

THE ECONOMY-WIDE EFFECTS OF MANDATORY SUPERANNUATION AND ITS TAX CONCESSIONS

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- Analysis of the mandatory Superannuation Guarantee (SG) rate and superannuation tax concessions in the Retirement Income Review (Treasury, 2020)
- Our submission to the Review (Bateman et al., 2020) – some results drawing on my previous work (e.g., Kudrna and Woodland, 2013)
- Recent debate about the SG rate and the costs of superannuation tax concessions

OBJECTIVE AND APPROACH

- **Objectives:** Quantify the economy-wide effects of changes to (i) the SG rate (e.g., “legislated” 12%) and (ii) superannuation tax concessions (e.g., “hypothetical” removal of all concessions), focusing on:
 - Long run steady state implications for macroeconomic aggregates, government budget, household welfare and life cycle behaviour
- **Approach:** Develop a stochastic overlapping generations (OLG) that
 - features stochastic labour productivity, endogenous labour and retirement, bequest motive
 - is calibrated to Australia, using HILDA data, ABS demographic and national account data and Australian Government (budget papers) data
 - incorporates a detailed representation of Australian income tax, means-tested public pension and mandatory superannuation policies

- International literature on “voluntary” tax-preferred private pensions (retirement accounts) using OLG models:
 - e.g., Imrohorglu et al. (1989); Fuster et al. (2007); Fehr and Kindermann (2010); Nishiyama (2011); Ho (2017)
- Literature on Australia’s mandatory superannuation using OLG models:
 - e.g., Creedy and Guest (2008); Kudrna and Woodland (2013, 2018); Kudrna, Tran & Woodland (2021); Fehr, Hofmann & Kudrna (2021)
- Literature on Australia’s mandatory superannuation using micro-simulation models:
 - e.g., The Retirement Income Review (Treasury, 2020), using Treasury’s Model of Australian Retirement Incomes and Assets (MARIA)

REVIEW OF THE MAIN RESULTS

- The simulation results for 12% SG rate (increased from 7% in the benchmark model) show positive macroeconomic and welfare effects in the long run:
 - Increased household total assets (by 12.7%), Output or GDP (up by 6.2%), and higher welfare across income distribution
- The simulation results for the removal of superannuation tax concessions show:
 - the budgetary cost (or tax expenditure) of these tax concessions at about 2.5% of GDP (assuming the benchmark 7% SG rate);
 - increased household total assets (up by 1.4%) and higher average welfare in the long run;
 - but reduced output and lower welfare of high-skill households

SIMULATION MODEL: KEY FEATURES

- **Type:** Stochastic general equilibrium with overlapping generations
- **Sectors:** Household, firm and government sectors
- **Market structure:** Both small open economy (SOE) (with constant factor prices) and closed economy (CE) (with endogenous factor prices)

HOUSEHOLD SECTOR: KEY FEATURES

- **Household structure:** Overlapping generations (16 age groups = 20-24, ..., 95-99 years) of 3 skill types (based on educational attainment), facing labour income and survival uncertainty
- **Labour productivity and supply:** Stochastic labour productivities (that differ by skill type); Labour supply is elastic (allowing for continuous choice); Retirement is endogenous (allowing households to work past pension access age)
- **Optimization problem:** Consumption/saving and leisure/labour decisions over the life cycle, to maximize lifetime utility (derived from consumption and leisure and also intended bequests), subject to budget and time constraints
 - Household behaviour impacted by government policy

HOUSEHOLD SECTOR: LIFETIME UTILITY

- Agents have preferences over streams of consumption c_j and leisure l_j and bequest \bar{b} (left up on death), and maximize expected lifetime utility:

$$E \left[\sum_{j=1}^J \beta^{j-1} \left(\prod_{s=1}^j \psi_s^i \right) \left\{ u(c_j, l_j) + \beta(1 - \psi_{j+1}^i) \mathcal{B}(\bar{b}_{j+1}) \right\} \right]$$

where

ψ_j^i : survival probabilities with $\psi_{j-1}^i = 1$

β : subjective discount factor

$u(c_j, l_j)$: annual utility (non-separable Cobb-Douglas form)

$\mathcal{B}(\bar{b}_{j+1})$: bequest function (De Nardi (2004) luxury good type)

- Note that state index z ($= (j, a_j, sa_j, i, \eta_j)$) is omitted for every variable here, with agents only distinguished by age j .

HOUSEHOLD SECTOR: BUDGET CONSTRAINT

- Expected lifetime utility is maximized subject to per-period budget constraint:

$$a_{j+1} - a_j = ra_j + (le_j - sc_j) + b_j + st_j \\ + ap_j + sp_j - T(\tilde{y}_j) - (1 + \tau^c)c_j,$$

where

a_j : liquid assets	b_j : bequest receipts
ra_j : interest income	le_j : labour earnings = $we_j \exp(\eta_j)(1 - l_j)$
sc_j : contributions	st_j : social transfers
ap_j : public pension	sp_j : superannuation drawdowns
$T(\tilde{y}_j)$: income taxes	$(1 + \tau^c)c_j$: consumption expenditure

with $a_j \geq 0$ and $l_j < 1$.

POLICY SETTINGS: MANDATORY SUPERANNUATION

- We incorporate compulsory superannuation system funded by mandatory contributions at the SG rate τ^P .
- Superannuation assets sa_j accumulate (and decumulate after the access age j_R) as:

$$sa_{j+1} = \begin{cases} (1 + r(1 - \tau^r))sa_j + sc_j - sct_j & \text{for } j < j_R \\ (1 - \zeta_j)(1 + r)sa_j & \text{for } j \geq j_R \end{cases}$$

where

τ^r : effective fund earnings tax rate

sc_j : mandatory super contributions = $\min[\tau^P le_j; \bar{sc}]$

sct_j : contribution tax = $\tau^s sc_j$, iff $le_j > y_{\min}$

ζ_j : drawdown fractions of private pension balance

sp_j : drawdowns = $\zeta_j(1 + r)sa_j$

POLICY SETTINGS: AGE PENSION

- Age pension is non-contributory, needs-based and means-tested.
- We assume that those aged $j \geq j_R$ (same as superannuation access age) becomes age eligible for the age pension benefit ap_j that is income tested:

$$ap_j = \begin{cases} 0 & \text{for } j < j_R \\ \max [\min [p^{\max} - \theta(\hat{y}_j - \hat{y}_{min})] ; 0] & \text{for } j \geq j_R \end{cases} ,$$

where

p^{\max} : maximum (or full) pension

\hat{y}_j : assessable income = $deem(a_j + sa_j) + 0.5le_j$

\hat{y}_{min} : income threshold (disregard)

θ : taper rate

POLICY SETTINGS: PERSONAL INCOME TAX

- Household's taxable income is taxed under the 2017-18 progressive income tax schedule $T(\tilde{y}_j)$. The taxable income (or income tax base) \tilde{y}_j is given as

$$\tilde{y}_j = (le_j - sc_j) + ra_j + ap_j.$$

- Under the *counterfactual* of the removal of superannuation tax concessions, the income tax base becomes

$$\tilde{y}_j = le_j + r(a_j + sa_j) + ap_j.$$

REST OF THE MODEL

- **Production sector** – perfectly competitive, profit maximizing firms that demand capital and labour to produce output
- **Government** – consumption tax rate adjusted to balance the budget
- **Market clearing** – labour, capital and goods markets must clear.

MODEL PERFORMANCE: MACRO SOLUTIONS

Benchmark model solution and targets - Macro*

Variable	Model	Target ^a
<i>Expenditures on GDP</i>		
Consumption	74.5	75.2
- Private consumption	59.4	56.9
- Government consumption	15.1	18.3
Gross investment	25.6	25.3
Net export	0.0	-0.6
<i>Capital markets</i>		
Capital stock	330.1	329.5
Government (net) debt	20.0	20.0
Household wealth	350.0	
- Superannuation assets	167.3	150 ^b
Interest rate p.a. (%)	4.5	

Notes: *% of GDP (if not stated otherwise); ^aDerived from ABS Australian National Account data as 5-year average ending in June 2018; ^bTaken from Chomik et al. (2018).

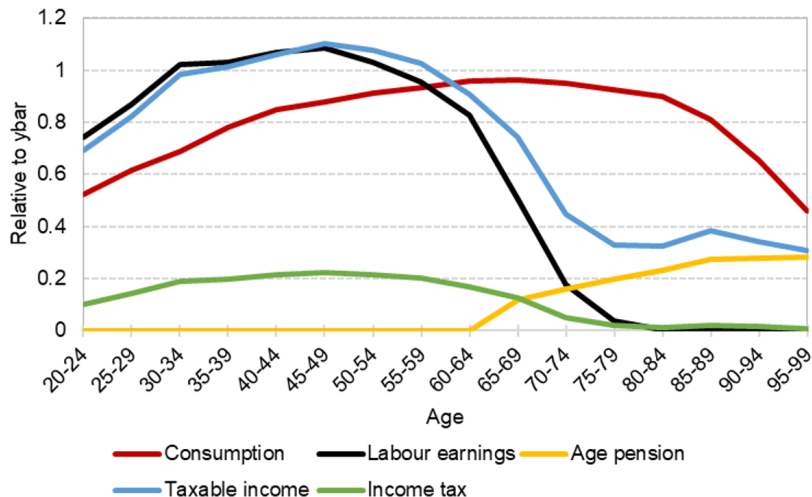
MODEL PERFORMANCE: FISCAL SOLUTIONS

Benchmark model solution and targets - Fiscal*

Variable	Model	Target ^a
<i>Government tax revenues and expenditures</i>		
Progressive income tax revenue	11.4	11.4
Superannuation tax revenue	0.9	0.9
Company tax revenue	4.6	4.6
Consumption tax revenue	6.2	6.2
Effective cons. tax rate (%)	10.4	
Public pension benefits	2.9	2.9
Social welfare benefits ^b	4.5	4.5
Interest on government net debt	1.0	
Mandatory SG rate (%) ^c	7.0	
<i>Distribution of those aged 65+ (%)^d</i>		
- Full pension	42.2	43.5
- Part pension	34.8	31.5
- No pension	23.1	25.0

Notes: *% of GDP (if not stated otherwise); ^aDerived from Australian Government Budget Papers as 5-year average ending in June 2018; ^bPaid to those aged younger than 65 (include unemployment, disability and family benefits); ^cCalibrated to approximate superannuation assets; ^dBased on DSS demographic data for June 2016.

Consumption, incomes and income tax by age (mean)*



- The benchmark model is applied to examine two sets of policy changes to :
 - 1) mandatory SG rate (i.e., set to 0% or 12%)
 - 2) superannuation tax concessions (i.e., contribution tax removal, removal of all tax concessions)
- Both SOE (partial equilibrium effects with constant factor prices) and CE (general equilibrium effects with endogenous factor prices) examined

SG RATE: MACRO AND WELFARE IMPLICATIONS

Table: Macro and welfare effects of changing mandatory SG rate in long run*

Variable	SG rate=0%	SG rate=12%	SG rate=12%
	SOE ^a	SOE ^a	CE ^b
Effective labour	0.03	-0.84	1.55
Wage rate (net of SG rate)	7.53	-5.38	-1.08
Output (GDP)	0.04	-0.85	6.21
- Private consumption	-4.21	3.53	4.70
- Gross investment	0.07	-0.79	13.39
- Net export (change)	0.14	-0.15	0.00
Capital stock	0.04	-0.82	13.39
Household wealth	-22.28	23.36	12.65
- Superannuation assets	-100.00	72.01	62.91
Net foreign assets (change)	-4.25	4.59	0.00
Interest rate (p.p.)	0.00	0.00	-0.52
Welfare effects ^c			
- Average	-0.49	0.44	0.93
- Low skill	-0.43	0.44	0.79
- High skill	-0.56	0.45	0.92

Notes: *% changes relative to benchmark equilibrium (if not stated otherwise); ^aSOE - Small Open Economy with exogenous factor prices (Partial Equilibrium); ^bCE - Closed Economy with endogenous factor prices (General Equilibrium); ^cEquivalent variation measure in % of initial resources.

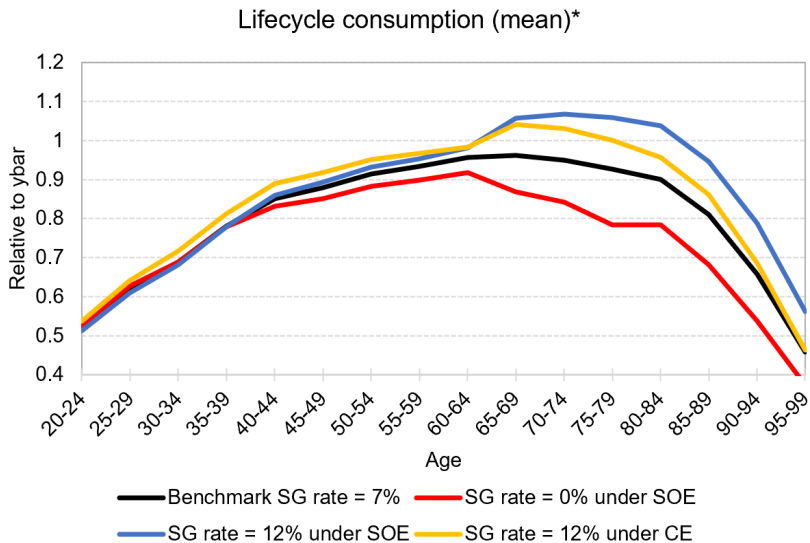
SG RATE: FISCAL IMPLICATIONS

Table: Fiscal effects of changing mandatory SG rate in long run

Variable	Benchmark	SG rate=0%	SG rate=12%	SG rate=12%
		SOE ^a	SOE ^a	CE ^b
Total tax revenue (% of GDP)	23.09	23.89	22.73	21.38
- Total (personal) income	12.30	13.42	11.70	11.67
- Progressive income	11.40	13.42	10.14	10.23
- Superannuation	0.90	0.00	1.56	1.44
- Company profits	4.60	4.59	4.60	4.29
- Total consumption	6.20	5.88	6.43	5.42
Consumption tax rate ^c (in p.p.)	10.44	-0.10	-0.06	-1.18
Pension expenditure (% of GDP)	2.90	3.71	2.37	2.49
<i>Distribution of those 65+ (%)</i>				
- Full pension	42.15	62.48	31.65	34.82
- Part pension	34.8	26.65	34.90	37.03
- No pension	23.05	10.88	33.45	28.15

Notes: ^aSOE - Small Open Economy with exogenous factor prices (Partial Equilibrium); ^bCE - Closed Economy with endogenous factor prices (General Equilibrium); ^cEffective consumption tax rate assumed to balance government budget.

SG RATE: LIFE CYCLE IMPLICATIONS



TAX CONCESSIONS: MACRO AND WELFARE IMPLICATIONS

Table: Macro and welfare effects of changing tax concessions in long run*

Variable	No contr. conces.	No all conces.	No all conces.
	SOE ^a	SOE ^a	CE ^b
Effective labour	-0.75	-2.33	-1.68
Wage rate (net of SG rate)	0.00	0.00	1.29
Output (GDP)	-0.77	-2.32	-0.42
- Private consumption	-0.43	-1.67	-1.33
- Gross investment	-0.72	-2.30	1.44
- Net export (change)	-0.02	-0.04	0.00
Capital stock	-0.75	-2.31	1.44
Household wealth	2.10	4.29	1.39
- Superannuation assets	16.44	20.73	18.59
Net foreign assets (change)	0.53	1.23	0.00
Interest rate (p.p.)	0.00	0.00	-0.15
Welfare effects ^c			
- Average	-0.08	0.06	0.20
- Low skill	-0.01	0.33	0.42
- High skill	-0.15	-0.20	-0.05

Notes: *% changes relative to benchmark equilibrium (if not stated otherwise); ^aSOE - Small Open Economy with exogenous factor prices (Partial Equilibrium); ^bCE - Closed Economy with endogenous factor prices

TAX CONCESSIONS: FISCAL IMPLICATIONS

Table: Fiscal effects of changing tax concessions in long run

Variable	Benchmark	No contr. conces.	No all conces.	No all conces.
		SOE ^a	SOE ^a	CE ^b
Total tax revenue (% of GDP)	23.09	23.14	23.53	23.14
- Total (personal) income	12.30	12.34	14.89	14.73
- Progressive income	11.40	0.37	0.00	0.00
- Superannuation	0.90	12.71	14.89	14.73
- Company profits	4.60	4.60	4.59	4.52
- Total consumption	6.20	5.84	4.05	3.88
Consumption tax rate ^c (in p.p.)	10.44	-0.64	-3.68	-3.84
Pension expenditure (% of GDP)	2.90	3.74	2.86	2.88
<i>Distribution of those 65+ (%)</i>				
- Full pension	42.15	39.93	39.94	41.27
- Part pension	34.8	34.87	35.41	35.57
- No pension	23.05	25.20	24.65	23.16

Notes: ^aSOE - Small Open Economy with exogenous factor prices (Partial Equilibrium); ^bCE - Closed Economy with endogenous factor prices (General Equilibrium); ^cEffective consumption tax rate assumed to balance government budget.

- Sensitivity of the long run effects to:
 - Lump sum and minimum drawdown alternatives
 - Alternative government budget balancing policy (e.g., scaling the income tax function)
 - Higher 12% SG rate policy environment for the “hypothetical” removal of superannuation tax concessions
 - Population ageing (with older population, lower population growth rate and increased survival probabilities)
- (In progress)

CONCLUSIONS

- We have examined changes to mandatory SG rate and superannuation tax concessions, using a stochastic OLG model that accounts for:
 - Behaviour responses of households to a policy change
 - Interactions between superannuation, age pension and income taxation
 - General equilibrium effects with changing factor prices
- The simulation results for *legislated* 12% SG rate show:
 - increased household total assets (by 12.7%), output or GDP (by 6.2%), and long run welfare across the income distribution
- The simulation results for *hypothetical* removal of superannuation tax concessions (in the mandatory system) show:
 - budgetary cost at 2.5% of GDP (under 7% SG rate);
 - increased household total assets (by 1.4%), higher welfare of low-skill households, but reduced output and welfare of high-skill households in long run

Thank you for your attention!

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Paper and presentation available at:
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