The Retirement Trap

Roger Cohen* Wen Chen† Zili Zhu†

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Abstract

It is well known that retirees with financial assets (including superannuation balances) of between $400k and $600k, can find their income decreasing (or not increasing) when these balances increase. This **Retirement Trap** is quantified and analysed by using a proprietary stochastic cascading economic scenario generator (ESG) that is calibrated to historical economic and demographic data. Industry recognised investment strategies (such as *growth* or *conservative* asset allocations) are incorporated into the study. Multiple long-term forecasts in the order of 100,000 scenarios are generated to calculate future economic return expectations. To simplify interpretation, and to remove dependence on monetary values and the effects of time (which would require results to be continually recalibrated), the concept of a **Pension Multiplier** is introduced to provide an intuitive way of measuring and comparing retirement income levels. This pension multiplier is a measure of current or future retirement income expressed as a multiple of the government pension. Results from this study show that the current government pension system introduces some peculiar disincentives for people saving for their retirement. Most notably, that more assets can actually lead to reduced retirement income in certain cases. The simulated outcomes in this paper clearly identify the Retirement Trap and its effect on both income and volatility or uncertainty of returns. These lead to conclusions which are counterintuitive and can challenge behavioural and psychological norms about risk taking and investment objectives for retirees.

Keywords: pension multiplier, retirement trap, investment strategy, drawdown strategy, Age Pension, superannuation, retirement

1 Introduction

Income in retirement generally derives from various sources including investment income, capital (savings) and for many Australians, the Government pension and other allowances[1]. Intuitively, it is expected that the larger the asset base a retiree has, the greater will be their potential income. However, this is not always the case. Modelling of retirement outcomes [2] shows that under certain circumstances, an increased asset base in retirement can actually result, for some retirees, in decreased income. Such affected retirees must either live on less income, or, compensate by chasing higher investment returns and/or consume more of their capital. These actions introduce increased risk (to both market factors and sustainability), and correspondingly increased uncertainty, at the very time that this is least desirable. This counterintuitive outcome is a consequence of the interaction between investment returns and pension entitlements under legislated income and asset eligibility tests.

*Senior Investment Specialist, BetaShares, (Roger.Cohen@betashares.com.au)

†RiskLab, Data61, the Commonwealth Scientific Industrial and Research Organisation (CSIRO), Australia

[1] in 2006-7 approximately 77% of Australians over the age of 65 received some form of income support. see https://www.dss.gov.au/our-responsibilities/seniors/publications-articles/pension-review-background-paper

A Few Assumptions and Simplifications in this paper

A full and complete analysis would require modelling of financial assets both within and outside of superannuation. Further, there would need to be a distinction between retirement accounts and accumulation accounts post retirement, as the tax treatment of each of these is different. For the purposes of this paper, it is assumed that all assets are held within superannuation, and that income is quantified without considering taxes. This means that income and related results may be overstated, however, this would mostly apply to retirement accounts with large superannuation balances (above the tax-free threshold) and large balances external to superannuation. The main issues and outcomes will largely not be affected by this simplification. Government allowances and entitlements generally vary for single retirees and for couples. Unless explicitly stated in the paper, illustrations and quantities are for a single retiree.

2 The Pension Multiplier

When comparing current and future income streams, it is essential to be consistent. While we tend to have an idea of values and amounts today, it is difficult to extrapolate to the future (or refer to the past). How do we compare today's dollars to dollars in the future. How do we account for inflation and interest rates. To reference values to today's dollars, future cashflows must be discounted by expected inflation rates. Only by focusing on real returns can we understand the future value of investments. To simplify this, we use the Government pension as an anchor, and introduce the **Pension Multiplier.** The Pension Multiplier represents the current or future income stream a retiree can expect in terms of a multiple of the Government Age Pension. For a pensioner with assets and income below the relevant threshold, the Pension Multiplier is 1 (the Pension Multiplier will never fall below 1, as a retiree with no income and no assets will be entitled to a full pension). As income and/or assets increase, the Pension Multiplier will change accordingly, but not necessarily proportionally. This will be discussed further below. Using the Pension Multiplier instead of dollar values, facilitates comparisons without having to correct for timing and indexation. If the pension is set and indexed to provide a "base level or safety net" [1], then the relativity of real and projected outcomes referenced to it allow for comparison and analysis.

At any time, dollar values can be substituted by multiplying the Pension Multiplier by the current level of the pension. The same concept and Pension Multiplier can be used for a couple. In this case, the Pension Multiplier refers to a multiple of the pension a couple (rather than a single person) would receive. All other concepts and calculations are the same. Results will thus apply to both singles and couples, and just reference a different dollar amount in each case. Using the Pension Multiplier makes comparison straightforward. It assumes that the intrinsic value of the pension is relatively stable. If there is a structural change to the pension (such as a non-indexed increase or decrease), then outcomes can be skewed, and Pension Multipliers may need to be recalculated. This can be compensated for by resetting the base level (away from 1) in the event of such changes.

For this paper, the base level of the Pension Multiplier will be maintained at 1, under the assumption that there will be no change to the fundamental methodology behind setting the level of the pension. We also assume that the retirement age is 67 and terminal age T is 104[2]. We compute pension multiplier $PM \geq 1$ as the ratio between the lifetime expected (mortality weighted) total consumption and the lifetime expected maximum total Age Pension a retiree can receive:

$$PM = \frac{\Sigma_{t=67}^{T=104} C_t \cdot p_{67,t}}{\Sigma_{t=67}^{T=104} A_t^{full} \cdot p_{67,t}} \quad (1)$$

[2]Note: terminal age is not the same as life expectancy. Demographic data (mortality rates) is used to model the latter. Terminal age is the maximum age used in the modelling. Only a low (near zero) proportion of the population will live to this age.

where $C_t = A_t + W_t$ is the discounted retirement income or consumption which is the total of Age Pension entitlement and account-based pension withdrawal at time t, A_t^{full} is the full Age Pension. $p_{67,t}$ is the conditional survival rate for people at $67+t$ given this person is alive at 67 years old. This can be done for both single retirees and for couples. For the remainder of this paper, we will only include the case for a single person.

The denominator is the expected total Age Pension received by a single person without any assets or income, who is entitled the full Age Pension during their entire retirement. The numerator is the expected total consumption for a single person. Due to the difference in mortality rates[3] of males and females, one unit Pension (denominator of Eq. 1) for a male differs to that for a female. As at September 2019, one unit Pension for a male is currently approximately $\$441,000$, for a female it is currently $\$507,000$, which reflects the longer life span of females. For couples, one Pension unit is currently $\$764,000$. Note that the pension unit calculated in this paper may be different from the pension unit values reported in other publications. For example, in [5], for a single person retiring at age 65, the present value of total future full age pension payments exceeds $\$500,000$, and for couple it exceeds $\$800,000$. In [3], the author suggests the value of the Age Pension from a male, a female and a couple at 65 years old eligible for full Age Pension is $\$400,000$, $\$450,000$ and $\$650,000$ respectively. While these actual dollar values vary depending on how they are calculated, in the current study, income and consumption (spending) are treated consistently, thus, resulting modelling will generate consistent results. Expressing these in terms of Pension Multipliers then removes ambiguity from subsequent interpretation.

In this paper, we set the eligible age pension age to be 67, and use the mortality rate weighted sum of future Age Pension to the age of 104. This is equivalent to males living up to age 85 (surviving for 18 years) and females living up to age 88 (surviving for 21 years). We apply the same weighted sum to consumption. As the Pension Multiplier is defined as the ratio of the sum of total consumption and total maximum pension entitlement, it will not vary much much between males and females. When translating from Pension Multipliers to dollar values, these amounts (as updated) must be used based on whether they are applied to a male, a female or a couple.

In retirement, the (current) Pension Multiplier can be observed directly. It is based on all sources of income including the Age Pension, and will change over time, as assessable assets, income and consumption patterns change. For example, a retiree may choose to spend more or less aggressively. They may also make investment choices with different expected outcomes (remember that although deemed income will not change, actual income depends on real investment outcomes). Whether income is spent or reinvested will also alter the Pension Multiplier over time, as will inflows from inheritances or other windfalls. Before retirement, the Pension Multiplier can be derived as the ratio of net worth to the present value of the pension for an individual or a couple. This is not detailed here, and is not trivial to calculate as it requires modelling of future pension entitlements [2]. It can also be calculated by modelling future retirement income, based on current assets, income, saving patterns and investment strategies chosen. This will be discussed further below. Investment choices will alter the pension multiplier and also the risk (or uncertainty) of achieving it. For example, more aggressive or risky investments (with higher expected returns) will generate a higher Pension Multiplier - but the uncertainty of achieving it increases (on both the up and downsides). This is illustrated in Figure 1 and 4.

The Pension and Pension Eligibility

The Australian government provides a means tested pension[4] which uses an income test and an assets test determine the level of pension to which an individual or a couple are entitled. How the income test and assets test are applied can be summarised as:

- Below an income and an asset threshold, a qualified person is intitled to a full pension;

[3] http://www.aga.gov.au/publications/life_table_2010-12/

[4] https://www.humanservices.gov.au/individuals/services/centrelink/age-pension

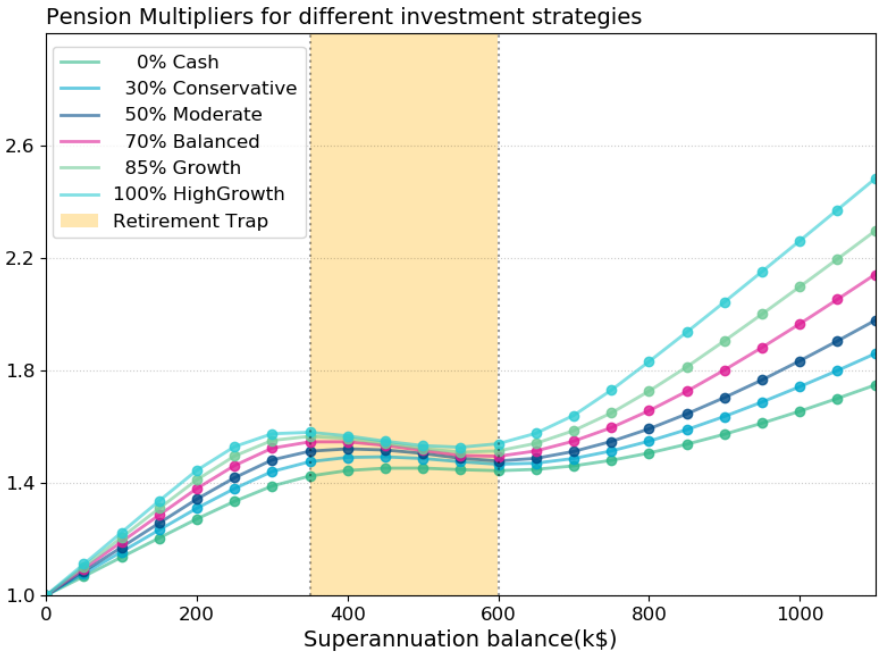


Figure 1: Pension Multipliers using different investment strategies and the Retirement Trap (light yellow region)

- For each $1.00 per fortnight of income above a specified threshold, the pension entitlement reduces by $0.50 per fortnight;
- For each $1,000 in eligible assets above a specified threshold, the pension entitlement reduces by $3.00 per fortnight;
- Financial assets are assumed to generate income at specified deeming rates of return[5], rather than being based on actual returns.

The income test and asset test create a tapering of the pension amount as income and assets increase. The pension, income and asset tests are indexed with CPI and the cost of living and referenced to an average weekly earnings wage[6]. Indexation is implemented in March and September each year.

3 More is not necessarily more

Figure 1 shows the pension multiplier for a given range of superannuation balances when different investment strategies are adopted. In this Figure, we use the *minimum* drawdown strategy to compute the Pension Multiplier.As demonstrated by Figure 1, the Pension Multiplier is highly dependent on the chosen investment strategy. Equally, it is also highly dependent on the selected drawdown strategy as shown in Figure 2where the investment strategy is *Balanced*. As expected, investment strategies which target higher returns will result in higher Pension Multipliers from the same asset base (or superannuation balance), but will also introduce more uncertainty and variability in achieving these outcomes. Aggressive drawdown strategies mean higher retirement income withdrawal, which understandably will result in a higher Pension Multiplier, but over a shorter time period because there is a higher risk of running out of money.

Because the pension is means tested, increased wealth or superannuation assets does not automatically translate to a retiree being better off with more income. Anecdotally, pensioners who derive income, or who accumulate

[5] https://www.humanservices.gov.au/individuals/topics/deeming/29656

[6] https://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/pubs/rp/BudgetReview201415/Indexation

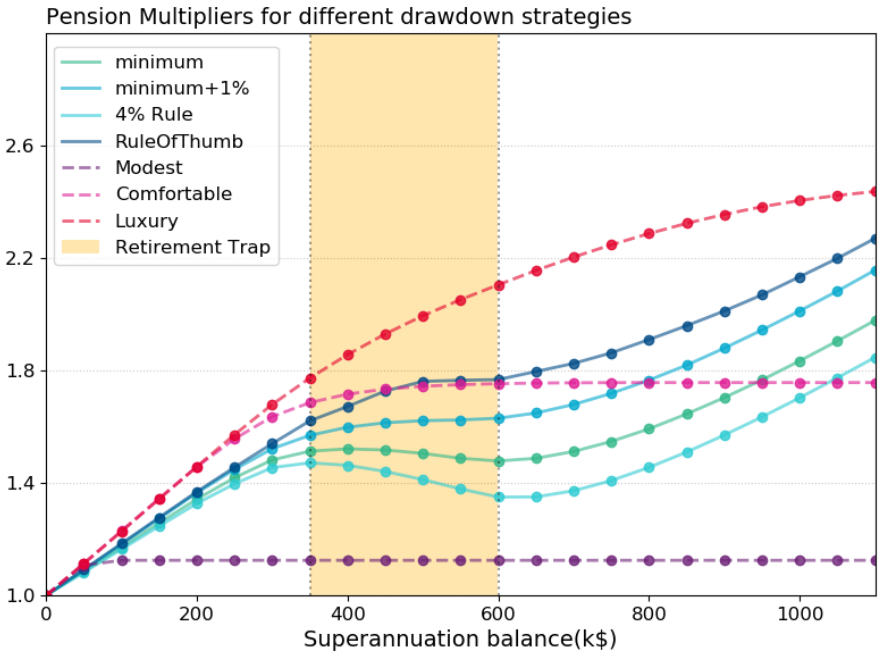


Figure 2: Pension Multipliers using different drawdown strategies with *Balanced* investment strategy, the Retirement Trap (light yellow region).

(financial) assets over certain thresholds pay what can be interpreted as a figurative "tax" in the form of reductions to their pension. This loosely translates as:

- Once fortnightly earnings exceed \$174[7], the effective tax rate for a retiree becomes 50%. That is, for each additional dollar earned, their pension reduces by \$0.50. Or, the marginal utility of an extra \$1.00 is only \$0.50. In certain specific cases, this "tax rate" can even be as high as 82.5%[8].
- If a retiree with an asset base over a relevant threshold[9], who receives a full or part pension accumulates an additional \$1,000 in assets, then that \$1,000, if invested, must generate an annual return in excess of 7.8% to replace the loss it causes to their age pension. This is because each additional \$1,000 in financial assets reduces pension entitlements by \$3.00 per fortnight (or approximately \$78.00pa). To offset the lost \$78.00, the yield on the \$1,000 must be at least 7.8%.

There are other anomalies in the system – including the way the family home is valued; the entitlement to medical and other benefits and certain allowances. These anomalies are outside the scope of this paper.

As can be observed clearly from Figure 1, there is a zone, where for an asset base of between approximately \$350,000 and \$600,000, the Pension Multiplier (and hence resulting retirement income) stops increasing, and actually reduces, as the asset base increases. We call this zone the **Retirement Trap**. The existence of such a retirement trap - besides being punitive - encourages behaviour which is rational, but both counterintuitive, and contrary to the tenets of a retirement system meant to encourage independence while aiming to reduce the burden on the Government. Anecdotally, some rational but inconsistent outcomes and observations can be made:

- **The Casino Paradox - A double or nothing bet is a sure fire exit from the Retirement Trap but with dire consequences.** Although gambling is not to be encouraged, and an all or nothing bet would be

[7] as at September 2019

[8] A retiree who has zero or few assets in superannuation, and earns ordinary income of between \$37,000 and approximately \$50,000 will pay income tax at a rate of 32.5% and also see their pension taper by \$0.50 for each additional dollar of income (as at September 2019). See https://www.humanservices.gov.au/individuals/topics/income-test-pensions/30406

[9] See https://www.humanservices.gov.au/individuals/services/centrelink/age-pension/how-much-you-can-get/assets-test

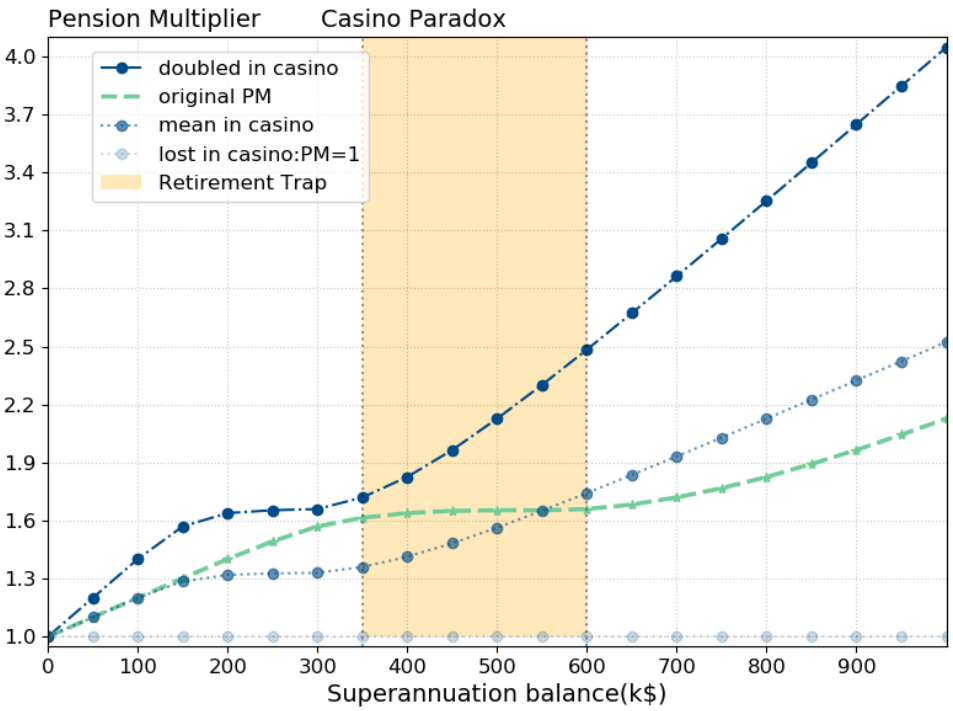


Figure 3: Pension Multiplier in casino

foolhardy, this hypothetical experiment serves to illustrate how the system is skewed against using additional wealth to derive income for retirees caught in the Retirement Trap. A double or nothing bet will leave the bettor with equal probability of ruin or doubling their asset base. The effect of these outcomes on retirement income is highly asymmetric. In the case where the bet is lost, the retiree (with zero assets) will end up with a pension multiplier of one and be entitled to the full government pension. In the case where the outcome is a win, and the winnings are used to generate income, we can see from Figure 3 that only with low (below $250,000) or high (above $550,000) starting asset levels is the increase in pension multiplier commensurate or better than the drop from a loss. The interpretation of this is that from an income perspective, the benefit from winning a double or nothing bet for those in the Retirement Trap is zero to marginal. Losing the bet has the same outcome for all, loss of all assets and a resulting pension multiplier of one. This means that for a retiree within the retirement trap, a windfall gain - unless well in excess of their total assets - is probably better spent, rather than being retained to generate extra income. Where it is retained, the additional income will only be a small increase in relative terms from current levels. (Note: for a retiree with a low pension multiplier, circumstance may dictate that such a small relative income increase is worthwhile). For a person in the Retirement Trap, a double or nothing bet is closer to a nothing or nothing bet if the outcome is measured in terms of income.

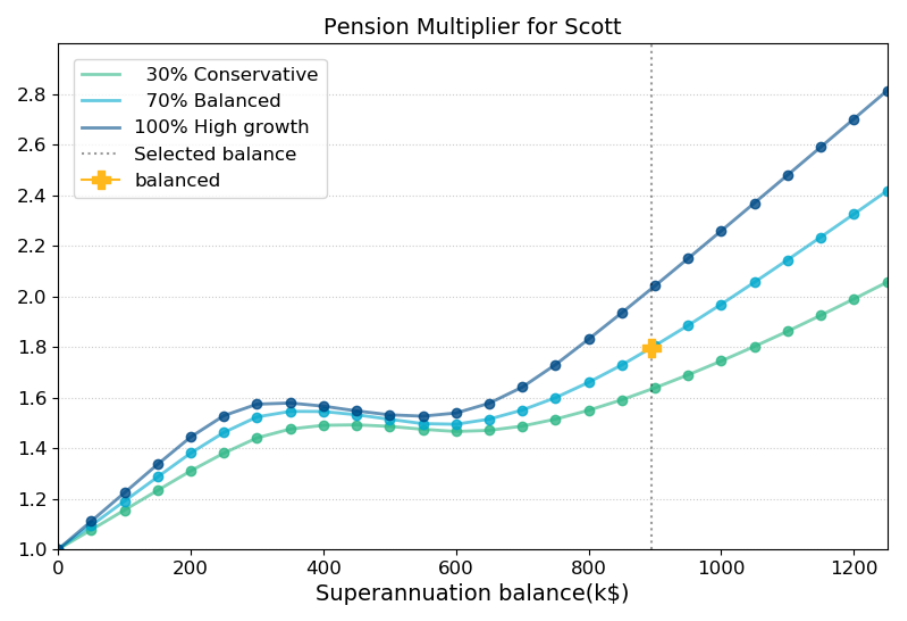
- **Invest for ultra high returns** - Investments must convincingly beat the 7.8% return hurdle to be meaningful. This in all likelihood entails putting capital at risk - something retirees are encouraged not to do.
- **Spend rather than save** - Saving to invest can actually reduce the retirement income.

This is counterintuitive and at odds with many behavioural factors including attitudes towards investment risk and bias towards loss aversion [4]. A rational approach towards risk and return from inside the Retirement Trap is contrary to the approach recommended to and taken by most retirees. The system results in a strong incentive to either spend, or to move investments towards ultra high potential returns, with resultant increased risk. To exit the retirement trap, the asset base must either be reduced, or increased - materially enough so that the figurative

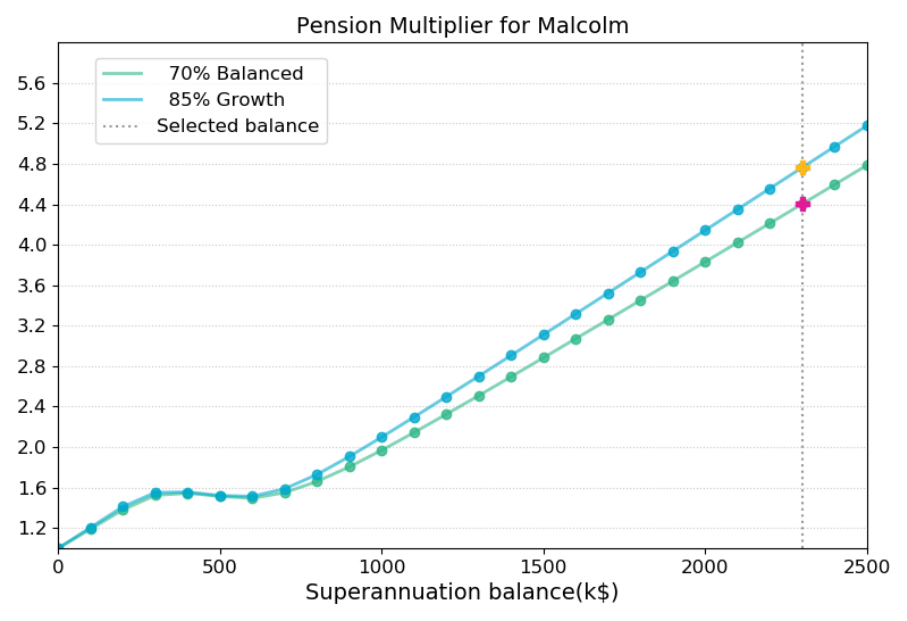
taxes described above are not applicable. Only outside this zone does the marginal utility of $1.00 approach its nominal value.

The **Pension Multiplier** in practice:

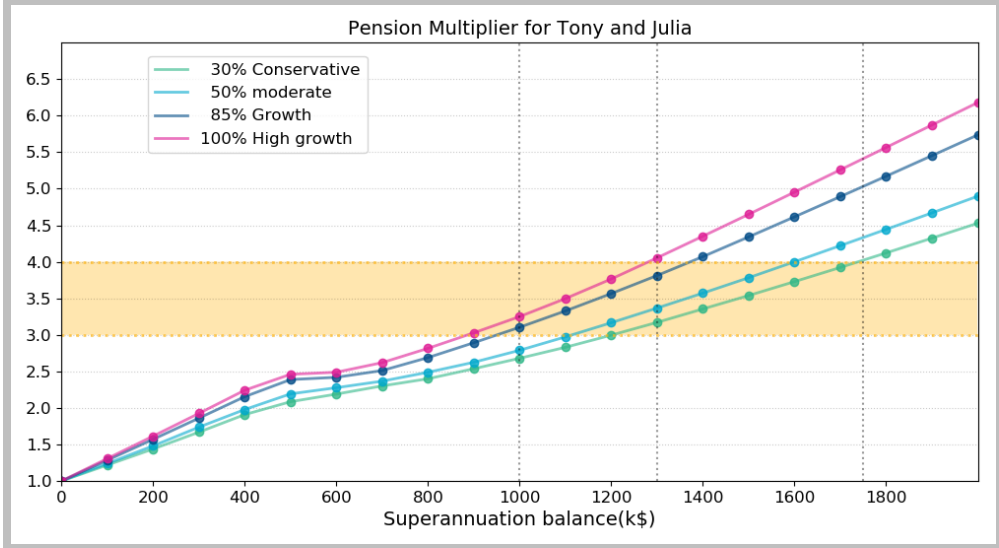
Example 1: Pension Multiplier 1.8. Scott, newly retired (aged 67), receives income from a combination of the Age Pension and his superannuation. Scott can anticipate receiving income at a total of 1.8 times the government pension with $895,000 in Superannuation, invested in a *Balanced* strategy.



Example 2: Malcolm, a pre retiree currently has $2.3 million of investible assets in his combined superannuation and investment accounts. He is told by his financial planner that with his current investment portfolio, he can expect a Pension Multiplier of 4.4. If he invests more aggressively, he can increase this to 4.8, but the added risk introduces a higher level of uncertainty. Malcolm uses this information to consider the merits of changing from a *Balanced* strategy (pink) to a *Growth* strategy (yellow).



Example 3: Tony and Julia, both in their mid 40's. They currently have a combined superannuation balance of $\$500,000$ and are together saving $\$50,000$ p.a. Their super is currently invested in a *balanced* strategy. They would like to retire with a Pension Multiplier between 3 and 4. Modelling shows that they can achieve their goal with the current investment strategy and savings rate. This should produce a total balance of between $\$1,300,000$ and $\$1,750,000$ when they retire. For lifestyle reasons they would like to start scaling back their work commitments in the next 10 years. This means they will save less. They are worried that if they do this, they will not achieve their retirement objective. If they move their investments into a *high growth* strategy, their goal will now require a balance of between $\$1,000,000$ and $\$1,300,000$. Further modelling shows that they will still comfortably achieve this, even if their savings rate drops by 70% (to $\$15,000$ p.a.).



4 The Future Will Not be What is Predicted

Modelling of future outcomes relies on assumptions about investment returns, saving and spending patterns and other factors. Interest rates, performance of markets, changes to earning and saving capacity, timing and other factors have an effect on the outcome, as does the choice of investments, the investment strategies and during retirement phase, the drawdown strategies. Because future outcomes are uncertain, derivation of the Pension Multiplier (or any other factor) requires a model to describe the future (or possible futures). The result will not be a single value, but rather, a distribution of outcomes, from which a "best estimate" or most "likely result" can be extracted. The distribution of outcomes will produce a guide as to how good this estimate is, and the likely deviation from it. Narrow concentrated distributions mean that the actual result will generally be close to the likely outcome, while wide distributions imply that achieving the likely outcome is less certain. The charts below show scatter plots for the Pension Multiplier for the *Balanced* and *High Growth* investment scenarios illustrated above. On these charts, the 10th and 25th percentile bands are shown. The range between these respective bands shows where the measured outcome should eventuate, with approximately 80% and 50% confidence. The scatter charts also show low probability extremes or outliers (both positive and negative).

It is interesting to observe that the magnitude of scatter decreases significantly in the Retirement Trap zone. This can again be explained by the interaction between the pension and the assets test. These provide a degree of cushioning to the variation or volatility of the outcome. For example, a $1.00 change in investment income results in a $0.50 change in total retirement income due to the pension tapering effect. In effect, investment risk, as measured by volatility, is reduced in the **Retirement Trap**. For volatility of outcomes to remain constant

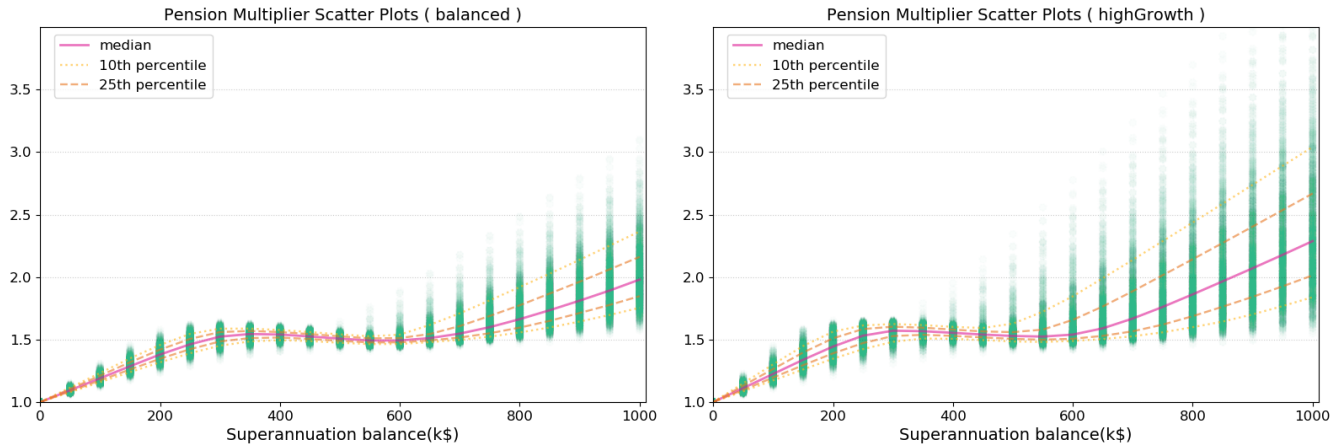


Figure 4: scatter plot for *Balanced* (top) and *High Growth* (bottom) investment strategies at different starting superannuation balances and the medians (pink) and the 25th (yellow broken line) and 10th (yellow dotted line) percentiles

irrespective of balances, investment risk would need to be increased in the region of the Retirement Trap. Again, this is not intuitive, or to be encouraged in practice.

5 Conclusions

The introduction of the **Pension Multiplier** is useful to enable generation and comparison of retirement outcomes on a consistent basis, without reference to dollar amounts and timing. Pension multipliers are computed to illustrate expected retirement incomes under a range of investment and drawdown strategies. The **Retirement Trap** can clearly be observed in the zone where the income and assets tests result in the tapering of pension entitlements. This tapering can be interpreted as a figurative tax, which can result in a reduction in retirement income despite an increase in assets. As a consequence, the rational behaviour to escape the retirement trap can encourage significant increases in risk taking, or accelerated spending. This is corroborated by the observed reduction in scatter or volatility of modelled outcomes for asset levels within the Retirement Trap. The Retirement Trap is the result of inconsistencies in the current Australian retirement system, which creates outcomes that are counter to behavioural biases and conventional economic wisdom. Remediating these inconsistencies will remove the Retirement Trap and produce numerous benefits, including better outcomes for retirees, alignment of risk and reward in retirement investing, and ultimately a reduced load on the government.

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Appendix - Description of the SUPA Model

The SUPA model [2, 6] is a stochastic model which describes the individual behaviour of economic factors, such as price inflation, wage growth, interest rates and asset returns, by stochastic time series as well as their interdependent relationships via a cascade structure described in Figure 5. The SUPA model developed at CSIRO as a multi-factor cascading model, which aims at projecting retirement income by simulation. The dynamic process of each economic factor in this model is influenced to some degree by other variables in the model following inherent relationships within the economy based on established economic theory. In Figure 5, the arrows describe the *flow* of the influence of one variable on another within the structure.

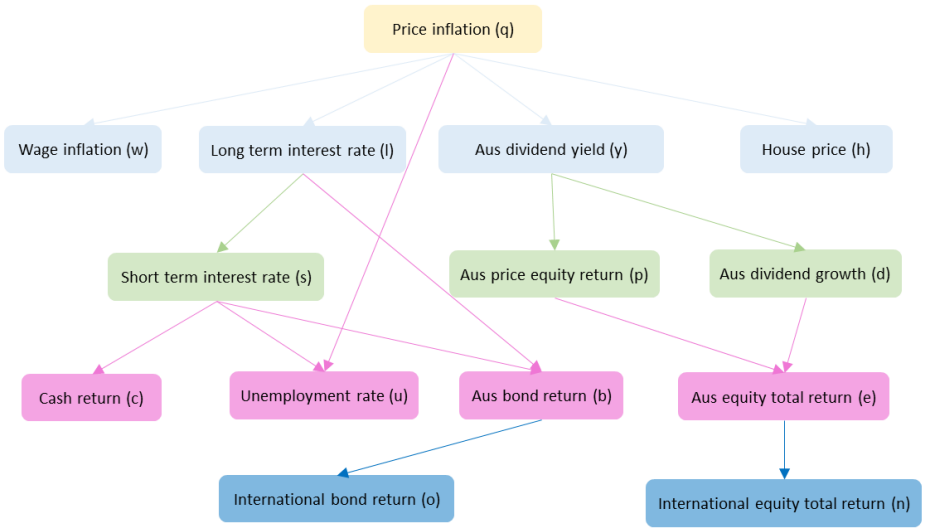

Figure 5: The cascade structure of the SUPA model with 14 variables.

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