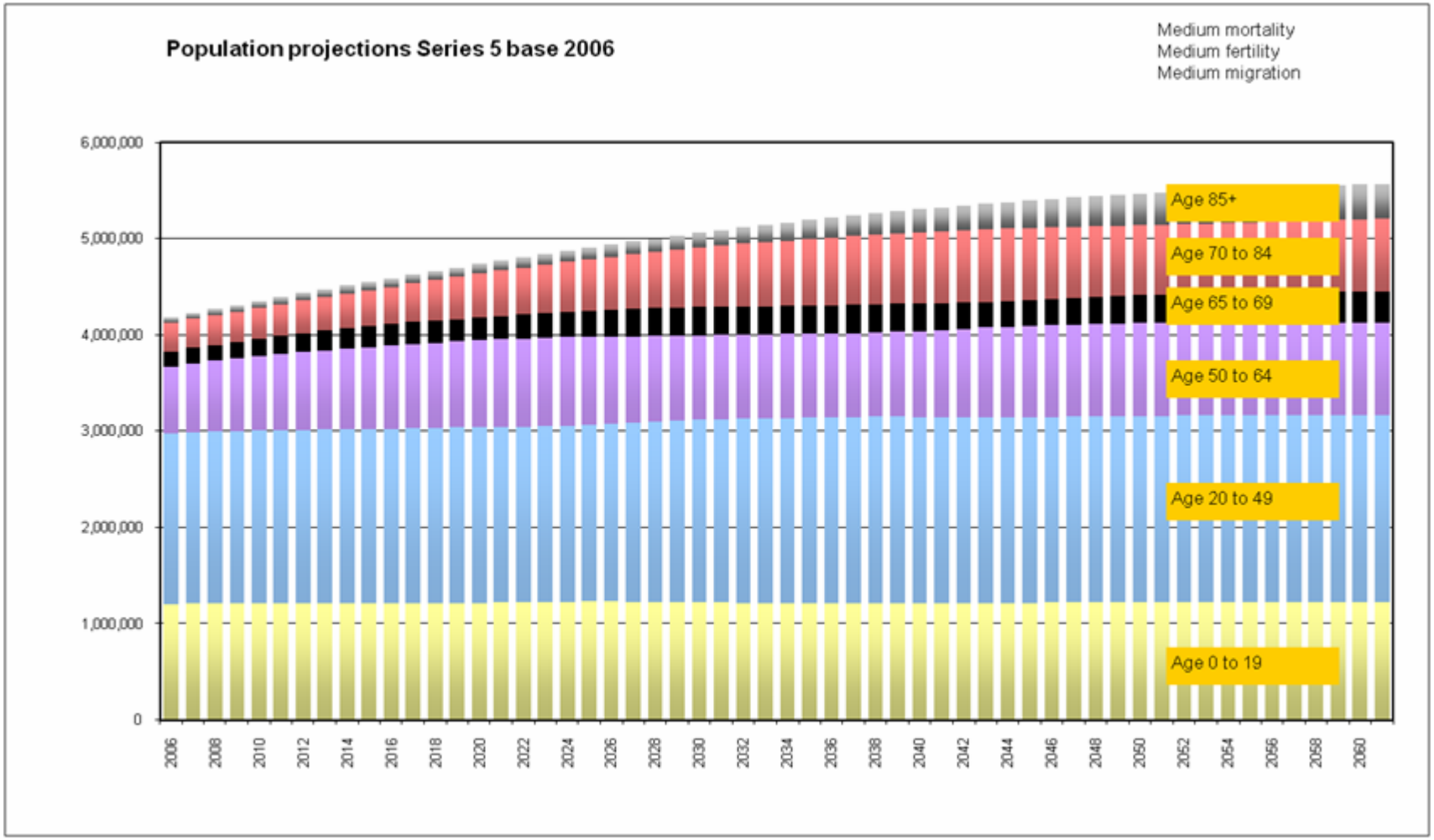
Exploration of actuarial accounting for the NZ social security pension

- Background: origin of this paper and disclaimer
  - Discussion of “actuarial accounting” at Helsinki PBSS
  - Proposed adding to work programme ...
  - ... but wound up doing it on my own time ...
  - ... so is exploratory and certainly not official in any way

Exploration of actuarial accounting for the NZ social security pension

- Background: NZ Superannuation
  - Universal – payable from age 65 provided person has been resident in NZ for 10 years
  - Flat rate – based on married couple rate, with extra for singles sharing accommodation, and singles living alone
  - Indexation to average wage on a net of tax basis
  - No ear-marked contributions – cost met from tax revenue

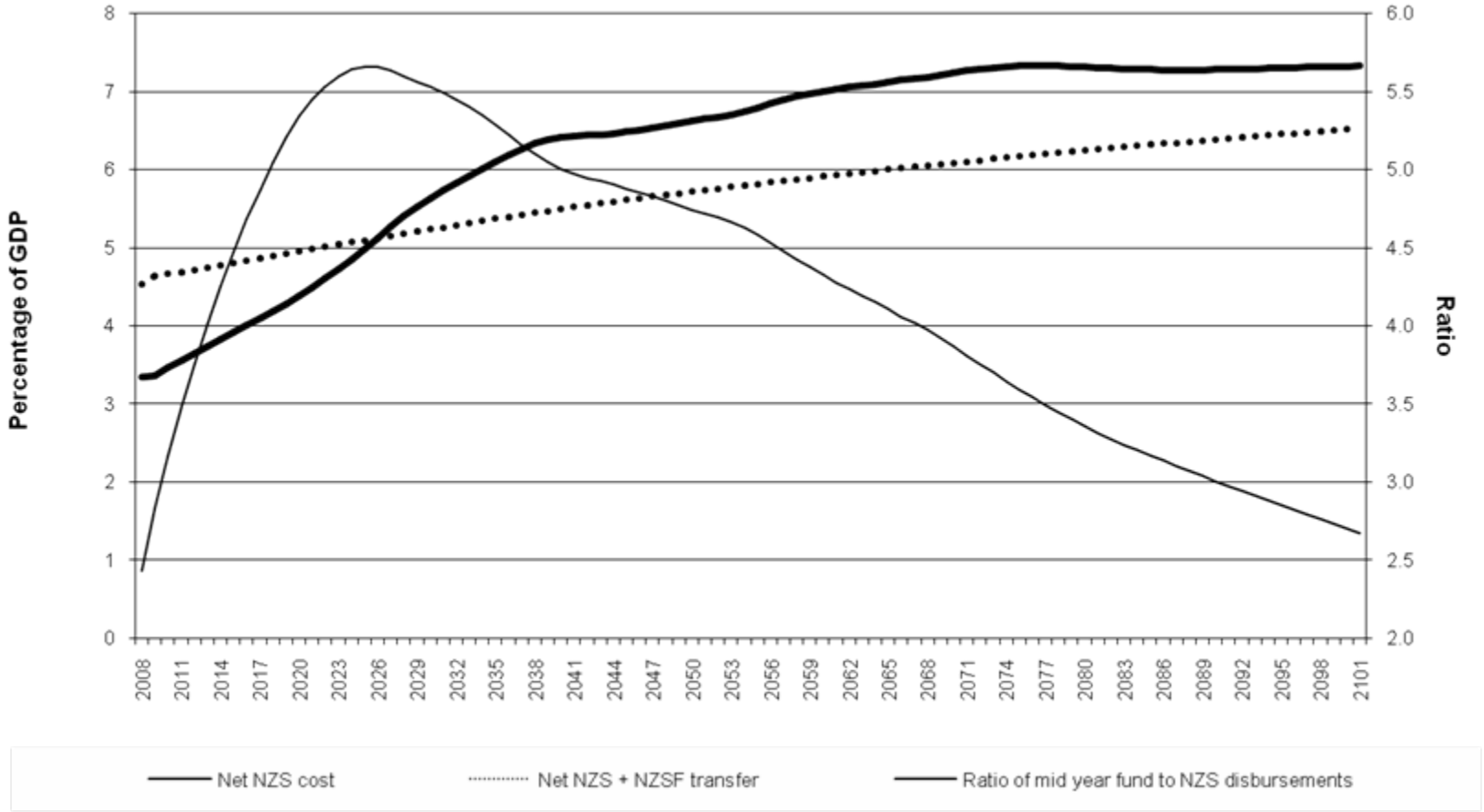
Exploration of actuarial accounting for the NZ social security pension



Exploration of actuarial accounting for the NZ social security pension

- Background: NZ Superannuation Fund
  - Introduced 2001 to smooth the cost of NZS
  - Based on 40 year rolling average
    - Calculate average cost pa over 40 year period
    - Pay in to or take out of fund difference between the current annual cost and the average
  - Projected to give rise to contributions in until 2026, then payments out commence

Exploration of actuarial accounting for the NZ social security pension



Exploration of actuarial accounting for the NZ social security pension

- Background: NZ Superannuation Fund
  - From graph, can see how NZS payments track increase in older population
  - Effect of NZ Superannuation Fund is to smooth, but not equalise
  - Fund will reach 5.5 times annual NZS disbursements, but decline over time

Exploration of actuarial accounting for the NZ social security pension

- Background: Swedish automatic balancing
  - Value liability in respect of pensioners and accrued liability in respect of contributors
  - Assets are the buffer fund plus the "contribution asset", derived using the turnover duration method
  - Contribution rate as percentage of income is fixed (inter-generational equality)
  - Automatic balancing through indexation adjustment

Exploration of actuarial accounting for the NZ social security pension

- The approach
  - The NZS principle
  - Defining the contributors
  - Treatment of immigrants
  - The discount rate

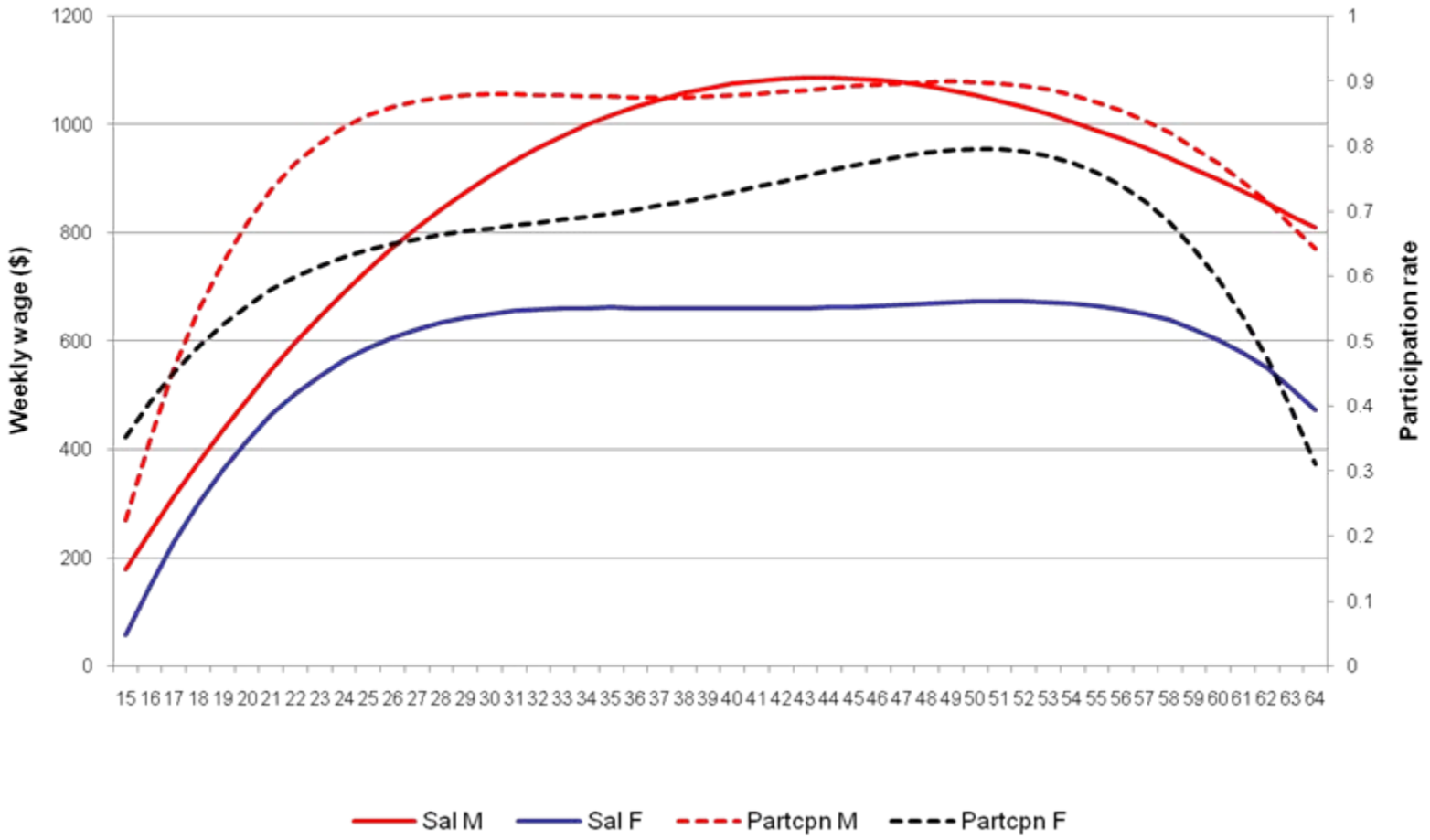
Exploration of actuarial accounting for the NZ social security pension

- The approach: the NZS principle
  - "Older people in NZ should receive sufficient state pension as to not just keep them out of poverty, but as to enable them to belong and participate in society" (Living standards work indicates only 8% of the 65+ are in any degree of hardship)
  - Inter-generational equality important but has taken a back seat

Exploration of actuarial accounting for the NZ social security pension

- The approach: defining the contributors
  - By far the greatest part of paid work occurs between ages 20 to 65
  - Hence take the “contributors” as those in the 20-64 age group and assume accrual of 45ths
  - Those in the paid work force are treated as meeting the cost of the inactive, since all benefit equally
  - Flat rate NZS benefit is, obviously, highly redistributive

Exploration of actuarial accounting for the NZ social security pension



Exploration of actuarial accounting for the NZ social security pension

- The approach: immigrants = new entrants
  - Generally assume full benefit accrues after 10 years residency
  - Can alternatively value on the basis that 45 years of residency from age 20 to age 65 is required for full benefit – hence for example
    - A person coming to NZ at age 45 would acquire entitlement to only 20/45ths of full NZS
    - A person entering after age 65 would have no entitlement

Exploration of actuarial accounting for the NZ social security pension

- The approach: the discount rate
  - Have assumed that the appropriate discount rate for a pay as you go arrangement is wage growth
  - This requires a small adjustment for pensions valuation since the effect of a net of tax indexation system is to discount slightly – the extent depends on the progressivity of the tax scales

Exploration of actuarial accounting for the NZ social security pension

- Method and assumptions
  - Contribution rate equation
  - Mortality
  - Salary and participation rates
  - Pensioner living arrangements
  - Contribution rate weighting
  - Liability calculation
  - Contribution asset calculation

Exploration of actuarial accounting for the NZ social security pension

- Method and assumptions: rate equation
  - Rate for entrant aged x

$$CR(x) \times \sum s(x,t) \times tP'x \times p(x,t) =$$

$$MC \times \sum la(x,t) \times tP'x \times r(x,t) \times (1+k)^{t-x}$$

  - Sum over time t and for each gender
  - The r(x,t) factor adjusts for residency in the full benefit case
  - And further adjusts for entry age in the proportional benefit case

Exploration of actuarial accounting for the NZ social security pension

- Method and assumptions: mortality
  - Have assumed continuous compound decrease of 1% pa across all ages

	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

Exploration of actuarial accounting for the NZ social security pension

- Method and assumptions:

  salary and participation rates

  – As per graph shown earlier, but with higher participation rates for women

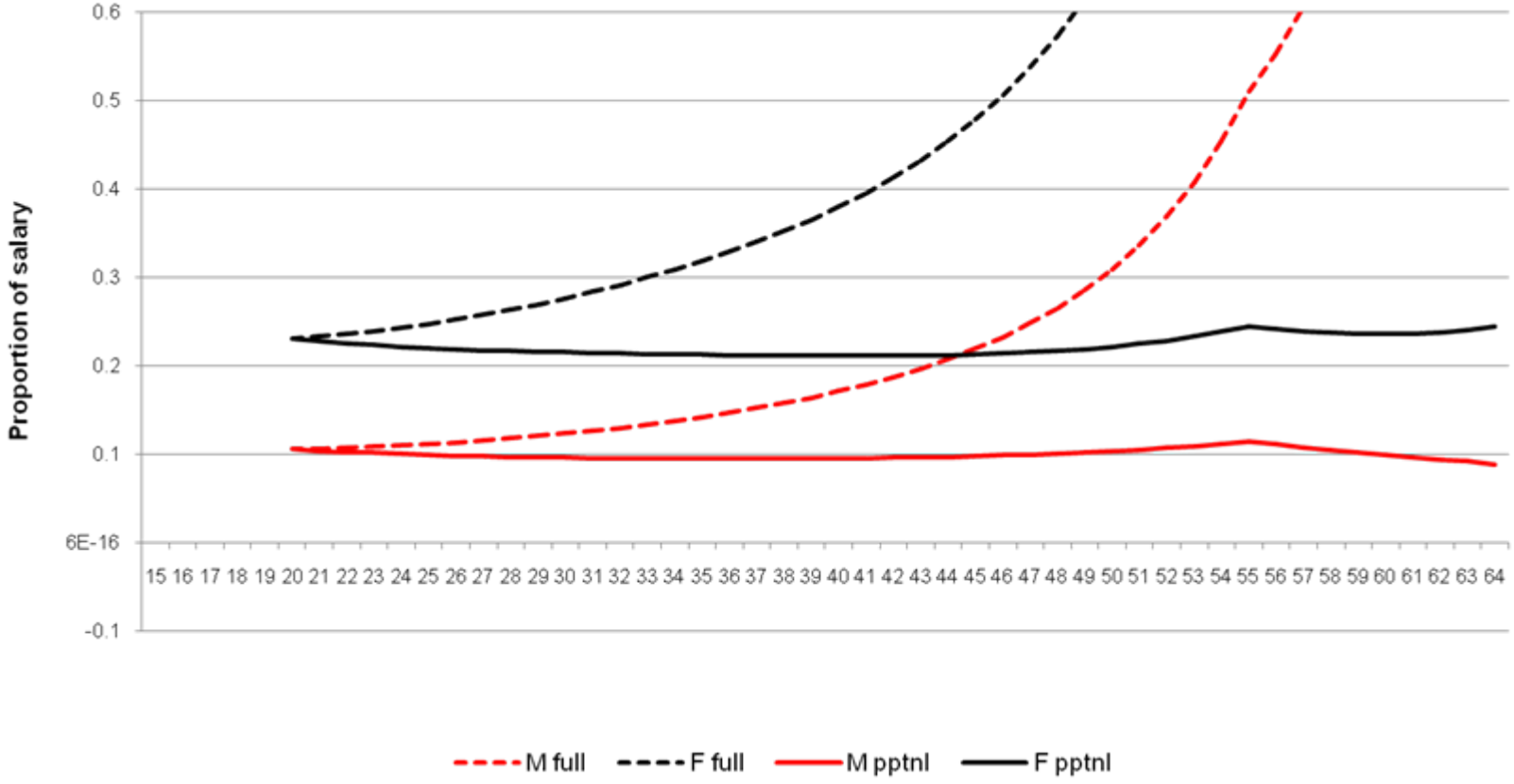
  pensioner living arrangements

  – Multiples of half the married couple rate by

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

Exploration of actuarial accounting for the NZ social security pension

Contribution rates by age at entry



Exploration of actuarial accounting for the NZ social security pension

- Method and assumptions: contribution rate weighting
  - To obtain a population contribution rate, weight by age totals
  - For the proportional benefit case, weights include subdivision by period of residency
  - This subdivision is approximate at present and needs refining, but does reflect census data as to proportions of NZ-born

Exploration of actuarial accounting for the NZ social security pension

- Method and assumptions: liability calculation
  - Follows the principles of the contribution rate calculations
  - Pensioners valued on full benefit and proportional benefit basis
  - Assumes contributors accrual is linear over the 20-65 period
  - For proportional case, accrual limited to residency between 20 and 65 in 45ths

Exploration of actuarial accounting for the NZ social security pension

- Method and assumptions: contribution asset calculation
  - Calculate contributor contribution-weighted average age, pensioner pension-weighted average age
  - Calculate one year salary
  - But note contribution rate as calculated implies a lot more pensioners than exist at present

Exploration of actuarial accounting for the NZ social security pension

- Results
  - Notional contribution rate
  - Addressing the difference with the implied actual rate
  - Balance sheet – does this add anything useful?
  - Effect of immigration on NZS costs

Exploration of actuarial accounting for the NZ social security pension

- Results: notional contribution rate
  - For full benefit, get a NCR of 18.3% of salaries
  - If everybody aged 20-64 active in the paid work force, rate drops to 13.8% (!)
  - And if no mortality improvement get 14.6%
  - BUT need to take into account NZ Superannuation Fund reductions
  - Trimming by 15% suggests NCR of **15.6**%

Exploration of actuarial accounting for the NZ social security pension

- Results: addressing the difference with the implied actual rate
  - Can calculate implied actual rate as current cost plus contribution to NZSF
  - This is **9.3**% of salaries in 2006/2007
  - What responses to the difference between 15.6% and 9.3% if generations are to be treated fairly?
  - NZS + NZSF contribution is net $7.4 bn; looking for further $2-5 bn pa

Exploration of actuarial accounting for the NZ social security pension

- Results: addressing the difference with the implied actual rate (ctd)
  - Could require current generations to contribute at a higher rate and invest it – infrastructure, social investment, future-proofing
  - Progressively reduce age of eligibility
  - Investigate intra-generational transfers – affluence taxes
  - Or just expect future workers to pay more?

Exploration of actuarial accounting for the NZ social security pension

LIABILITY	billions			ASSETS	Billions
Pensions	$72.8			Fund	$9.9
Contributors	$237.2			Offsets	$9.3
TOTAL	$310.0			CA	$412.7
				TOTAL	$431.9

- Surplus of $121.9 could be present value of "underpayments"? ie investment to be made to compensate for higher contributions later?
- Alternatively, can calculate this would balance with NCR of 11% - so?

Exploration of actuarial accounting for the NZ social security pension

- Results: balance sheet – does this add anything useful?
  - The usefulness is not in their absolute values, it is in the causes of change eg
    - Change in longevity
    - Change in migration
  - The contribution asset – a work in progress …

Exploration of actuarial accounting for the NZ social security pension

- Results: effect of immigration
  - The proportional benefit NCR, after "trimming" for the effect of the NZSF, is 14.2%, compared to 15.6%
  - In terms of the liability, the deficit, after making an allowance for the recoveries made by offsetting overseas social security pensions, is estimated as $22.8 bn in 2006
  - Can not reduce benefit under NZS principle – so require a pension buyback?

Exploration of actuarial accounting for the NZ social security pension

- CONCLUSION
  - Quantification of policy issues should help advance the debate and encourage a focus on actions
  - Also potentially a useful management tool
  - But a little more development work needed