COVID-19, INVESTMENT RISK, AND RETIREMENT SECURITY

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ABSTRACT

Investment risk and retirement income security are constant bedfellows. This paper provides estimates of investment risk for defined contribution (DC) plan members to illustrate the importance of compounding (both positive and negative) during the accumulation phase of retirement saving *and* associated retirement income during the decumulation phase. In addition to workers being exposed to investment risk via their DC plan, older workers face significant COVID-19 related headwinds in the labour market. The cresting of investment risk with the current pandemic may create a lost generation of those approaching retirement (and recently retired) through lower contribution rates and an unfavourable path of returns.

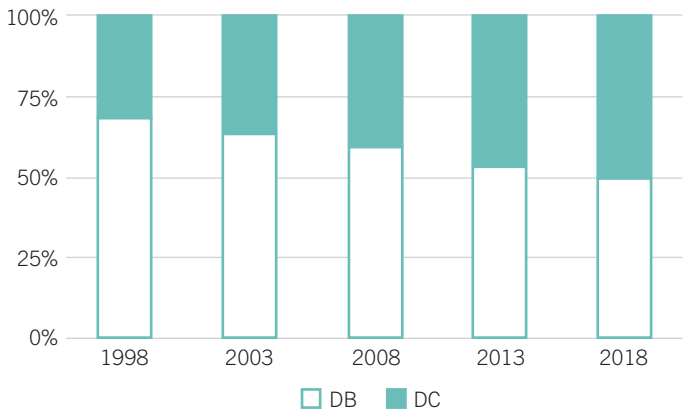
Introduction

The financial press is replete with stories regarding the exodus of workers moving into retirement. In the United States (US) alone, 10,000 baby boomers reach retirement age (65 years of age) each day and will do so for at least another decade.[1] Many workers retire on a Friday, with their metaphorical gold watch and accompanying well wishes, only to be greeted with the stark realisation on monetising their retirement nest-egg on Monday morning that it only replaces a fraction of the return (wages and benefits) that they had previously received from their human capital whilst in employment.

The system that was once in place to provide workers with certainty in retirement—the defined benefit (DB) plan—has collapsed (or is collapsing) around the world. The passing of the Revenue Act of 1978 by the US Congress was the start of what some have described as the 'accidental retirement revolution'. [2] Section 401(k) of the Act marked the statutory creation of the defined contribution (DC) plan and was the catalyst for a substitution effect (specifically, corporate DB pooled plans being replaced by individual DC account-based plans) that has forever changed the global pension system. Looking forward, it is likely that DB plans will be extinct within a generation, replaced entirely by DC plans as the default retirement savings vehicle for all.

It can be argued that the changes in the global pension system that have occurred since the 1970s have resulted in the single largest transfer of financial risk from the corporate sector to households in human history. The closure of DB plans has decoupled the pension liability of workers from the corporation, recoupling it to the individual. As illustrated in Figure 1, the extent of the disruption that has occurred is evidenced by the fact that DC pension assets globally exceeded that of DB assets for the first time in 2018 (Willis Towers Watson 2019).[3] Within fifty years, a relatively obscure statutory creation for supplementing traditional DB-like pension income, the humble DC Plan, now represents the majority of retirement savings for workers around the world.[4]

Figure 1: Proportion of defined benefit and defined contribution assets through time



Source: Willis Towers Watson (2019)

[1] For further background on this trend, see https://www.bloomberg.com/news/articles/2019-04-11/managing-baby-boomer-retirement-when-you-re-not-allowed-to-ask.

[2] The description, 'accidental retirement revolution' has been used in the financial press, see https://www.cnbc.com/2017/01/04/a-brief-history-of-the-401k-which-changed-how-americans-retire.html.

[3] As Roger Urwin, Global Head of Investment Content at the Thinking Ahead Institute, observed: *'… we've reached a pivotal moment in the DC pension assets growth story, as they exceed DB pension assets for the first time, after a slow and steady grind over 40 years'* (quoted in Willis Towers Watson 2019).

[4] In countries such as Australia, some 86% of total pension assets are in DC funds (Willis Towers Watson 2019).

The merits (or otherwise) of going from pooled vehicles (such as DB Plans) to individual account-based DC plans continue to be debated today. Clark (2006) observes that some of the issues with DC plans are, *'… too often located "offstage" shrouded behind curtains of ignorance of its principal imperatives and modes of practice'* (p. 84). Even those leading practitioners on the metaphorical pension 'stage', such as Roger Urwin, have cautioned that, *'… despite its long history, DC is still weakly designed, untidily executed, and poorly appreciated'* (quoted in Willis Towers Watson 2019).[5] The USD 40+ trillion question is: are DC plans up to the challenge of providing retirement security for workers? [6]

Defined contributions plans

While DB plans are characterised by their contractual obligation to members, DC plans offer members a market-related payment. DC plans have resulted in the pension liability being coupled with the worker, meaning that the individual holds the risk. As such, managing investment risk is critical to the success (or otherwise) of DC plans as a retirement savings product. Exley (1997) reminds us that, *'the benefits (from a DC plan) depend only on the returns achieved on contributions put into the scheme and no guarantee or underpin is provided by the company'* (p. 842).[7] To operationalise these issues, a stylised investment risk control process in a typical DC Plan is provided in Figure 2.

Figure 2: A stylised investment risk management process for DC plans

[5] Another wrinkle for individuals to manage as they are coupled with their pension liability in DC plans is that the liability itself is, *'not reliably quantifiable, not legally tradeable, not cheaply retireable, and not easily transferable'* (Clark & Monk 2006, p. 43). As a result, Monk (2009) explains that it has, *'proved extremely difficult to create a portfolio that perfectly matched the assets to the liabilities'* (p. 873).

[6] Willis Towers Watson (2019) estimate that the largest 22 global pension markets in the world had USD 40,173 billion in pension assets.

[7] Furthermore, individual decisions regarding the investment risk appetite of workers can be solved using some form of utility of wealth function (Poterba et al. 2007).

Financial economic theory provides a set of *a priori* expectations regarding the steps in the risk management process outlined in Figure 2:

- Owner. The owner of the risk is considered rational and self-seeking; in the case of the DC plan this is the member. Trustees (or sponsors) of DC plans hold a fiduciary duty to the fund members. Members seek perfect alignment to their agent, the fiduciary (Jensen & Meckling 1976).
- Identify. Investment risk has been identified as the key driver of benefits; where returns are compensation for the level of systematic risk borne by the investor (Sharpe 1964).
- Evaluate. Investment risk is probabilistic in nature and evaluated using a *Gaussian*-like asymptotic distribution; where standard deviation (or, as commonly termed by practitioners, volatility) is a meaningful proxy for investment risk (Fama 1965).
- Treat. The control for investment risk is portfolio theory; where a less than unitary correlation between asset classes allows for optimal portfolio selection (Markowitz 1952) and the accommodation of liquidity preferences (Tobin 1958).
- Monitoring and review. Finally, the superiority (or otherwise) of the investment risk taken by the portfolio selection process can be monitored and reviewed on a per unit of risk basis using received portfolio evaluation techniques (Sharpe 1966).

With investment risk controlled by the DC plan, the role of the fiduciary is to, on behalf of the worker, follow this continuous risk management process through to their retirement date (Drew & Walk 2019). At this point the individual's stock of human capital is largely depleted and their investment capital (via their DC plan) can provide an adequate real income stream for life (Merton 1969).

Baseline estimates of investment risk

Financial economics views the investment problem facing the members of DC plans as a probabilistic one, a complex balancing act between investment risk and reward. To illustrate this balancing act in a practical way, we report some stylised facts about investment risk in the DC plan context from a basic stochastic model. To operationalise our model, we take a hypothetical DC plan member (named 'Dawn') newly entering the workforce at 25 years of age and make the following assumptions:

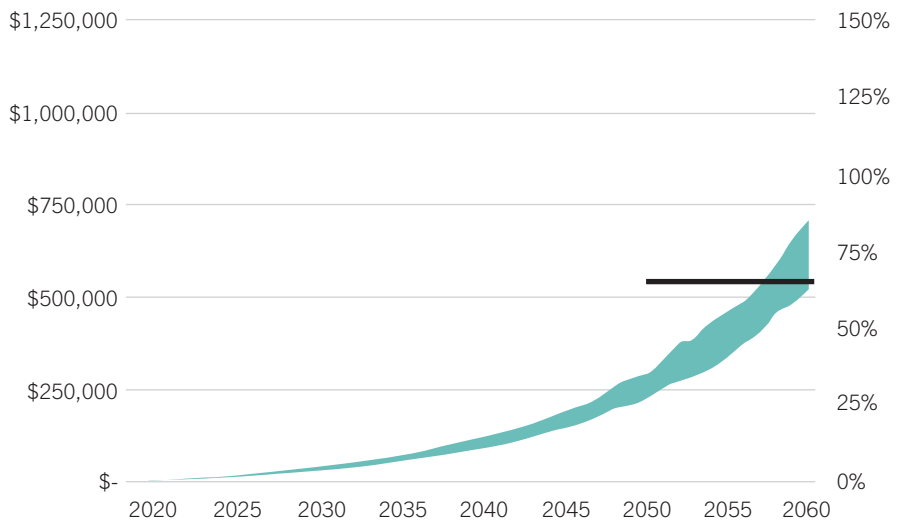
- starting base salary is $40,000 p.a.;
- the starting DC plan balance is zero;
- the retirement savings contribution is set at six per cent of salary (and is in addition to her base salary);
- due to productivity gains, remuneration growth slightly exceeds inflation, with a real base salary increase of 0.5% p.a.;
- our DC plan member works for forty years until the statutory retirement age of 65 years and has no career breaks;
- contributions are made to the DC plan annually in arrears;
- markets are informationally efficient, and there are no taxes and charges (Fama 1970);
- only two parameters are required to describe investment risk: an expected return (net of fees)

of 7.5 per cent annually (mean), with an annual expected volatility (standard deviation) of 3.1 per cent; and

- investment risk follows an independent and identically distributed ('i.i.d') normal model (Campbell, Lo & MacKinlay 1996) and 10,000 paths are simulated.

Parameterising our basic model in this way resulted in Dawn achieving a median retirement wealth ratio ('RWR') of around 11 times her final salary at 65 years of age.[8] At the date of retirement, we assume that Dawn takes the entirety of her accumulated lump sum in her DC plan and purchases an immediate term annuity. For peace of mind, Dawn's annuity has a term of 25 years (hence, her life expectancy is set at 90 years of age), and the prevailing inflation-linked payment on the term annuity is 3.0% per annum. Without any other retirement income sources (private and/or public) under this scenario, there is a greater than 80% probability (a four out of five chance) that Dawn will replace (at least) two-thirds of her pre-retirement income through to age 90. The results of the simulation are presented in Figure 3, with terminal wealth on the primary *y*-axis, and income replacement (percentage) on the secondary *y*-axis.

Figure 3: Range of best and worst paths (7.5%, 3.1%) [9]



The simulated worst and best average annual return paths are also reported to provide some sense of the distributional properties of investment risk.[10] This allows a set of controls that can be developed to reflect the DC plan member's appetite for this risk.

[8] We follow the approach of Basu and Drew (2009), where the RWR is expressed as a multiple of terminal wealth (accumulated balance in the DC plan) at time *t* to income (final salary) at *t*; where *t* is assumed to be the retirement date (at the age of 65 years).

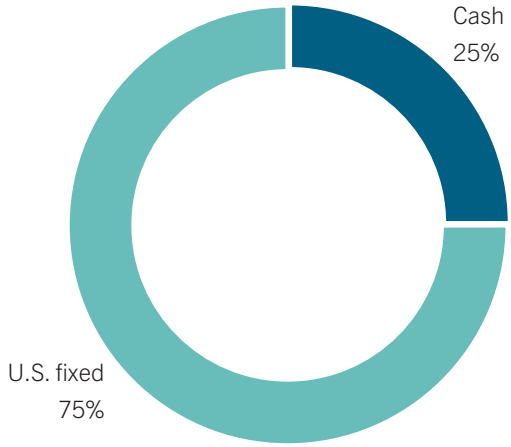
[9] Where 'best' is defined at the 90th percentile highest average annual simulated return over forty years, and 'worst' is the bottom 10th percentile.

[10] The range of simulated paths (7.5%, 3.1%) produced a relatively narrow range of outcomes, whereby the worst (best) paths would replace around 60% (85%) of pre-retirement salary to age 90.

Capital market expectations

Our illustrative example of a DC plan holding a portfolio with an annual expected return of 7.5% and standard deviation of 3.1% was not selected at random. This is exactly the investment problem that a DC plan fiduciary faced in the US some thirty years ago. The asset consulting firm, Callan Associates (2016; 2019), have reported that (using their proprietary capital market engine) an investor in 1989, wishing to achieve an expected return of 7.5% per annum, would have a portfolio with an expected annual volatility of 3.1%.[11,12] In 1989, Callan Associates' (2019) return expectations for cash and US fixed income were 6.80% and 9.35% respectively. As such, this portfolio held defensive assets only (25% cash and 75% US fixed interest), with no growth assets (such as equities and/or alternatives) required to earn a 7.5% expected return.

Figure 4: Capital markets expectations, 1989 (7.5%, 3.1%)



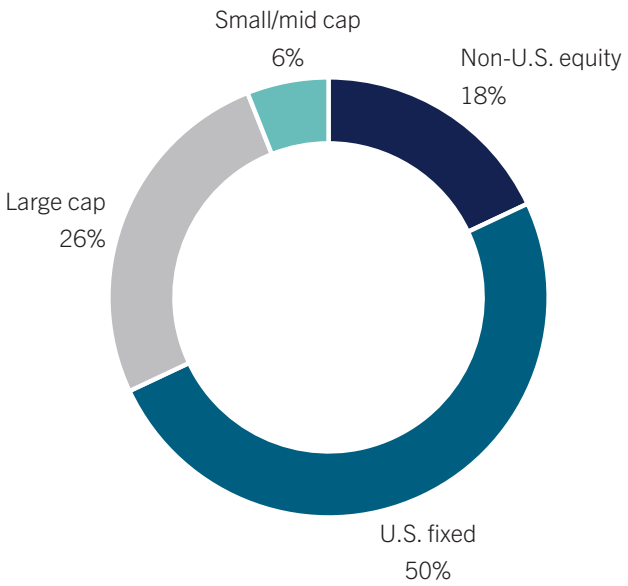
As capital market history has shown, changes to investment risk have persisted for decades, and could span a working life (and subsequent retirement years). Illustrative of this point is how radically capital market expectations have changed since the late 1980s to today. Data from Callan Associates (2019) shows that a US-based fiduciary seeking an annualised return of 7.5% per annum in 2004 (some fifteen years later than our original 1989 example) would need to hold a very different portfolio. The 2004 portfolio consisted of equal portions of defensive (50% US fixed interest) and growth assets (US large cap 26%, non-US equity 18%, and US small/mid-cap 6%), with an expected standard deviation of 8.9% (three times larger than the expected annualised volatility for the same expected return in 1989).

[11] We consider this forward-looking approach to be consistent with the original intention of the CAPM, that is, a consideration of the expected return that compensates for that risk, unlike the typical *ex-post* market model that dominates the pricing of investment risk by practitioners.

[12] This series of papers and updates by Callan Associates (2016; 2019) have received widespread coverage in the financial press, see https://www.wsj.com/articles/pension-funds-pile-on-the-risk-just-to-get-a-reasonable-return-1464713013

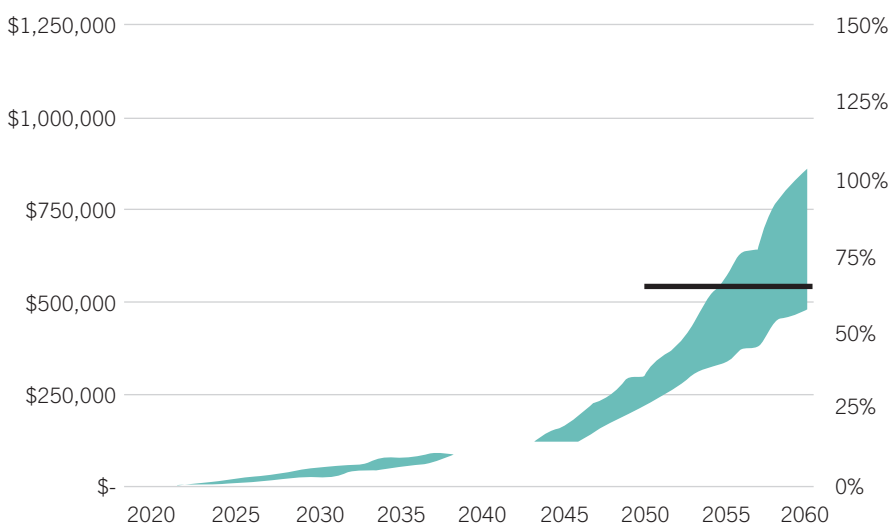
The portfolio allocation from 2004 is illustrated below.

Figure 5: Capital markets expectations, 2004 (7.5%, 8.9%)



Applying the rule of *ceteris paribus*, we return to our basic stochastic model and simulate terminal wealth outcomes for our same hypothetical DC plan member, Dawn. The goal remains that of replacing two-thirds of her pre-retirement income to age 90. Therefore, the only change in the model is that volatility has increased from an expected 3.1% in 1989 to 8.9% in 2004.

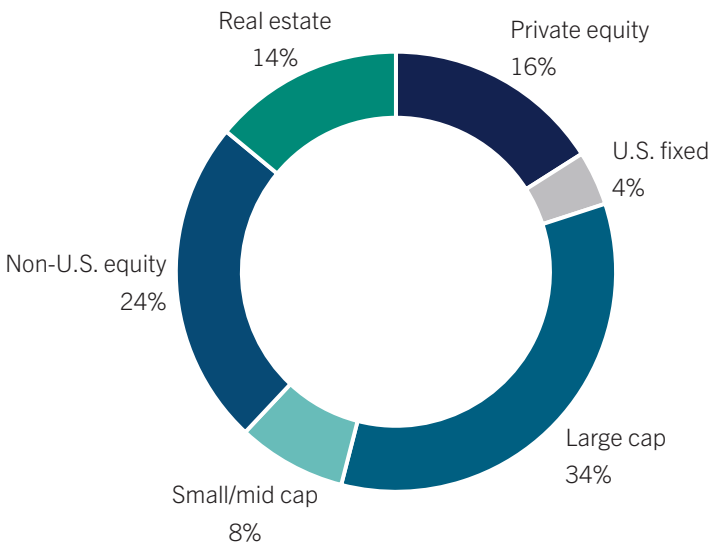
Figure 6: Range of best and worst paths (7.5%, 8.9%)



As expected, the range of potential retirement income levels at age 65 has become wider. The best paths allowed Dawn to replace all of her pre-retirement income to 90 years of age. In contrast, the worst paths replaced just over half of Dawn's pre-retirement income. Under this set of risk and reward characteristics, there is around a two-in-three probability of replacing at least two-thirds of Dawn's pre-retirement salary through to age 90.

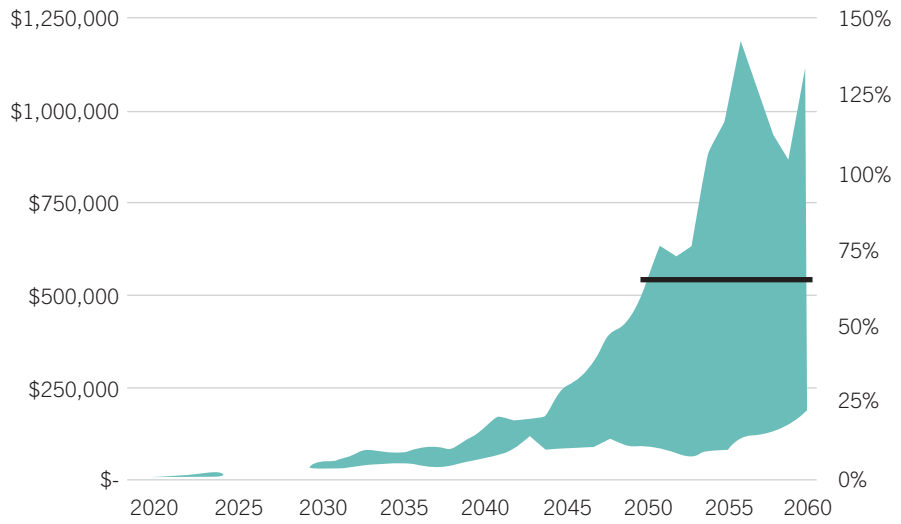
The contemporary story on investment risk faced by individual DC plan members is nothing short of alarming. In 2019, Callan Associates (2019) advised that, for the US setting, a fiduciary seeking an annual expected return of 7.5% would have to move to a portfolio allocation that was 4% defensive (US fixed interest 4%) and 96% growth (US large cap 34%, non-US equity 24%, and US small/mid-cap 8%) of which 30% of the growth allocation was to alternative assets (such as Private equity 16%, real estate 14%).

Figure 7: Capital markets expectations, 2019 (7.5%, 18.0%)



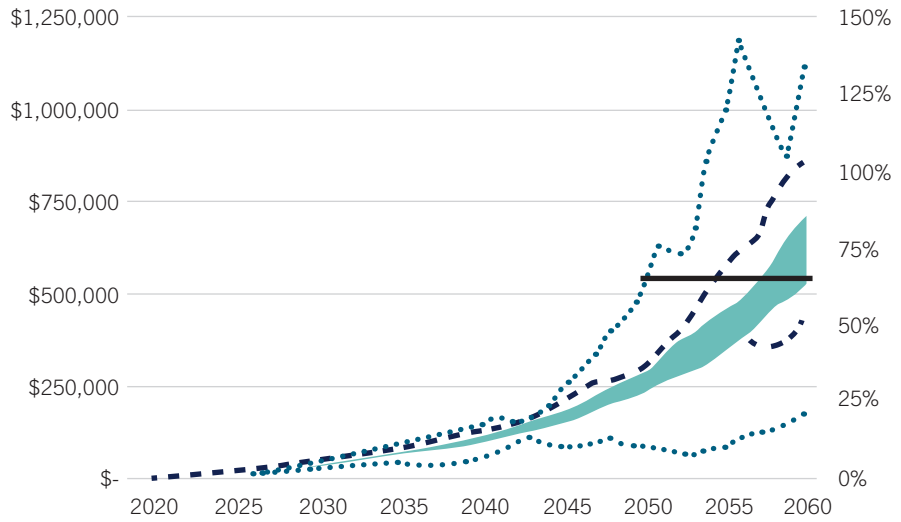
Again, *ceteris paribus*, portfolio volatility today for those seeking an expected return of 7.5% per annum is expected to be 18.0%. If, and acknowledging that it is a big 'if', this level of investment risk continued over Dawn's working life, the best paths actually replaced more than her pre-retirement salary (for some paths, an income replacement of 130% through to age 90 were simulated). However, at the other end of the spectrum, if Dawn experienced bottom decile-like returns, the level of income replacement would only be 20% of her pre-retirement salary. In the space of thirty years, the probability of replacing two-thirds of our hypothetical DC plan member's pre-retirement salary through to age 90 has gone from over 80% in 1989, to a two-thirds chance in 2004, to the odds of tossing a fair coin today. These stylised facts demonstrate the impact that the interplay of path dependency, sequencing risk, and the portfolio size effect (Basu & Drew 2009) can have on DC plan outcomes.

Figure 8: Range of best and worst paths (7.5%, 18.0%)



This one change—heightened volatility—is illustrative of how events such as COVID-19 can put the retirement security aspirations of workers in peril. Same worker, same human capital, same level of contributions, same targeted return, same immunising asset, seeking the same retirement income objective. The only variable that has changed in our basic model is that the expected investment risk has increased six-fold from around 3% in 1989 to 18% in 2019 (Callan Associates 2019).[13]

Figure 9: Range of best and worst paths (7.5%, σ = 3.1%, 8.9%, and, 18.0%)



[13] It is important to note that we are not debating the accuracy (or otherwise) of proprietary capital market projections; rather, this form of analysis allows us to illustrate the changes that have occurred in the statistical properties of investment risk facing DC plan members over the last three decades.

The stylised facts presented are nothing more than that—stylised—and it is entirely appropriate at this juncture to offer a *mea culpa*, of sorts, regarding the (many) simplifying assumptions in our model. Good returns have been accompanied by largely benign investment risk, save a few crises (Kindleberger & Aliber 2015) over the last fifty years. These generally good long-run investment returns (until the recent impacts of a global pandemic) have perhaps been able to hide from full view the emerging vulnerabilities that a DC plan member faces through their life course. Our stylised facts, for all their shortcomings, demonstrate the heavy expectation that is placed on investment risk to achieve retirement security. The price of investment risk has changed so dramatically, particularly over the last thirty years, that the questions we face today are confronting:

- Would you invest your retirement savings in a 4% defensive/96% growth option, with 18% volatility, for an expected annual return of 7.5% per annum?; and
- Do you think of your retirement savings as a 'game of chance', where the probability of 'winning' your retirement security mirrors the odds of tossing 'tails' on a fair coin?[14]

COVID-19 and retirement security

The analysis presented shows the challenges of investment risk facing DC plan members. From the start of 2020, we have seen the devastating impacts of the COVID-19 global pandemic throughout the world. At the time of writing, we are now witnessing COVID-19 shift from a public health crisis to a looming retirement security issue for many workers approaching retirement (and those in retirement).

In the Australian context, our research shows the average worker accumulates around half of their terminal (at-retirement) superannuation balance during the last decade of their working life (Basu & Drew 2009). As such, this outcome is largely driven by received returns on existing retirement savings and the decision to make additional voluntary superannuation contributions in the lead-up to retirement. The importance of returns earned during this last decade of working life on members' superannuation savings cannot be understated. Those workers approaching their retirement date (that is, when retirement savings reach their zenith) face an increasing level of what is known as 'sequencing risk' or sequence of returns risk (Drew, Walk & West 2015).

This means the impact of falling investment markets is much greater for those over 50 (when compared to a 25-year-old) because they have a larger amount of money at risk and the order (or sequence) of returns an investor has in the last decade of their working life is considerably more important than the average return received. By way of example, a 25-year-old today, with a small superannuation balance, can withstand the current COVID-19 related market volatility as they don't need to access their retirement savings for another 40 years. In short, the dollar value of decline for a 25-year-old is relatively small when compared to say, a 55-year-old.

Many folks nearing retirement (or currently retired) were just emerging from the drawdown of the GFC and are now facing a new shock in the form of COVID-19. Like the GFC, COVID-19 has heightened volatility in investment markets. However, the loss of employment (either temporary or permanent) and the Australian Government's decision to allow, for the first time, early access to superannuation savings (via the Early Release of Superannuation 'ERS' scheme) have also had a number of consequences for retirement security.[15] This has twin impacts on retirement security—

[14] Not unexpectedly, the answer we have received anecdotally to both of these questions has been a resounding and unequivocal, 'no'.

[15] For full policy details, see https://www.ato.gov.au/individuals/super/in-detail/withdrawing-and-using-your-super/covid-19-early-release-of-super/

both a decrease (or cessation) of contributions in the final decade of working life, and the potential for up to $20,000 being withdrawn by members via the ERS.

On the matter of voluntary superannuation contributions, an unexpected loss of employment during the final decade prior to retirement can be devastating. Given the challenges that older Australians face in the labour market, there is a rising concern regarding how, or perhaps if, this sector of the community will return to work over the coming year (Drew & Drew 2005). This not only affects the standard of living for those in their 50s and 60s today but will curtail their consumption in retirement.

Conclusion

Returning to our hypothetical member, Dawn—the simple analysis presented in this paper highlights the exposure that workers have to investment risk via their DC plan. In a system without pooling (a key advantage of DB plans), the importance of compounding (both positive and negative) during the accumulation phase of retirement saving *and* the income (or decumulation phase) is a risk that requires careful control for those in DC plans (Drew, Walk & West 2015; 2016). In addition to this risk, older workers face the significant COVID-19 related headwinds in the labour market. There is much work to do to ensure that a generation of near-retirees can repair their household balance sheets from the impacts of the global pandemic. The risk now is the current COVID-19 health crisis may create a lost generation of those approaching retirement and recently retired.

The results provided in this paper suggest that the balancing act between investment risk and reward is akin to walking a tightrope, with the public pension acting as a form of safety net. The COVID-19 investment landscape has presented DC plan members with a wicked problem. Cash and fixed interest returns today are expected to deliver zero (and perhaps negative on a real return basis), with risky assets bringing considerable investment risk to the DC plan member's portfolio as the price of seeking higher expected returns. These are non-trivial decisions facing the members of DC plans and their fiduciary boards. Responding to these challenges will involve a range of agency, behavioural, demographic, economic, environmental, gerontological, investment, labour, organisational, public health, and regulatory responses. For the retirement security of many workers, including Dawn, we can, and we must, do better.

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