

Determination of optimal superannuation contributions

Since 1 July 2007, the Government's co-contribution initiative has been extended to those who are self-employed and, since then, newspapers have been full of advice on the appropriate level of post-tax voluntary contributions. This paper determines, and illustrates, the optimal combination of voluntary and salary sacrificed contributions to superannuation for a variety of earnings levels and disposable amounts, in order to maximise the superannuation balance.



HUGH O'REILLY is a Lecturer in the Department of Econometrics and Business Statistics at Monash University. Email: hugh.o'reilly@buseco.monash.edu.au



KIM WYATT is a Senior Lecturer in the Department of Accounting and Finance at Monash University. Email: kim.wyatt@buseco.monash.edu.au



JON PHILLIPS is an Assistant Lecturer in the Department of Accounting and Finance at Monash University. Email: jon.phillips@buseco.monash.edu.au

IN THE COMING DECADES, Australia's ageing population will place great demands on retirement incomes. Australia's current superannuation system has previously been criticised on a number of levels, including performance, risk and inadequacy.

Clements, Dale and Drew (2006) argue that the structure and conduct of Australian retail superannuation funds leads to costly funds management products that, in the long term, provide minimal additional returns to investors. Drew and Stanford (2003), when taking an agency theory perspective, found that due to the structure of superannuation funds, there was little that members could do to safeguard their superannuation entitlements.

Gallery and Gallery (2005) felt that retirement incomes based on a superannuation guarantee rate of 9% were inadequate on their own and, together with low levels of voluntary superannuation contributions, the retirement needs of Australians would not be met.

Bateman (2005) highlights a multi-pillar arrangement in Australia's approach to retirement income provisions. This comprises the aged pension (a public safety net), the Superannuation Guarantee (SG) scheme (mandatory employer contributions), and voluntary retirement savings (provided by the individual). Since 1992, Australia has seen a greater reliance on superannuation funding of retirement income via the mechanism of the SG scheme.

This is an intended shift away from a heavy reliance on the aged pension, which was introduced by the Government at that time as part of a revamped Australian retirement incomes policy. However, Bateman, Kingston and Piggott (2001, p. 202) suggest that the 'superannuation guarantee on its own would only partially address many of the financial risks faced by an individual in retirement'.

In order to address this, the Australian Government has recently introduced changes to the taxation of funds in superannuation, such as tax-free withdrawals after reaching age 60 and the abolition of the reasonable benefits limits that restricted the amount of superannuation that could be withdrawn at concessional rates. This has provided greater incentive, particularly for older individuals, to contribute a significant portion of their savings towards superannuation.

Since 1 July 2005, most individuals have been given a greater choice in determining which fund their contributions can be invested with. This change is in line with Drew and Stanford's (2003) policy recommendations, where they advocated unrestricted member choice of superannuation fund and portability of superannuation entitlements. In addition, this now provides an opportunity for members to maximise their returns by becoming more involved.

Other incentives, such as the Government's co-contribution, play an important role in maximising individuals' overall contributions to their superannuation fund. Since 1 July 2007, this initiative has been extended to those who are self-employed.

Recently, the media has been flooded with articles providing advice on superannuation: see for example (Alafaci 2007; McKenna 2007; Murphy and Davis 2005; Probert 2007; Probert 2007). Many articles suggest that readers would

be best to make a voluntary (non-concessional) contribution of \$1000, so as to gain the co-contribution from the government. Even after a closer reading of the co-contribution criteria (see below), it remains difficult to determine the exact post-tax voluntary contribution that is optimal when pre-tax salary sacrificed contributions are also possible. For most people the optimal voluntary contribution amount lies somewhere between \$0 and \$1000.

Advising a client to make a voluntary contribution of \$1000 (or even of \$0) is often not optimal, since salary sacrificing into superannuation also provides multiplier benefits. If a client has a certain disposable amount available to invest in superannuation, he/she would naturally wish to discover the optimal post-tax voluntary contribution that would maximise their superannuation balance, with the remainder of this disposable amount being placed in superannuation through pre-tax salary sacrifice. Salary sacrifice reduces an individual's assessable income, so when salary sacrifice (pre-tax) is combined with voluntary contributions (post-tax), the government co-contribution increases, resulting in an increased superannuation balance.

Given a particular earnings level, it is necessary to perform a complicated balancing act in order to discover the optimal proportions of voluntary contributions and salary sacrifice that will maximise the superannuation balance. These optimal proportions differ for individuals with various disposable amounts to invest in superannuation.

Co-contribution criteria

The Government's superannuation co-contribution scheme was introduced on 1 July 2003 as an initiative to encourage low-income earners to save for their retirement. Where an individual's total income (assessable income

TABLE 1: Alternative strategies for a particular individual

Strategies	Strategy A	Strategy B	Strategy C	Strategy D
Earnings	\$45,000.00	\$45,000.00	\$45,000.00	\$45,000.00
Salary Sacrifice	\$0.00	\$1459.85	\$0.00	\$734.39
Total Income	\$45,000.00	\$43,540.15	\$45,000.00	\$44,256.16
Tax	\$8775.00	\$8315.15	\$8775.00	\$8540.83
Net Income	\$36,225.00	\$35,225.00	\$36,225.00	\$35,715.78
Voluntary Contribution	\$0.00	\$0.00	\$1000.00	\$490.78
Disposable Amount	\$1000.00	\$0.00	\$0.00	\$0.00
Final Income	\$35,225.00	\$35,225.00	\$35,225.00	\$35,225.00
Superannuation Balance	Strategy A	Strategy B	Strategy C	Strategy D
Sal. Sacrifice after 15% tax	\$0.00	\$1240.88	\$0.00	\$631.88
Vol. Contribution	\$0.00	\$0.00	\$1000.00	\$490.78
Co-contribution	\$0.00	\$0.00	\$699.00	\$736.17
Superannuation Increase	\$0.00	\$1240.88	\$1699.00	\$1858.83

plus reportable fringe benefits) is less than \$58,980, the government offers a co-contribution of up to \$1.50 for every post-tax dollar contributed by the individual to a complying superannuation fund. The co-contribution is capped at a maximum of \$1500 and is calculated on a sliding scale based on the individual's total income. For the financial year ending 30 June 2008, the lower total income threshold is \$28,980. The co-contribution is reduced by 5 cents for every additional dollar of total income over \$28,980, phasing out completely when total income reaches \$58,980. From 1 July 2008, the lower threshold of \$28,980 will be indexed on an annual basis and the higher threshold will be equal to this indexed amount plus \$30,000.

For a particular total income, the maximum government co-contribution is given by:

$$\begin{aligned} &\text{Maximum co-contribution} \\ &= \$1,500 - [(\text{Total Income} - \$28,980) \times 0.05] \end{aligned}$$

The co-contribution payable by the government to a particular individual is the lesser of the maximum co-contribution (as calculated above) and the amount of that person's post-tax superannuation contribution multiplied by 1.5. (See www.ato.gov.au)

Case study

The need for optimisation can best be illustrated through a case study. Table 1 illustrates four strategies for an individual with earnings of \$45,000 for the financial year ending 30 June 2008 and a disposable amount (post-tax) of \$1000 to invest in superannuation. All four strategies result in the same final income of \$35,225 for personal use, but each of the four varies the pre-tax and post-tax contribution proportions and so concludes with differing amounts added to the superannuation balance.

Strategy A illustrates the situation where the individual spends \$1000 on personal items and so doesn't contribute any of it to superannuation.

In **Strategy B** the same individual converts the whole \$1000 post-tax amount into a salary sacrificed (pre-tax) contribution. In order to maintain the same final income, \$1459.85 [from \$1,000/(1-31.5%)] is sacrificed into superannuation. After the 15% contributions tax, \$1240.88 is added to the individual's superannuation balance.

Strategy C illustrates the situation where the same person contributes the whole \$1000 to the superannuation fund as a voluntary contribution. Such a post-tax contribution will qualify for a government co-contribution amount of \$699, resulting in \$1699 being added to the individual's superannuation balance. Clearly this is a far better strategy than strategies A or B.

Strategy D is the optimal strategy, since it combines both post-tax voluntary contribution and pre-tax salary sacrifice in order to maximise the superannuation balance. The optimal voluntary contribution is neither \$1000 nor \$0, but is \$490.78. The salary sacrifice component is \$734.39 [from $(\$1000 - \$490.78)/(1 - 31.5\%)$] which, after 15% contributions tax, adds \$631.88

to the superannuation balance. This, with the optimal voluntary contribution of \$490.78 and the resulting government co-contribution of \$736.17, now maximises the superannuation balance at \$1858.83.

The fact that \$490.78 is the optimal voluntary contribution (for this case study) can be supported by the simple process of testing values both above and below the \$490.78. With a post-tax contribution of \$600, the superannuation balance would be \$1824.55, and with a post-tax contribution of \$400, the balance would only be \$1744.53. Both of these balances are inferior to the optimal solution provided by Strategy D.

The value of this optimisation process can be even more significant for individuals with higher earnings and greater disposable amounts to invest in superannuation. Consider, as an example, an individual with 'high earnings' of \$60,000 and a disposable amount of \$5000. It appears obvious that a voluntary contribution of \$1000 is not optimal, but neither is a voluntary contribution of \$0 optimal (even though the individual's earnings are greater than \$58,980).

Figure 1 illustrates that the optimal voluntary contribution is approximately \$200. (The exact result is provided later in the article.) With the remainder of the disposable amount being salary sacrificed (pre-tax), this brings the total income below \$58,980 and delivers a superannuation balance of approximately \$6450. This is an improvement of approximately \$250 over a post-tax contribution of \$0 (and also an improvement of approximately \$250 over a contribution of \$1000).

Formulas and calculations

For the above case study, as well as for any other situation, the exact optimal voluntary contribution required to maximise the superannuation balance can be calculated using the following formula:

$$\text{OVC} = [d + (U - e)(1 - t)] / [1 + (U - L)(1 - t)/1000]$$

where:

OVC	= the optimal voluntary contribution
U	= upper total income threshold, currently U = \$58,980
L	= lower total income threshold, currently L = \$28,980
d	= disposable amount, let d = \$5000
e	= earnings, let e = \$60,000
t	= marginal tax rate, let t = 31.5% = 0.315

Substitution of the above values for this 'high earnings' example delivers an optimal voluntary contribution value of exactly \$199.60. After this optimal voluntary contribution (OVC) has been determined, further calculations can then be made to find the government co-contribution amount (CC), and the final salary sacrificed amount (SS). These three components are then summed to provide the maximum superannuation balance: $\text{MaxSuper} = \text{OVC} + \text{CC} + \text{SS}$.

Using such formulas can be a laborious process for financial advisors and/or individual investors. Determining the optimal voluntary contribution and calculating the

corresponding amounts of pre-tax salary sacrifice and government contribution can be more easily performed using a spreadsheet model.

The spreadsheet model

A spreadsheet adopting the above formulas and calculations enables a simultaneous illustration of various individual situations. The spreadsheet user can enter any values for the disposable amount and/or the earnings. The spreadsheet then determines the optimal voluntary contribution, the government's co-contribution, the salary sacrificed amount and, ultimately, the maximum superannuation balance. This spreadsheet also illustrates multiple situations simultaneously to assist with comparative analyses. Furthermore, to allow for any future changes in marginal tax rates, tax brackets or co-contribution thresholds, the interactive spreadsheet has an introductory page where the 'current' rates and thresholds can be altered by the user.

Summary tables

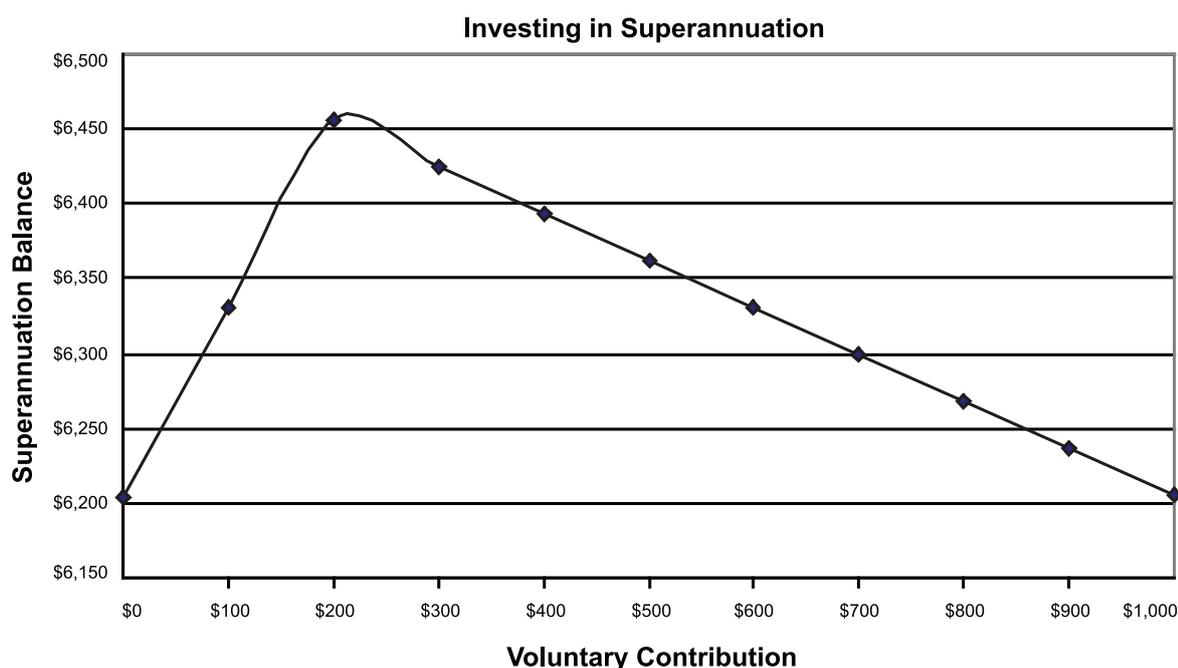
Table 2 summarises the Optimal Voluntary Contributions (OVC) for various situations with the disposable amounts (d) varying from \$1000 to \$5000, and earnings (e) varying from \$25,000 to \$65,000. This summary of multiple situations provides comparisons that are informative. It can be observed that as earnings increase (reading across any row in the table) the OVC decreases, as would be

expected. Note though, that as the disposable amounts increase (reading down any column of the table) the OVC actually increases.

Table 3 summarises the instant returns for individuals making the optimal voluntary contributions from Table 2 while contributing the remainder of their disposable amount by salary sacrifice. Consider, for example, the original case study, where an individual earning \$45,000 with \$1000 of disposable funds available to invest in superannuation (optimally) increases his/her superannuation balance by \$1858.83 (in Strategy D). This increase to the superannuation balance yields an instant return of 85.88% on the investment of that \$1000.

An instant return provides an attractive measure for comparing situations. Comparing each of the columns in Table 3, for disposable amounts greater than \$2000, suggests that those with earnings of approximately \$35,000 receive the greatest instant return. Further analysis with earnings varying between \$25,000 and \$35,000 reveals that the highest instant return (for individuals with a disposable amount of \$2000 or more) would be received by those with just over \$30,000 in earnings. This means that those with 'lower' earnings, i.e. below \$30,000, actually receive a lower instant return than those with earnings of more than \$30,000. It also raises the question of whether the formula for voluntary contributions in its current state sufficiently satisfies the government's aim of encouraging lower income earners to save for their retirement through superannuation.

FIGURE 1: From earnings of \$60,000 and disposable funds of \$5000



Conclusion

It is clear that advice from financial planners for clients to contribute a full \$1000 post-tax into superannuation (or alternatively to make \$0 contribution) is only applicable at particular total income levels and with particular disposable amounts. For most individuals, such advice is less than optimal.

Any client, with a certain disposable amount intended for investment in superannuation, naturally wishes to maximise his/her superannuation balance. With formulas and calculations, or with a spreadsheet model, an optimal voluntary contribution (OVC) can be determined that would satisfy this wish, when the remainder of the disposable amount is placed into superannuation through salary sacrifice.

Tables in this article, and in the spreadsheet (which are available from hugh.oreilly@buseco.monash.edu.au), illustrate that the higher the earnings, the *lower* the OVC: and the higher the disposable amount, the *higher* the OVC. Further analysis indicated that earnings levels just over \$30,000 (based on current thresholds and tax rates) receive the greatest instant return where the (post-tax) disposable amount available for superannuation investment exceeds \$2000.

Finally, the spreadsheet model demonstrated has other benefits, in that it allows user input to remain 'current'. This allows the optimal values of the components that maximise the superannuation balance to be accurate, even with future changes to marginal tax rates and/or to co-contribution thresholds.

References

- Alafaci, D. 2007, 'Dollars & Sense', *Sunday Herald Sun*, Melbourne, 8 July, p. 89.
- Bateman, H. 2005, 'Retirement Incomes for an Aging Australia', *The Economic and Labour Relations Review*, vol. 15, no. 2, pp. 284–308.
- Bateman, H., Piggott, J. and Kingston, G. H. 2001, *Forced saving: mandating private retirement income*, Cambridge University Press, Oakleigh, Victoria.
- Clements, A., Dale, G. and Drew, M., E. 2006, 'Australia's Retail Superannuation Fund Industry: Structure, Conduct and Performance', *Accounting, Accountability & Performance*, vol. 12, no. 2, pp. 1–31.
- Drew, M. E. and Stanford, J. D. 2003, 'Principal and Agent Problems in Superannuation Funds', *Australian Economic Review*, vol. 36, no. 1, pp. 98–107.
- Gallery, G. and Gallery, N. 2005, 'Paradox of choice in a mandatory pension savings system: challenges for Australian retirement income policy', *Policy & Politics*, vol. 33, no. 3, pp. 519–532.
- McKenna, M. 2007, '\$1bn push for young to invest in super – BUDGET 2007'. *The Australian*, 8 May, p. 2.
- Murphy, C. and Davis, M. 2005, 'Low paid snap up super gift', *Australian Financial Review*, Melbourne, 25 February, p. 16.
- Probert, G. 2007a, 'Give the piggy bank a top up, with federal help', *The Age*, Melbourne, 14 April, p. 6.
- Probert, G. 2007b, 'Super scheme is greater than the sum of its parts', *The Age*, Melbourne, 31 March, p. 10.

TABLE 2: Optimal Voluntary Contributions

Disposable Amount	Earnings				
	\$25,000	\$35,000	\$45,000	\$55,000	\$65,000
\$1000	\$1000.00	\$808.65	\$490.78	\$172.91	\$0.00
\$2000	\$1000.00	\$855.05	\$537.18	\$219.32	\$0.00
\$3000	\$1000.00	\$901.45	\$583.59	\$265.72	\$0.00
\$4000	\$1000.00	\$947.86	\$629.99	\$312.13	\$0.00
\$5000	\$1000.00	\$994.26	\$676.39	\$358.53	\$40.66

TABLE 3: Instant Returns

Disposable Amount	Earnings				
	\$25,000	\$35,000	\$45,000	\$55,000	\$65,000
\$1000	150.00%	125.91%	85.88%	45.86%	24.09%
\$2000	75.90%	77.92%	57.91%	37.90%	24.09%
\$3000	51.20%	61.92%	48.58%	35.24%	24.09%
\$4000	38.85%	53.92%	43.92%	33.91%	24.09%
\$5000	31.44%	46.38%	41.12%	33.12%	25.11%