Barriers to Co-Contribution in Superannuation: a Comparative Assessment of the Financial Benefits of Scheme Participation

Aaron Bruhn[1] and Tim Higgins, Australian National University

Abstract

Voluntary superannuation contributions provide a means for individuals to top-up their savings in a tax advantaged environment. In order to encourage voluntary contributions the government instituted the co-contribution scheme in 2003. Under the existing scheme, within a given financial year the government contributes up to a maximum of $500 when an individual on a low income makes a voluntary contribution of up to $1,000. Despite the apparent financial attractiveness of the scheme, participation among eligible persons is low. Reasons may include competing expenditure needs leading to a lack of sufficient funds for contribution, lack of trust in the system given regular changes to superannuation policy, and behavioural reasons including a short-term rather than long-term focus, procrastination from uncertainty and fear of regret, and loss aversion. In this paper we investigate another possible reason for low participation, namely poor financial opportunity cost. While an immediate 50% investment return may appear to be a 'no-brainer', for eligible individuals or families with mortgages, scheme participation may in fact not be optimal. We investigate the relative benefit of scheme participation versus reducing a mortgage, and conclude that while participation is sensible for those with short remaining mortgage terms, for those with longer mortgage terms the decision to participate may not be preferred unless one assumes generous long-term superannuation investment returns, or unless scheme participation is intended year on year for long durations.

Keywords: Superannuation; voluntary saving; co-contribution scheme

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[1] *aaron.bruhn@anu.edu.au*

INTRODUCTION

The Australian system of provision for retirement relies essentially on three pillars. One, the provision of a state-provided age pension which is subject to means testing; two, a tax-advantaged superannuation savings scheme arising from the superannuation guarantee which became compulsory for most salary and wage earners in 1992; and three, the additional voluntary savings an individual is able to make over their working life.

In order to encourage lower-income earners to save more for their retirement, a government co-contribution scheme was introduced in 2003. This provided a capped government contribution to an individual's superannuation account in proportion to any additional and voluntary contributions an individual made to their superannuation savings. Such co-contributions can be made recurrently over many years to eligible individuals. While the incentives to use superannuation accounts as an additional savings vehicle may appear highly attractive, the majority of the population faces substantial financial liabilities during their working lives and diverting additional funds to superannuation may not be optimal.

This paper compares the financial benefits of co-contribution scheme participation for a person with competing financial liabilities. Specifically, we consider the benefits of scheme participation versus making additional repayments to a home mortgage. This adds to the debate about superannuation as the primary retirement savings vehicle for Australians, in the context of competing monetary demands throughout working life. Given the anecdotal intent of many Australians to rely on their superannuation savings as the means to ultimately amortise their home loan, one might ask whether working age individuals with disposable funds should place priority on building their superannuation, or instead on reducing their mortgage. The answer to this question is not clear without analysis, but is of importance for individuals, financial advisers, and policy makers.

The structure of the paper is as follows. We first consider the concept of financial adequacy in retirement to set the scene for an overview of the history, features and experience to date of the co-contribution scheme. A series of comparisons are then presented between the application of a $1,000 voluntary contribution into the co-contribution scheme versus $1,000 applied against a home loan. Sensitivity tests allow for a more considered view of the relative benefit and opportunity cost associated with scheme participation for both single and multiple contributions over time. We conclude with a discussion of the results, and briefly consider other factors that may affect scheme participation.

ADEQUACY OF RETIREMENT SAVINGS

Compulsory superannuation arrangements in Australia have contributed to a significant increase in national savings, with the pool of superannuation funds standing at $1.38 trillion as of June 2012. As well as mandated employer contributions, individuals can make voluntary contributions to their superannuation accounts. These can be from either after-tax income, or before-tax income in the form of salary sacrifice and contributions by the self-employed for which tax deductions are claimed. Limits apply as to the size of contributions from either source.

The question of whether retirement savings are, or will be adequate as the system continues to mature, depends on the definition of adequacy. The methods that are mainly employed to quantify adequacy are budgetary standards and replacement rates. A budgetary standard is the dollar amount necessary to cover the cost of maintaining a certain living standard

in a particular location, measured by the cost of a representative basket of goods and services[2]. An alternative measure of adequacy is the replacement rate which is the ratio of post-retirement income or expenditure to its pre-retirement levels. The Senate Select Committee on Superannuation and Financial Services (2002) suggested a target replacement rate of 60% to 65% of gross pre-retirement income, which is approximately 70% to 80% of pre-retirement expenditure for those on average earnings. The rate will be higher for those with lower earnings and lower for those with higher earnings. These are often used as rules of thumb for financial planning purposes.

As well as these measures of adequacy, individuals also have their own perceptions of financial preparedness. Figures have been reported on the proportion of Australian adults who believe that they will have adequate savings when they retire. These change over time and differ between surveys. For example, figures have emerged such as 62% in 2001, 35% in 2006 (Cameron & Gibbs 2006), 50% in late 2007 (Ipsos 2008), and then 50% again via a Citibank Australian Wealth Survey in September 2009.

A widespread view is that that those most unlikely to save enough are women and the self-employed. Due to the likelihood of part-time work and career breaks to raise children, many women accumulate much smaller superannuation balances than men[3], an issue exacerbated by the tendency for women to live longer than men - one estimate is that a young woman in June 2009 who retires at age 67 would need 13% more savings than an otherwise identical male, solely due to longevity differences (Rice Warner Actuaries 2010a). The self-employed make up over 10% of the workforce and consist mainly of older males. Given that compulsory superannuation applies only to employees, a large number of self-employed still have little or no superannuation (Clare 2008).

THE GOVERNMENT CO-CONTRIBUTION SCHEME

In order to target those in the low to middle-income range and boost their superannuation savings, a government co-contribution scheme was introduced on 1 July 2003. The original parameters of the scheme were that the government would match employees' voluntary contributions made from after-tax income at the rate of $1 for every dollar contributed, to a maximum of $1,000 per annum. The maximum amount of $1,000 would be paid for those on incomes up to $27,500, and thereafter the maximum amount payable would reduce by 8 cents for every dollar above $27,500, so that those on incomes of $40,000 would not be eligible for any co-contribution amount.

In order to participate in the scheme various eligibility criteria have applied. These have included age limits and visa requirements, as well as the proportion of income from eligible employment, and the definition of income, which has been modified over time. The parameters of the scheme have also changed since the scheme inception, with changes to the co-contribution rate, the maximum amount payable, and the income thresholds (both minimum and maximum).

[2] Recent figures from the Association of Superannuation Funds of Australia (ASFA) suggest that in order for a single person to have a "comfortable" retirement, an annual income of $41,197 is required, and to have a "modest" retirement, an annual income of $22,654 is required (http://www.superannuation.asn.au/resources/retirement-standard).

[3] One projection for 2019-20 estimated that the amount of superannuation assets held by women will be about half those held by men (Ferris & Olsberg 2001). More recent research finds an average balance for non-retiree males aged 58-62 of $210,000 compared to $95,000 for non-retiree women (ACFS 2012).

Under the current scheme arrangements (for contributions made in the 2013-14 financial year), $0.50 is paid as a co-contribution for every dollar contributed up to a maximum co-contribution of $500 a year for those on incomes below $33,516, and the co-contribution amount reduces by 3.333 cents for every dollar above that amount to give a maximum eligible income of $48,516 (ATO 2013)[4].

While some research indicates generally high awareness of the co-contribution scheme (e.g. AIST 2008), awareness does not translate into action. Although seemingly attractive at face value, participation in the scheme has been relatively low; ANAO (2010) suggested that only 15% of those eligible for the co-contribution received it in 2008-09 and Rice Warner Actuaries (2010b) suggested that 13% received it the year before. Furthermore, there is evidence that the operation of the scheme is misunderstood by many (Commonwealth of Australia 2006).

Han (2010) found that whether or not an individual who is eligible for the co-contribution scheme makes a voluntary contribution in order to receive a co-contribution varies with several factors. For example, gender, age, and income (within the minimum and maximum income thresholds specified for co-contribution eligibility) all appear to be correlated with scheme participation. In general, those with a higher chance of participating were female, aged under 20 or over 45, those with incomes between $15,000 and $35,000 per year, and those seemingly more 'engaged' with their superannuation. A range of reasons are possible for these relationships, including the lack of funds for voluntary contribution between age 20 and 45 due to competing expenditure commitments, the greater availability of funds for saving when incomes are above a moderate part-time wage, the declining incentive to utilise the co-contribution when incomes are higher than the minimum threshold, and so on. Overall however, participation rates among eligible persons are seen to be low.

There are a range of possible reasons for limited participation, with lack of disposable funds being a key barrier. Other financial commitments limit the availability of funds to contribute to superannuation, particularly during early and middle adulthood when faced with child-rearing and mortgage costs (e.g., AIST 2008, ABS 2009, Cameron & Gibbs 2006). An intentional limitation with the co-contribution scheme arrangements is that only those persons with low incomes can participate, however, those on low incomes are most likely to have insufficient funds to contribute to superannuation. Furthermore, research has shown that those who tend to be least interested in superannuation are those on lower incomes (e.g. Fear 2008).

Uncertainty as to the level of retirement income required in retirement, coupled with changing superannuation contribution limits and taxation rules, makes the decision to voluntarily contribute to superannuation a potentially complex exercise and can result in apathy towards retirement planning (e.g. AIST 2008, ABS 2009). Furthermore, there may be doubt as to whether or not the scheme will continue to exist, and moreover whether it will continue in a similar form. This scepticism is reasonable given the multiple changes in the scheme to date, and this distrust may limit participation.

In addition, there are a range of human behavioural characteristics that tend to dampen decision-making for long-term savings. Individuals tend to put a higher value on short term payoffs than longer term payoffs (Dasgupta & Maskin 2005), the implication being a preference for immediate rather than future consumption, leading to insufficient retirement savings (e.g.

[4] This lower co-contribution amount, compared to the original one to one co-contribution, is partially offset by the additional provision of a low income superannuation contribution, which is a tax rebate of up to $500 per year for those with incomes below $37,000 (the payment being equal to 15% of concessional contributions made by or for individuals).

O'Donoghue & Rabin 2000). The focus on the present over the future results in procrastination and inertia. Furthermore, the complex considerations when preparing financially for retirement, including uncertainty regarding future investment returns, and one's future income and expenditure needs, coupled with the potential importance of the savings and investment decisions, all accentuate procrastination through fear of making the wrong decision. For many young people retirement is a distant and irrelevant concern (Cheah 2008) and as a consequence many delay decisions about retirement savings well into the future. Loss aversion also may play a role in deterring participation. A loss tends to have a greater weight on individual utility than a gain of the same magnitude, and as such, a loss in current consumption is viewed more negatively than the gain from increased saving (Benartzi & Thaler 2004). Finally, some choose not to make voluntary contributions to superannuation because of a belief that the superannuation guarantee contributions are adequate (e.g. ABS 2009).

Is The Co-Contribution Scheme Really As Generous As It Seems? Comparing Co-Contributions With Mortgage Payments

While lack of disposable funds due to various expenditure commitments (such as mortgage or rent, child-rearing, and increasing utility bills) limits voluntary contributions and participation in the co-contribution scheme, it is the case that the co-contribution scheme can offer a favourable financial return compared to many other options.

While the financial incentives for participation fall as income increases, for persons below the income threshold, under the current scheme arrangements a member making a voluntary contribution of $1,000 receives $500 as a co-contribution soon thereafter – that is, more or less an instantaneous return of 50%. Furthermore, the $500 would compound with investment growth until retirement. In the event that sufficient funds are available and not required for immediate expenditure, *should those funds be used as a voluntary contribution in order to access the co-contribution payment, or should they instead be used to reduce existing financial liabilities?*

Despite the apparent financial attractiveness of the scheme, it is worth comparing the financial benefits of participation for a person with competing financial liabilities. Specifically, we consider the benefits of participating in the scheme versus making additional repayments to the home mortgage.

Single contribution, monthly repayments

As a simple example, consider a couple with a home mortgage of $300,000 with a 30 year term, with one of the couple earning below the co-contribution scheme's lower threshold limit but still able to make a $1,000 contribution in a given year. It is often the case that the best investment is to reduce the balance of one's mortgage, because mortgage interest rates generally exceed low-risk investment returns available within superannuation, and this difference compounds over the life of the loan.

However, we now consider the circumstances under which participating in the co-contribution scheme can lead to a superior financial outcome. In this example the total interest on this loan would come to approximately $455,152 (assuming an annual interest rate of 7.5%

convertible monthly – that is, an effective interest rate of 0.625% applies each month[5]), and level monthly payments of $2,098 (to the nearest dollar) would amortise the loan over 30 years.

Assume now that the member has two options:

- Option 1 – pay $1,000 into the mortgage. This would immediately reduce the mortgage to $299,000. In this case the mortgage would be paid off more quickly, and there would be savings in interest payments. Under this option, the mortgage would be paid off 4 months earlier, in 29 years and 8 months.

- Option 2 – instead put the $1,000 into superannuation as a voluntary payment, receiving the $500 co-contribution. That is, an extra $1,500 is invested in superannuation[6].

ASIC indicates that the 'characteristic' annual return for a superannuation growth investment strategy is 8%, and for a balanced investment strategy it is 7.5% (both before fees and taxes)[7]. Whether the diversion of additional funds from a mortgage repayment to superannuation (where it enables a co-contribution to be made) is favourable purely in terms of investment returns, is dependent on one's investment choice, performance and level of fees (assuming tax on investment returns under superannuation remains at 15% into the future).

Thus, the two options provide the following outcomes. Under option 1, after 29 years and 8 months there is a net savings of $9,190 if we compare the repayments and outstanding balance under the original and reduced mortgages[8]. Under option 2, if the $1,500 was invested into a growth investment strategy with average annual returns of 8% per annum, this would grow to a balance of approximately $9,206 after 29 years and 8 months[9].

Hence, option 2 is favourable to the amount of $9,206 –$9,190 = $16. In other words, for this example with this set of assumptions, the difference between the outcomes purely in

[5] A 15 year fixed home loan rate was approximately 7.5% as at October 2013 (for example, see https://www.commbroker.com.au/Net/Documentum/interest-rates-fees/home-loan-rates-fees/home-loan-interest-rates.aspx, accessed 27 October 2013), so this is considered as a reasonable approximation to the average interest rate that might apply over the course the entire loan.

[6] For the sake of argument here, the $500 co-contribution amount is assumed to be deposited into the relevant superannuation account at the same time that the $1,000 voluntary contribution is made.

[7] https://www.moneysmart.gov.au/superannuation-and-retirement/how-super-works/super-investment-options, accessed 27 October 2013.

[8] This assumes that the same monthly amount of $2,098 continues to be paid under the reduced mortgage. The net savings of $9,190 can be calculated in two ways:

- Under option 1, repayments after 29 years and 8 months come to $745,833. If the $1,000 had not been put on the mortgage then the repayments after 29 years and 8 months would be $746,761 and the outstanding mortgage balance at this time would be $8,261. The difference between the outstanding balance plus repayments under the original mortgage and the repayments under the lower mortgage of $299,000, comes to $9,190 ($746,761+$8,261– $745,833).
- Another way to present this is to note that under option 1, the final mortgage payment is only $1,169, which is $929 less than the payment that would have been made after 29 years and 8 months under the original mortgage. The outstanding balance of the original mortgage at that time ($8,261) plus the $929 equals $9,190.

[9] This assumes an annual return of 8%, tax of 15%, and investment management fees of 0.58% (in line with Unisuper's fees for the 'Growth' Investment option (http://www.unisuper.com.au/investments/options-and-performance/investment-costs) as one example, accessed August 2012), which gives an annual net effective return of (8% - 0.58%) x 0.85 = 6.307%.

terms of monetary returns is negligible. Quite clearly it is possible to make a case for either option depending on one's beliefs about future mortgage rates and investment returns. And of course, there are many factors to consider other than simply assuming steady, constant mortgage interest rates and superannuation investment returns. These are discussed shortly.

As the mortgage reduces over time, one might expect that the relative benefit of using the $1,000 to attract a co-contribution payment would increase compared to the start of the mortgage. This is because the individual is getting closer to realising the immediate return of 50% under the co-contribution amount of $500. To extend this example further with the same mortgage ($300,000 over 30 years, interest of 0.625% per month, and monthly payments of approximately $2,098 maintained throughout the term of the mortgage), we demonstrate the relative benefit of investing an extra $1,000 into superannuation versus mortgage reduction over time. Table 1 illustrates this where the comparison relates to a single amount of $1,000 being contributed a specific time after commencement of the mortgage (i.e. there are no additional $1,000 payments before or after the one being considered).

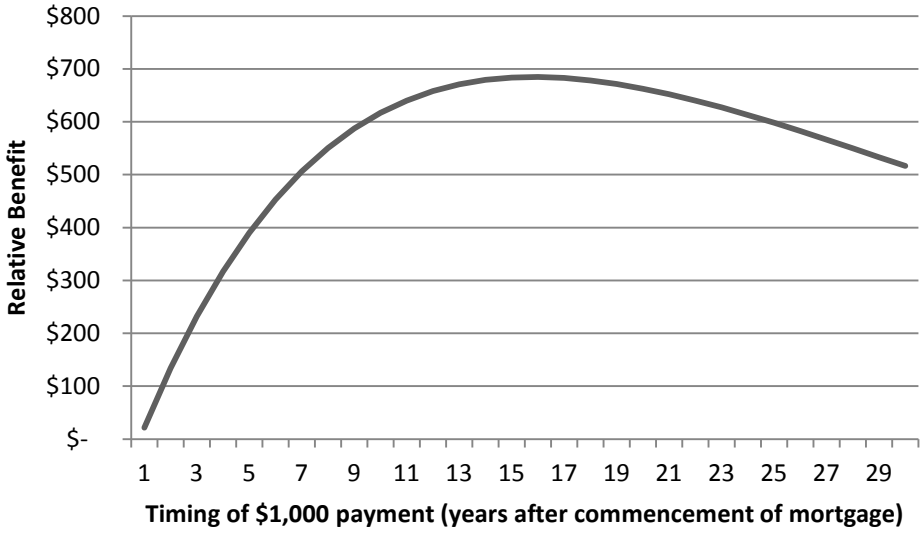
Table 1: Relative benefit of co-contribution at different points in time. $300,000 loan, 30 year term, 7.5% nominal mortgage rate and 8% gross investment return.

Years since mortgage commencement	**Option 1:** Difference between original and reduced mortgages	**Option 2:** Accumulated additional superannuation funds at the time mortgage is paid off[10]	Relative advantage of participation in co-contribution scheme
0	$9,190	$9,206	$16
5	$6,363	$6,815	$452
10	$4,406	$5,045	$639
15	$3,050	$3,735	$684
20	$2,099	$2,751	$652
25	$1,453	$2,037	$583

The relative advantage of investing in the co-contribution scheme is presented graphically in Figure 1.

[10] Assuming tax of 15% and investment management fees of 0.58%.

Figure 1: Relative benefit of co-contribution at different points in time. $300,000 loan, 30 year term, 7.5% nominal mortgage rate and 8% gross investment return.



Single Contribution, general case with continuous repayments

The relationship between the 'relative benefit' of investing in the co-contribution scheme, versus reducing a mortgage, can be expressed mathematically. The relationship is presented here in terms of continuously compounding mortgage interest in order to keep the mathematical formulation simple. The results of the formula differ only marginally from those obtained when assuming fortnightly or monthly compounding interest. In words, the relative benefit of contributing to superannuation can be expressed as the accumulated superannuation investment (the $1,000 plus the government co-contribution of $500 accumulated with investment earnings) minus the amount remaining on the mortgage in the event that the funds are invested in superannuation. The time at which the investment is accumulated to (and the date at which the remaining mortgage balance is calculated) is equal to the time at which the mortgage *would* have been completely paid off in the event that the $1,000 was instead used to reduce the mortgage. Mathematically, this can be written as:

$$RB = 1{,}500(1+i_s)^{t-q} - X\left(\frac{1-(1+i)^{-n+t}}{\ln(1+i)}\right) \qquad (1)$$

where,

RB is the relative benefit;

i_s is the net annual return on the superannuation investment choice;

i is the applicable effective annual mortgage rate;

n is the term of the original loan;

q is the number of years after the commencement of the mortgage when the payment of $1,000 is either made to reduce the mortgage or is invested in superannuation;

X is the level annual repayment required to repay the loan under the original term n;

t is the length of time required to repay the reduced loan (i.e., the original loan minus $1,000).

In equation (1), $X\left(\frac{1-(1+i)^{-n+t}}{\ln(1+i)}\right)$ is the balance of the original mortgage that would exist at time *t*. In this context, it represents a lost opportunity to save by otherwise allocating the $1,000 against the mortgage loan at time *q*.

X can be found by equating the initial loan amount to the present value of the repayments:

$$L = X\left(\frac{1-(1+i)^{-n}}{\ln(1+i)}\right) \qquad (2)$$

where *L* is the original loan amount (e.g., $300,000 in the previous section). Therefore,

$$RB = 1{,}500(1+i_s)^{t-q} - L\left(\frac{1-(1+i)^{-n+t}}{1-(1+i)^{-n}}\right) \qquad (3)$$

t can be found by equating the outstanding loan balance at time *q* with the present value of future loan repayments made between time *q* and time *t*, where we assume that the level repayment amount *X* doesn't change. That is,

$$OB(q) - \$1{,}000 = X\left(\frac{1-(1+i)^{-t+q}}{\ln(1+i)}\right) \qquad (4)$$

where $OB(q)$ is the outstanding balance at time *q* just prior to the additional $1,000 mortgage payment. If we solve (4) for *t*, we get:

$$t = q - \frac{\ln\left[1-\left(\frac{OB(q)-\$1{,}000}{X}\right)\ln(1+i)\right]}{\ln(1+i)} \qquad (5)$$

$OB(q)$ can be expressed as the difference between the original loan amount *L* and the repayments made up to time *q*, accumulated to time *q*:

$$OB(q) = \left(L - X\left(\frac{1-(1+i)^{-q}}{\ln(1+i)}\right)\right)(1+i)^q \qquad (6)$$

Thus, *RB* can be found in terms of i_s, *i*, *L*, *n* and *q*.

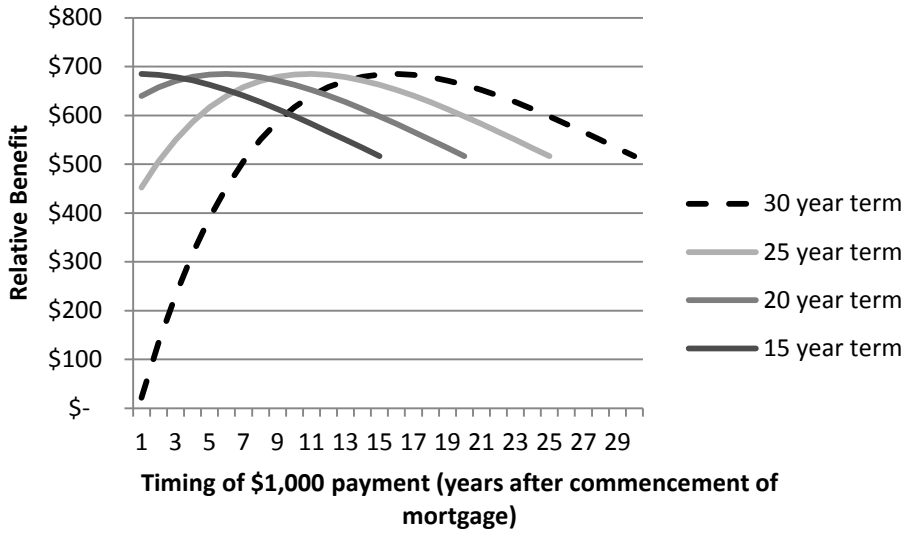
From equation (1) it can be seen, unsurprisingly, that the greater the return on the superannuation investment, the greater the relative benefit of contributing to superannuation. While it might not be immediately clear from this equation, it is also the case that the lower the mortgage interest rate, the greater the relative benefit of contributing to superannuation. When

mortgage interest rates are low relative to investment returns, interest accrues more slowly on the mortgage and the relative gains from repaying the mortgage quickly are less than they would be otherwise. Conversely, when mortgage rates are high, relative advantages arise by making greater mortgage repayments.

The relationship can be better appreciated by varying the levels of i_s, i, L, n, and q each in turn while keeping the levels for the other variables constant.

As an example, in Figure 2 the relative benefit of the co-contribution scheme is shown for the same investment return and mortgage rate assumptions as for the example above, but where the initial mortgage term is varied from 30 years to 15 years. A maximum relative benefit of $685 arises for a $300,000 mortgage with a 15 year term. Of note is the fact that the relative advantage of the co-contribution scheme is *identical* for an individual who makes a superannuation contribution at the start of a 15 year term, as for one who contributes 5 years into a 20 year mortgage, or one who contributes 15 years into a 30 year term. This can be seen in Figure 2, where the maximum of the curve for each mortgage coincides with a contribution 15 years prior to the end of the mortgage term, a result consistent with Figure 1. The example graphed in Figure 1 is repeated as a dashed line in this plot.

Figure 2: Relative benefit of co-contribution at different points in time for different original loan terms. $300,000 loan, 7.5% nominal mortgage rate and 8% gross investment return.



It is noted that the size of the mortgage has a negligible impact on the optimal time to make a single contribution. Instead the optimal time is predominantly a function of the relative difference between the assumed mortgage rate and investment return. The fact that 15 years is optimal in the above example is due to the specific mortgage rate and investment return assumptions. If these were different, both the relative benefit and the optimal time for a single $1,000 contribution would change.

For example, consider now a mortgage interest rate of 6.5% (convertible monthly) over the term of the loan, but a continuation of an expected gross investment return of 8% per annum. These assumptions are reasonable if there is a belief in the persistence of an extended period of low mortgage interest rates. The total interest over the course of the loan is now $382,633, and

the monthly level mortgage payment which amortises the loan after 30 years is $1,896. In this case greater relative benefits could accrue from participation in the co-contribution scheme, as demonstrated in Table 2.

Table 2: Relative benefit of co-contribution for alternative mortgage rate. $300,000 loan, 30 year term, 6.5% nominal mortgage rate and 8% gross investment return.

Years since mortgage commencement	**Option 1:** Difference between original and reduced mortgages	**Option 2:** Accumulated additional superannuation funds at the time mortgage is paid off[11]	Relative advantage of participation in co-contribution scheme
0	$6,879	$9,254	$2,374
5	$5,002	$6,850	$1,848
10	$3,637	$5,071	$1,434
15	$2,630	$3,735	$1,105
20	$1,902	$2,751	$849
25	$1,383	$2,037	$654

As might be guessed from the pattern in the final column in Table 2, the single optimal time to make a co-contribution payment is actually well before the mortgage starts – the fact that now the net investment return (6.307% per annum effective) is very close to the effective annual mortgage interest rate (6.697%)[12] means that the location of the optimum time lies much further out than before (the actual solution gives a negative time). The obvious bounds in this context implies that participating in the co-contribution as early as possible is better than later, due to the relatively lower interest rate burden on the mortgage.

Sensitivity testing

To appreciate the sensitivity of the results to interest and investment return assumptions, in Figure 3 the relative benefit is given for a $300,000 loan with a 30 year term at 7.5% interest, where the gross investment return on superannuation is varied from 6% to 10%. The example in Figure 1 of 8% investment return is again repeated as a dashed line in this plot. It is clear that there is substantial variation in the relative benefit when the gap between the mortgage rate and investment return varies; at the upper end of investment returns, and given this fixed mortgage rate, the relative benefit of contributing to superannuation at the start of the mortgage is over $5,500; conversely, it is closer to a relative 'loss' of $3,500 at the lower end of investment returns.

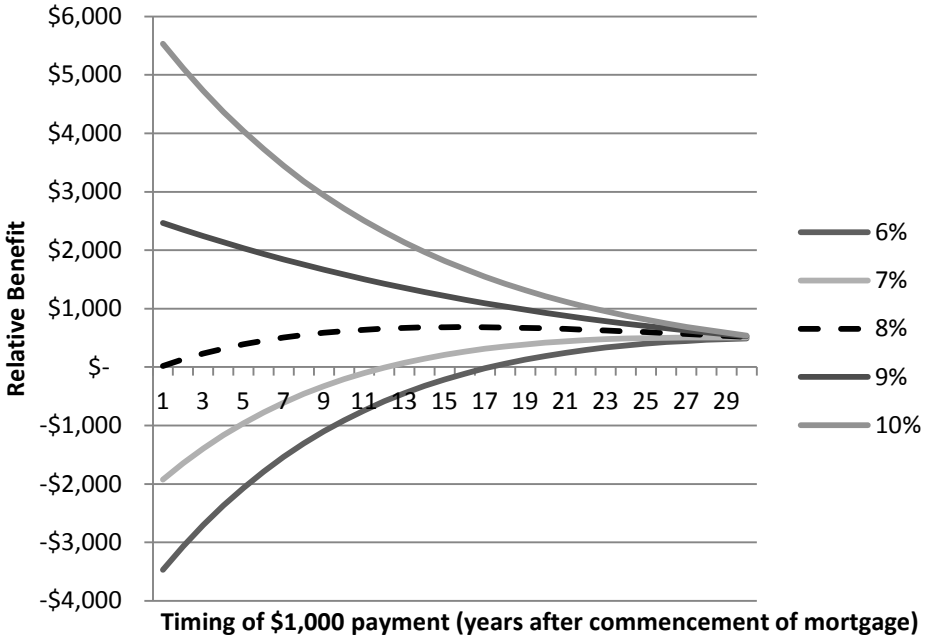
As the remaining term reduces, the relative benefit converges to $500 under each scenario. This makes sense intuitively; for high investment returns relative to mortgage rates, the longer the period of investment (i.e., the greater the remaining term of the mortgage), the greater the compound growth of the superannuation investment; conversely, for low investment returns relative to mortgage rates, the magnitude of the relative loss from investing in superannuation is

[11] Assuming tax of 15% and investment management fees of 0.58%.

[12] As given by $(1+\frac{0.065}{12})^{12}-1=6.697\%$.

accentuated over a longer term, and the loss is minimised (indeed, the loss becomes a gain) as the remaining term is shortened due to the fact that the co-contribution of $500 is guaranteed.

Figure 3: Relative benefit of co-contribution for different gross investment return assumptions. $300,000 loan, 30 year term, 7.5% nominal mortgage rate.[13]



Another way to express these results is to find the values of i_s such that *RB* is positive for a given mortgage interest rate, loan size and term. That is, rearrange (3) to find the values of i_s such that:

$$1{,}500(1+i_s)^{t-q} > L\left(\frac{1-(1+i)^{-n+t}}{1-(1+i)^{-n}}\right) \qquad (7)$$

Results are presented in Table 3 for selections of loan amount, loan term, and mortgage rates, where it is assumed that the additional $1,000 is applied at the start of the loan term (i.e., $q = 0$).

For example, for a $300,000 loan with a 30 year term and mortgage rate of 9%, in order to favour participation in the superannuation co-contribution scheme over a mortgage repayment, the long-term gross investment return on superannuation would need to be at least 9.86% per annum. Although the original loan amount has very little impact on the required investment return, the required investment return reduces considerably as the term of the mortgage falls due to the guaranteed $500 co-contribution.

[13] A similar figure can be produced if we keep the investment return constant and vary the mortgage interest rates.

Table 3: Corresponding gross investment return for different scenarios assuming a single contribution at the start of the mortgage term.

Loan amount ($)	Term of loan (yrs)	(Nominal) Mortgage interest rate	Required gross investment return
500,000	30	7.5%	8.00%
400,000	30	7.5%	8.00%
300,000	30	7.5%	7.99%
200,000	30	7.5%	7.98%
100,000	30	7.5%	7.95%
500,000	20	7.5%	7.16%
400,000	20	7.5%	7.15%
300,000	20	7.5%	7.15%
200,000	20	7.5%	7.14%
100,000	20	7.5%	7.11%
500,000	10	7.5%	4.66%
400,000	10	7.5%	4.66%
300,000	10	7.5%	4.65%
200,000	10	7.5%	4.64%
100,000	10	7.5%	4.60%
300,000	30	9.0%	9.86%
300,000	30	8.0%	8.61%
300,000	30	7.0%	7.37%
300,000	30	6.0%	6.14%
300,000	30	5.0%	4.93%
300,000	20	9.0%	9.01%
300,000	20	8.0%	7.77%
300,000	20	7.0%	6.53%
300,000	20	6.0%	5.31%
300,000	20	5.0%	4.10%
300,000	10	9.0%	6.48%
300,000	10	8.0%	5.26%
300,000	10	7.0%	4.05%
300,000	10	6.0%	2.85%
300,000	10	5.0%	1.66%

Year on Year Contributions

A further way to consider the relative merits of the co-contribution scheme is to assess the impact of participating year-on-year, versus otherwise putting an additional $1,000 into mortgage reduction. The fact that the year-on-year co-contribution benefits are additive and cumulative over time can make participation in the scheme more attractive than when just considering a single contribution. Returning to the original example of a $300,000 loan over 30 years, with a mortgage rate of 7.5% (convertible monthly), monthly mortgage repayments of $2,098, and a net investment return of 6.307%, the two options now considered are:

- Option 1 – pay $1,000 into the mortgage at the start of *each* year until the mortgage is repaid. In this case the mortgage would be paid off after 26 years and 2 months, the total interest incurred over the life of the loan would reduce from $455,152 to $384,145, and the final mortgage payment would be $583.

- Option 2 – put the $1,000 at the start of *each* year into superannuation as a voluntary payment, receiving the $500 co-contribution. In this case the balance of the mortgage after 26 years and 2 months would be $83,635, and at that time the additional superannuation funds would be $101,249.

In terms of the resultant balances in 26 years and 2 months from mortgage commencement, option 2 is superior to option 1 by $16,099[14].

To better appreciate the effect of year-on-year co-contribution scheme participation, Figures 4 and 5 present the relative benefit for different loan term and superannuation investment return assumptions. The relative benefit for single, one-off contributions are also given in the figures for comparison, where it is assumed that the single contribution is made at the beginning of the loan term.

Following from Table 3, we can again find values of i_s such that *RB* is positive for a given mortgage interest rate, loan size and term, assuming year on year contributions. i_s is found for the same loan amount, term and mortgage interest rate assumptions as in Table 3, and the results are given in Table 4. Note that in some cases the required gross investment return is negative which implies that even in the event of zero superannuation investment growth, or indeed small negative returns, the relative benefit is still positive if contributions are made to superannuation each year for the duration of the mortgage.

The results of Figures 4 and 5 and Table 4 suggest two things. First, year on year contributions generally (but not always) yield higher relative benefits than single contributions, but the attraction of regular participation in the co-contribution scheme increases substantially for shorter mortgage terms. Second, and importantly, while the relative benefits are higher for year-on-year contributions than for single contributions when investment returns are strong, Figure 4 shows that scheme participation can actually yield substantially poorer financial positions if gross returns are only modest.

Despite this cautionary observation, the relative benefits of the co-contribution scheme in terms of year-on-year participation may well provide a more tangible and significant

[14] $101,249 - $83,635 – ($2,098 - $583)

motivation to participate than the benefits of single one-off participation for those eligible and having the means to contribute an additional $1,000 each year.

Figure 4: Relative benefit of co-contribution for different gross investment return assumptions. $300,000 loan, 30 year term, 7.5% monthly nominal mortgage rate.

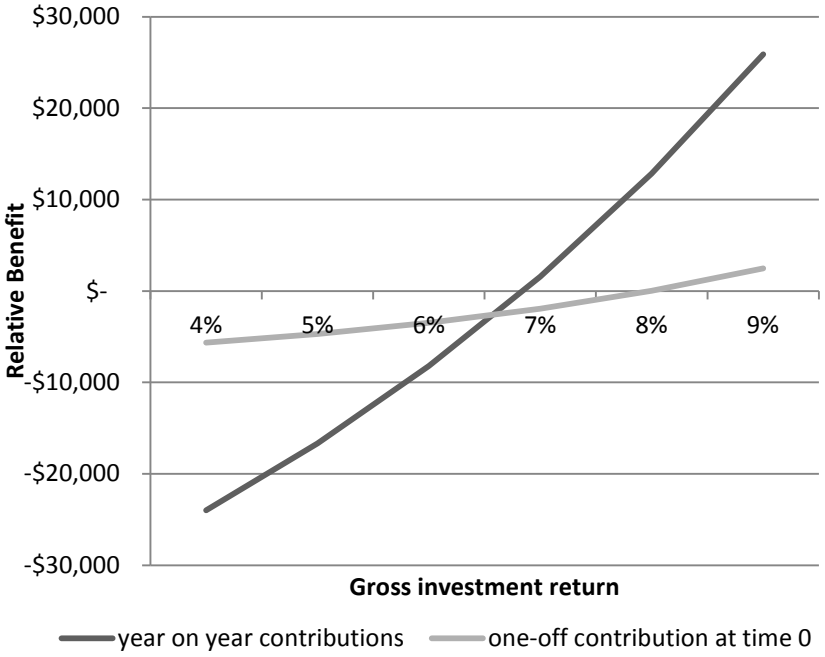


Figure 5: Relative benefit of co-contribution for different gross investment return assumptions. $300,000 loan, 20 year term, 7.5% monthly nominal mortgage rate.

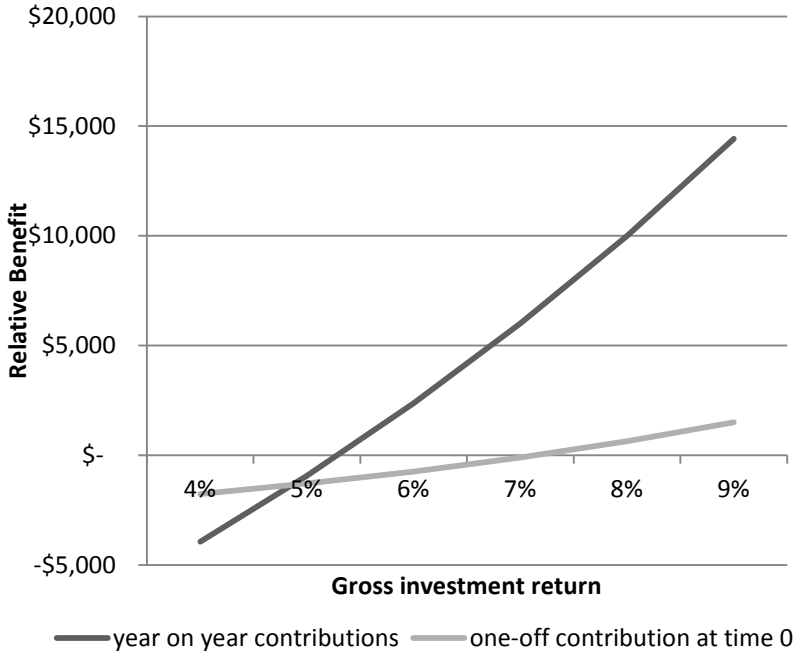


Table 4: Corresponding gross investment return for different scenarios assuming year-on-year contributions.

Loan amount ($)	Term of loan (yrs)	(Nominal) Mortgage interest rate	Required gross investment return
500,000	30	7.5%	6.83%
400,000	30	7.5%	6.76%
300,000	30	7.5%	6.65%
200,000	30	7.5%	6.43%
100,000	30	7.5%	5.79%
500,000	20	7.5%	5.22%
400,000	20	7.5%	5.16%
300,000	20	7.5%	5.06%
200,000	20	7.5%	4.86%
100,000	20	7.5%	4.28%
500,000	10	7.5%	0.17%
400,000	10	7.5%	0.12%
300,000	10	7.5%	0.03%
200,000	10	7.5%	-0.15%
100,000	10	7.5%	-0.67%
300,000	30	9.0%	8.57%
300,000	30	8.0%	7.29%
300,000	30	7.0%	6.01%
300,000	30	6.0%	4.72%
300,000	30	5.0%	3.42%
300,000	20	9.0%	7.03%
300,000	20	8.0%	5.72%
300,000	20	7.0%	4.40%
300,000	20	6.0%	3.09%
300,000	20	5.0%	1.78%
300,000	10	9.0%	2.00%
300,000	10	8.0%	0.68%
300,000	10	7.0%	-0.62%
300,000	10	6.0%	-1.92%
300,000	10	5.0%	-3.22%

CONCLUSION

Behavioural differences and differing attitudes towards savings and retirement will affect the attractiveness of the co-contribution scheme, as will lack of availability of funds, ignorance of the scheme, or disengagement with retirement savings decisions.

This paper was motivated by our intuition that the generosity of the co-contribution scheme (a guaranteed return of 50% on an investment of $1,000), if presented in a comparative fashion to mortgage reduction, may help to lower some of the barriers to scheme participation. While participating in the co-contribution scheme may seem an optimal decision at first blush, the examples above show that the optimal decision depends critically on the difference between superannuation investment returns and mortgage interest rates, and importantly, for long mortgage terms, high sustained gross superannuation investment returns are required in order for co-contribution scheme participation to be favoured. While loan size has an almost negligible impact on the relative benefits of scheme participation, for shorter loan terms it was shown that participation would more likely yield benefits.

Despite the findings above, when faced with decisions as to the best use of extra funds in this context, there are factors to consider other than a best-estimate assumption of future returns on superannuation investments relative to interest rates. One significant factor is the issue of access and liquidity. While superannuation funds are inaccessible until later ages (generally age 60 at the current time) for many mortgages extra funds can be withdrawn immediately and at low, if not zero cost. Further, while mortgage rates are often fixed, or vary in small discrete steps as monetary policy levers are pulled, investment returns are volatile. This is particularly evident post GFC. An extension of the examples herein would be to consider the impact of stochastic variability in investment returns on the relative benefits of co-contribution scheme participation, as well as considering relationships between mortgage rates and investment returns.

While the examples above have compared superannuation contribution to mortgage repayment, the scheme is without doubt a better long-term financial option in terms of savings outcomes if the alternative use of the $1,000 was for discretionary expenditure needs rather than mortgage repayments, as often is the case. Conversely, retiring expensive debt, such as credit card liabilities, should take precedent over co-contribution scheme participation.

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