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Schroders
Why strategic asset allocation is flawed

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Executive Summary

Most investors have as their investment objective the desire to achieve a real return outcome over a defined time period. The industry approach to meeting the investment objective has been to set a broadly fixed strategic asset allocation (SAA, eg: 60/40) and implement this along single asset class lines (typically in a multi-manager structure for each asset class).

In this paper we examine the portfolio outcomes from a traditional strategic asset allocation based investment approach and investigate what is required to achieve a typical balanced/growth investment objective of a *real* return of 4% to 5% p.a. over a 5 to 10 year time frame. The historical analysis in this paper supports the proposition that real returns from capital markets consistent with this objective can be achieved over the longer term – ie. the level of the return objective is broadly right *in the very long term*. However, the historical evidence does not provide the same level of support for real returns to be delivered consistently over 5 to 10 year time frames.

Given the impact of the accumulation (and decumulation) process of most savers, achieving return objectives over very long term time horizons is simply not enough to meet their requirements. Individuals need greater comfort that their investment return objectives will be delivered over more shorter horizons. This will require a rethink of the strategic asset allocation dominated approach to investing.

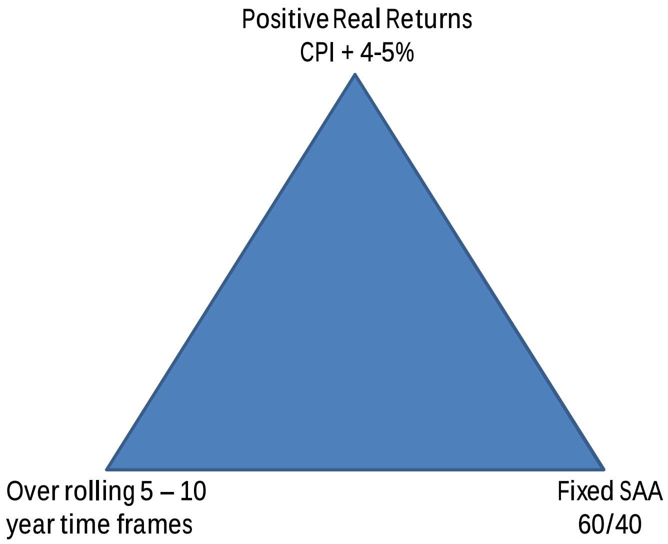
Introduction

Most investors have as their investment objective the desire to achieve a real return outcome over a defined period. For example, a typical investment objective for a “balanced” or “growth” investment option may be outlined as:

“To outperform the Consumer Price Index (CPI) by 4% per annum over rolling 5 year periods after tax.”

After stating the relevant investment objective, the typical industry approach would then be to define the method to achieving these objectives as a broadly static allocation to a range of asset classes. At a high level, a typical balanced fund with a CPI + 4%-5% objective is likely to have an allocation to growth assets of 60-70%.

Conceptually, investors are trying to balance three competing objectives as shown graphically below. We outline in this paper how it is not possible to achieve these at the same time. One must be relaxed. Given that the fixed SAA is the means to an end and therefore the one investors should be indifferent to, the common sense approach would be to drop it and so improve the ability to meet individual’s investment objectives.



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The purpose of this paper is to consider the extent to which the fixed strategic asset allocation approach (which is the mainstay of the investment portfolio construction of most investors) will be able to meet the typical balanced fund investment objective and to understand the real risks introduced from such an approach. To do this we analysed a 'stylised' traditional balanced fund using asset class data commencing in 1900. Such long term modelling was able to provide a foundation to suggest whether the ability to achieve a real return objective is realistic over long periods of time.

Importantly we sought to shed light on the frequency and duration of failure of the traditional strategic asset allocation approach to meet this objective.

Interestingly, we note that some industry participants have elected to broaden their investment objectives to include an additional objective (or sometimes the sole objective) of outperforming the "median fund". In our view, this is perhaps partly a reaction to the last decade's inability of consistently achieving rolling real returns and a reflection on how most of the industry really manages investment options. That is, with an eye on what everyone else is doing and the ubiquitous league tables! Unfortunately, from an individual's perspective the "objective to outperform the average of others" is relatively pointless, conveying little real meaning and generally resulting in poorer outcomes (through herding). From a risk management perspective we would argue that it should provide little confidence to individuals (and indeed the regulator) to then define investment risk relative to others.

Analysis and Results

To test the characteristics of a traditional strategic asset allocation based portfolio and validity of a target real return objective of 4% to 5% p.a. analysis was conducted on a sample of asset class returns over the last 110 years. The index data used in our analysis is summarised in Appendix A. The data period is seen as a useful representative sample as it covers such economic events as depression and boom, environments of rising inflation and deflationary forces.

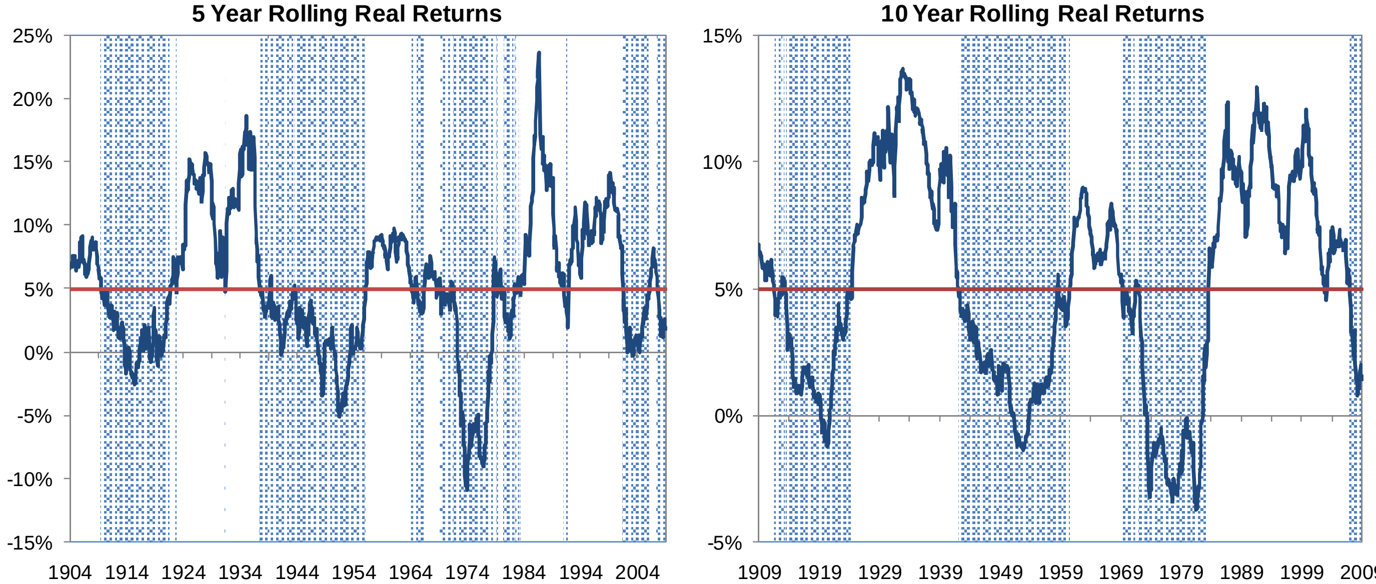
The representative portfolio used to conduct the analysis we describe as a 'stylised' balanced portfolio. It contains an exposure to growth assets of 60% (half Australian and half international equities), and defensive assets of 40% (one quarter in cash and three quarters in bonds). We chose this structure as it is broadly representative of long term investment portfolios with real return objectives of 4% to 5% p.a..

It is fair to observe that the portfolio is perhaps not as well diversified across asset classes as many current long term portfolios. However, we favoured the long term availability of data to model long term outcomes over a more diversified portfolio (with exposures to property, overseas bonds and alternative asset classes) which is more constrained in terms of sourcing long term data series. In any case, most new "asset classes" are not in fact asset classes but rather derivatives of more mainstream listed asset classes above.

The purpose of this analysis was to understand whether long run return drivers over the last century would have given rise to a satisfactory real rate of return. Given that our modelling used monthly return series, we made no further assumptions about asset allocation positioning and therefore rebalanced the portfolio at its strategic weights at monthly intervals.

The chart on the following page shows the rolling 5 and 10-year real returns of the stylised balanced portfolio.

Stylised balanced fund - rolling 5 and 10 year real returns[1]



Source: Schroders, Global Financial Data, Shaded areas represent periods below 5% p.a. objective

The annualised compound real return since the start of the 1900s has been 5.3%p.a. above inflation which places it comfortably above the 4% to 5%p.a. real return objective of most investors before any implementation costs, or active management outcomes are taken into account. However, another critical observation is that the performance is delivered in long term regimes, with the portfolio underperforming a 5% real return objective 49% of the time on a rolling 5 year basis and 47% of the time on a rolling 10 year basis. The worst rolling five year period provided a -10.8% p.a. real return and the worst rolling 10 year period -3.7% p.a. real return.

The analysis above shows the rolling 5 and 10 year returns through time. We can see from these charts that for some of these 5 and 10 year rolling periods there are periods of time, potentially quite long, when the real rolling return can be below zero or, put another way, real returns have been negative for the prior 5 or 10 years.

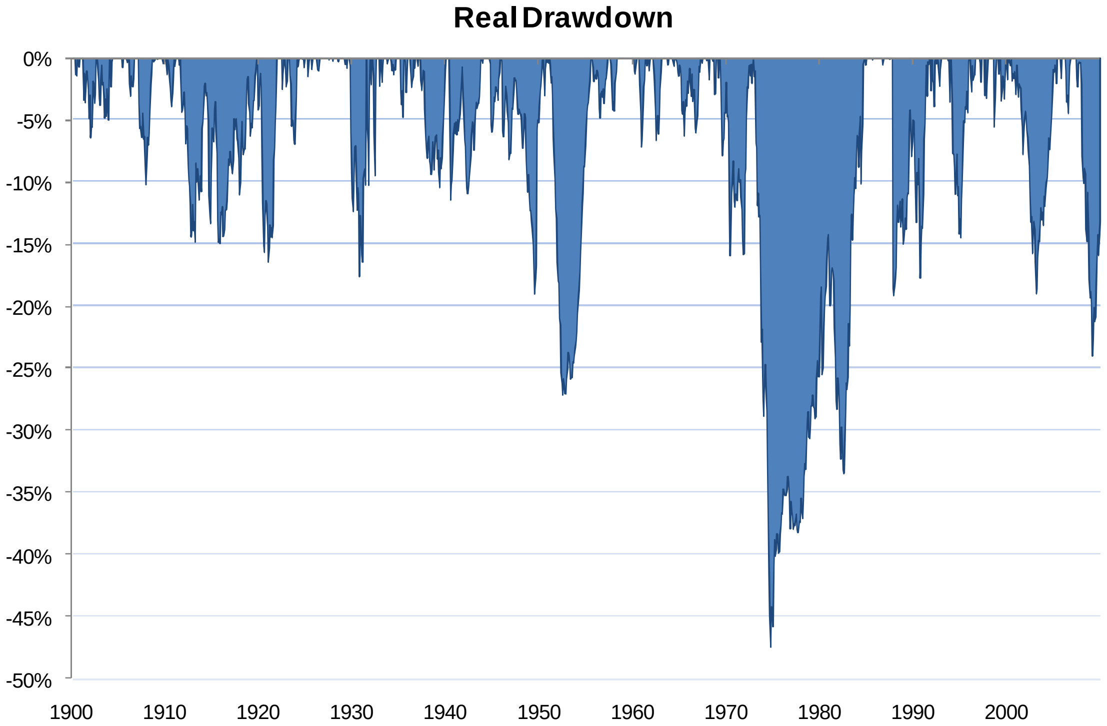
Given that an individual may start investing at any point in time, the use of rolling period returns does not reflect the initial experience of that investor. Historical returns may have been strong and so rolling period returns look relatively good, however the immediate future return may turn out to be quite poor. In this situation, rolling period returns can remain strong and positive for a period of time however the new investor does not have this prior experience and so starts with a negative outcome.

In order to examine the potential negative return experience faced by a new investor we can look at a “drawdown” analysis. This analysis shows the cumulative maximum loss faced by an investor who starts investing at the previous market peak. Essentially we consider the experience of a theoretical investor who commences at the point real returns from the strategic asset allocation turn negative. In this way we ignore prior periods of outperformance and just examine how much the investor would have lost in real terms until such point when the market regains its previous high and that investor has recovered the real value of their savings.

What the drawdown analysis does is examine the maximum loss that would have been made historical for any investor unlucky enough to have started saving at the market peak. Recognising that at any point in time a typical approach will have new individuals starting an accumulation process or starting the decumulation phase there is a strong potential that at least some cohort of the investor base will experience these drawdowns.

[1] US equity returns are used as a proxy for global equities up until 1925 and then Global Financial Data’s global equity series is used.

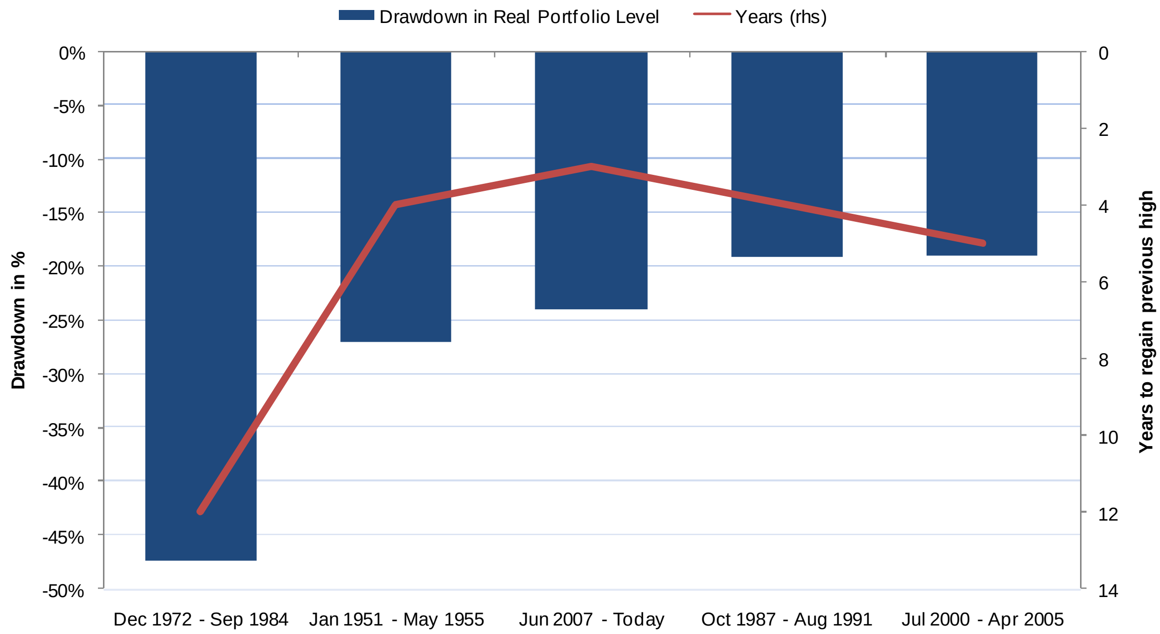
Stylised balanced fund – Cumulative Real Drawdown



Source: Schroders, Global Financial Data

Relative to inflation, it is clear from the above that a traditional strategic asset allocation can result in substantial loss of purchasing power for long periods of time. While eventually such drawdowns are recouped, the time horizon for this is in some cases over a decade and in most cases many years. We can see in the figure below the top 5 drawdowns in real terms over the last 110 years and the time in years taken to recover from these. However we note that this is just recovery in real terms, it takes no account of the need to then deliver a positive real return. In any case, the magnitude of these drawdowns has been significant along with the time taken to recover.

Stylised balanced fund – Top 5 Real Drawdowns in Last 110 Years



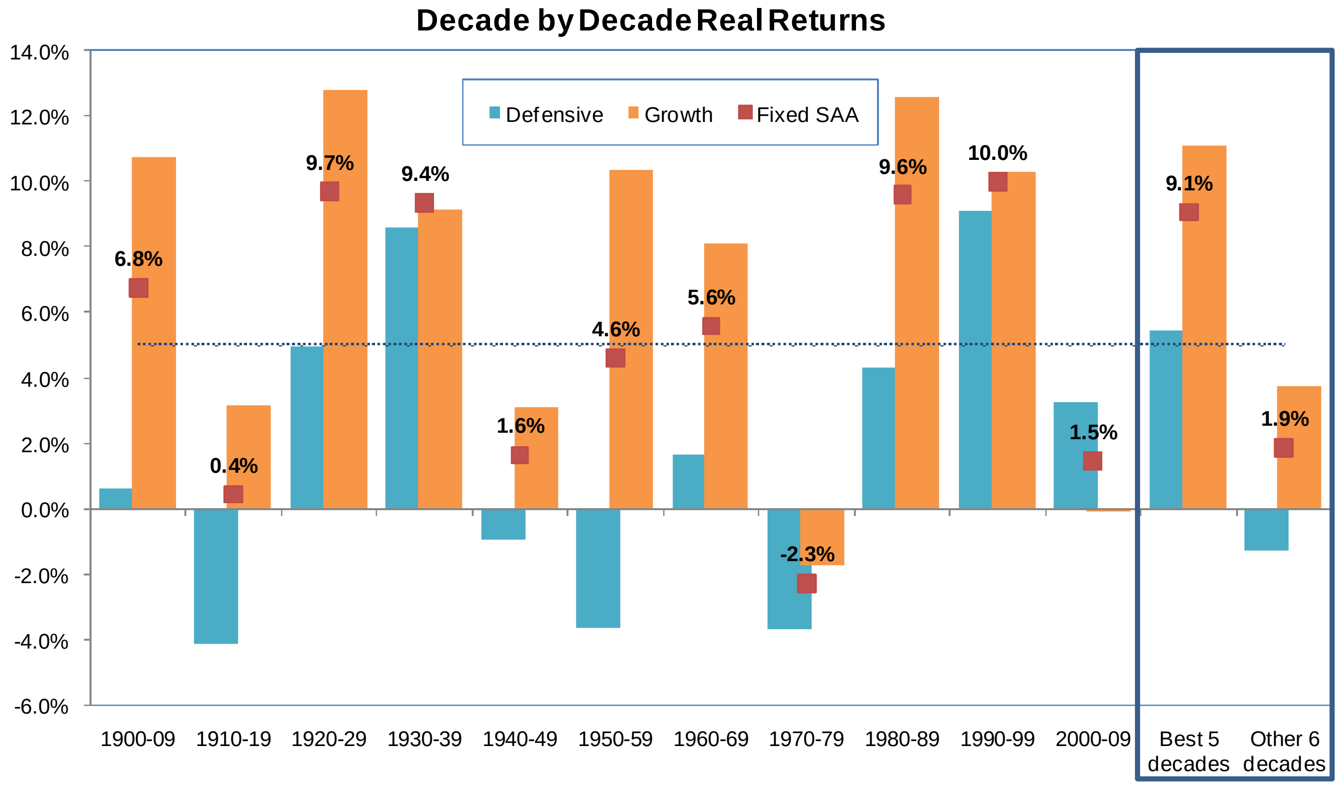
Source: Schroders, Global Financial Data

For individuals where the underlying value of the capital may change given contributions or pension payments (that is, for pretty much everyone), such long time periods until recovery can have a substantial negative impact on accumulated balances (or account based pension payments).

Looked at another way, we show below the decade by decade real returns of the traditional strategic asset allocation approach together with the respective returns for the defensive (bonds and cash) and growth (equities) parts of the portfolio. We can see from the chart that the "lumpiness" of equity returns effectively creates intergenerational inequity. For example the members of the 1910's, 40's, 70's and 2000's (to date) have effectively subsidised the equity returns for members of other generations. This is not a framework for arguing the consistent achievement of individual objectives!

We also note from the chart that the 1930's depression is "hidden" in Australia (it wasn't in many other countries) and that the nature of the monthly rebalancing process meant that the fixed strategic asset allocation gave a slightly better return than either of its defensive or growth components in this period.

Stylised balanced fund – Decade by Decade Real Returns



Source: Schroders, Global Financial Data

We can observe from the above chart that:

1. The dispersion in returns between growth and defensive assets has at times been quite large;
2. The 1930's and the 1990's were the two periods where asset allocation mattered less, albeit for the 1930's we also know that while the decade returns were similar the path taken to achieve that was very volatile for equities; and
3. In only 6 of the last 11 decades did the strategic asset allocation portfolio meet or exceed objectives (not exactly a strong hit rate when we are considering decade long periods).

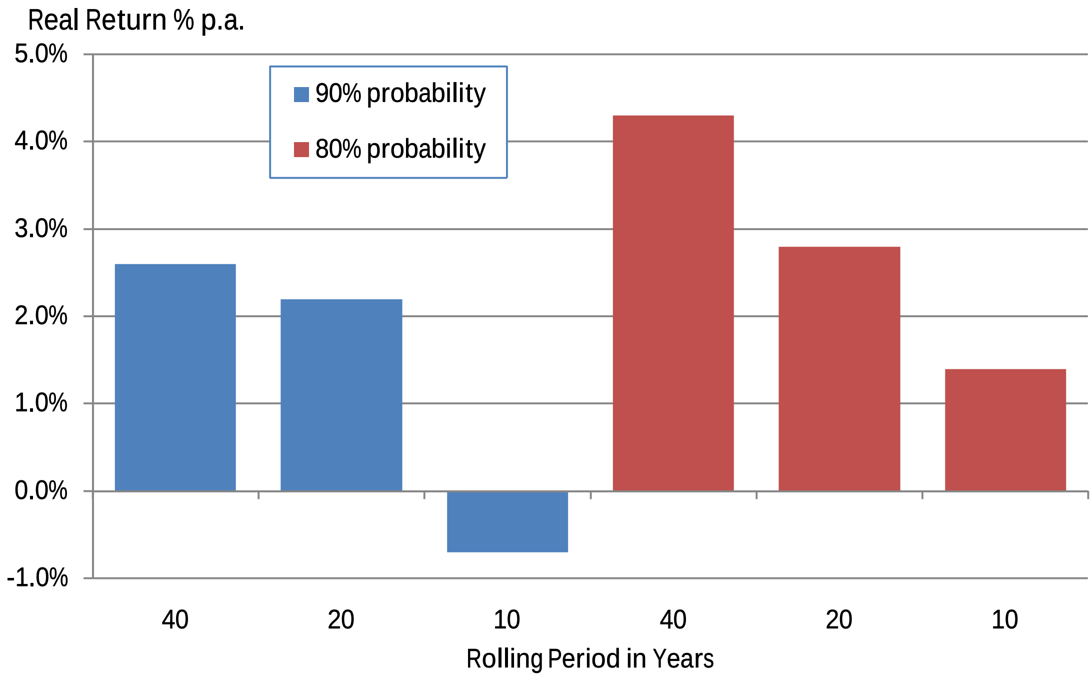
How long do I really need to be sure of meeting my objectives?

One argument commonly adopted by the industry is that despite the objective of generating more consistent medium term outcomes, in reality it is the long term that counts. As we outline above, over the very long term the strategic asset allocation process has been able to generate satisfactory real return outcomes, so why should we be concerned about this medium term variability of returns? In particular, the long term nature of retirement savings means that shorter term time horizons are just not that relevant.

To this end, it is worthwhile analysing the historical probability of achieving certain real return outcomes over longer periods of time.

The chart below shows what level of real return would have been achieved 90% of the time or 80% of the time for a given time horizon.

Historical probability of achieving real return outcomes



Source: Schroders, Global Financial Data

The above chart shows that even with a 40 year time horizon we would have achieved a rolling real return outcome of CPI+4.3.% only 80% of the time. If our time horizon was 20 years and we required a 90% probability the return target was only CPI+2.2%. That is, one in every 10 individuals over 20 years would have achieved less than CPI+2.2%.

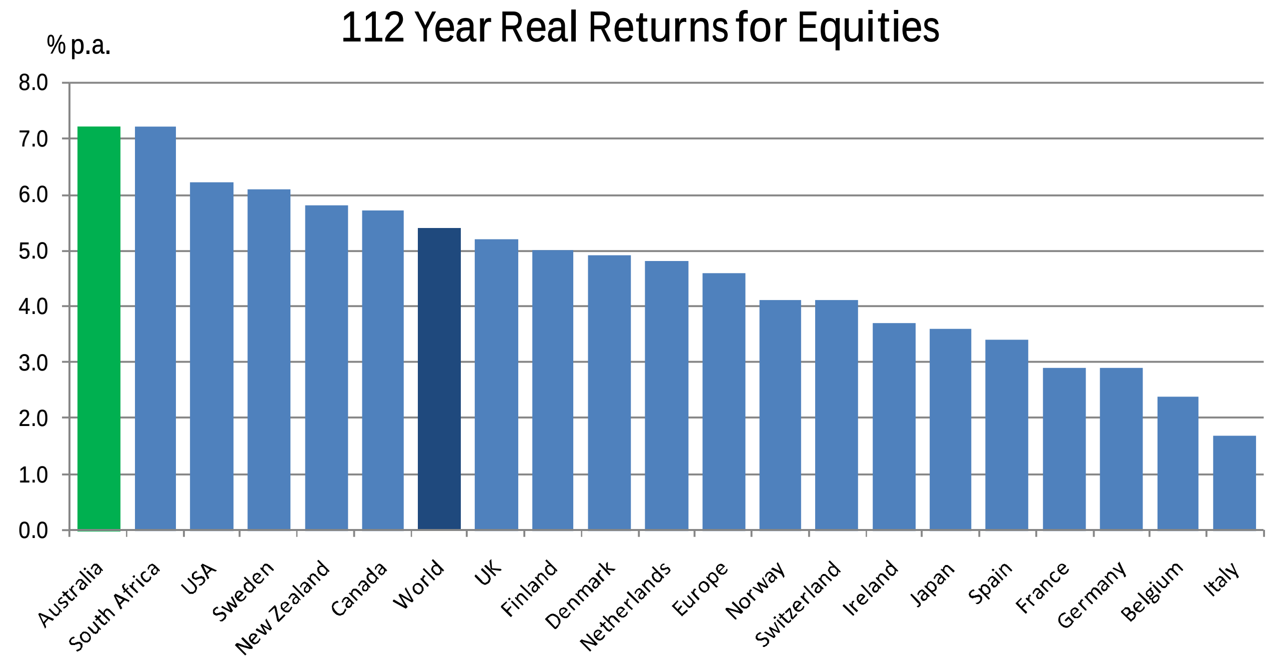
Historically if our target was CPI+4% we would have required a time horizon of 53 years to achieve this with 90% probability. For a CPI+5% target with 90% probability required 85 years. This also suggests that in fact the achievement of these returns is not so much a statistical probability that will occur given enough time, but rather a statistical anomaly in that we have only achieved these returns from this asset allocation because the return on equities (particularly Australian equities) has been very high.

While the 110 year return from a 60/40 portfolio has been circa 5.3% p.a., to have a reasonable degree of certainty of achieving our desired outcome the time horizons required exceed most investors lifetime accumulation periods. Controlling medium term volatility becomes even more important when we take into consideration the accumulation and decumulation process and the resultant impact on money weighted returns. We address this in a forthcoming paper.

A significant observation in respect of the analysis conducted in this paper is that we are utilising for a large part Australian biased assets. As such we should note:

"Whether it is down to luck or good economic management, Australia has been the best-performing equity market over the 112 years since 1900, with a real return of 7.2% per year."

Long Term Real Returns of Equities for Developed Markets

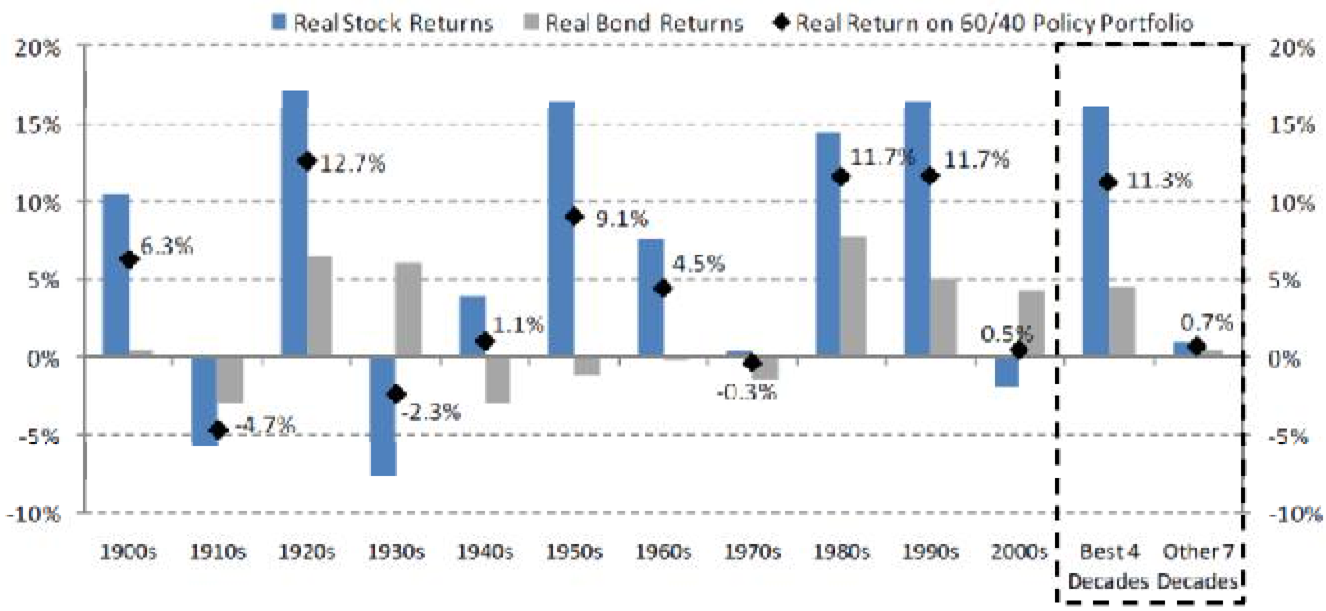


Credit Suisse Global Returns Yearbook, 2012, Real returns from 1 January 1900 to 31 December 2011.

As such, we would suggest that the results of this study are biased upwards in favour of equities. Were future years not to be as good as history (which, on the balance of probability is likely) then very Australian equity biased portfolios are unlikely to perform as well as outlined above even over the very long term.

Consequently, to consider a more normalised view we consider a similar analysis to that shown above from the perspective of a US investor with 60% US equities and 40% US bonds the results of which are set out below. Recognising that US equity returns have also been relatively good over the last 110 years, just not as good as Australia, we can see that the potential underperformance of the traditional strategic asset allocation portfolio is quite large.

Stylised balanced fund – Decade by Decade Real Returns US Investor



Source: Deutsche Bank, "A third generation in Asset Allocation", Brad Jones, Jan 2012

While this simple study shows that a 4% to 5%p.a. real return has been achievable over very long periods, it also shows that it has been much more difficult to achieve over shorter periods, including the 5+ year time horizon typically included in many investor's objectives. In order to achieve objectives consistently, substantially greater flexibility in asset allocation would have been required historically.

Conclusions

The purpose of this paper was to investigate the suitability of the fixed strategic asset allocation approach to achieving individual investment objectives.

The historical analysis in our paper suggests evidence exists to support the proposition that real returns from capital markets are consistent with the objectives of the typical approach of up to 5% p.a..

However, the historical evidence does not provide as much support for real returns consistent with many individuals objectives to be delivered reliably within the required timeframes for fixed asset allocation portfolios. Instead fixed asset allocation portfolios require a very long term time horizon, given that equity markets in particular have delivered real returns in long term cycles or 'regimes'. This also has important implications for the money weighted returns earned by individuals.

In summary if the industry is to achieve the investment objectives it communicates to individuals, a substantial rethink of the approach is required. Fixed strategic asset allocations generate significant medium term volatility of outcomes, making them unsuitable for consistently achieving objectives. In the trade-off between delivering real returns over constant time frames with a fixed strategic asset allocation, something has to give. It is in this context that we have demonstrated above that fixed strategic asset allocations don't work. Given the unsustainability of fixed SAA portfolios it follows that the lifecycle type approaches that follow a pre-defined asset allocation glidepath are also unlikely to be any more useful in achieving investor objectives. We address the issues of lifecycle funds and money path dependency (money weighted returns) in more detail in a forthcoming paper.

Appendix

Data sourced from Global Financial Data:

Australia Consumer Price Index

Australia Total Return Bills Index

Australia 10-year Government Bond Return Index

GFD World Return Index

Australia S&P/ASX 200 Accumulation Index

S&P 500 Total Return Index (w/GFD extension)

Schroders
Enhancing Default Investment Strategy Design

Schroder Investment Management Australia Limited

Background

With the introduction of MySuper there has been an increasing desire to find a single investment strategy that works throughout the accumulation stage of a members' life and, presumably, can then funnel into the right retirement strategy.

In this paper we investigate a number of alternative approaches to this "single investment strategy" problem for the accumulation stage.

Alternative approaches and the Lifecycle model

There are numerous investment strategies available for members in the accumulation phase, with the current default option being the balanced (70/30 or some variant of this) portfolio which allocates a reasonably fixed portion of approximately 70% to growth assets and the remaining 30% to defensive assets. Alternatives to this approach which have been proposed for various stages of the accumulation phase, one of the more prominent of these is the so-called "lifecycle model". Lifecycle models vary widely in their structures but share the common characteristics that they adjust their asset exposures for different (usually age determined) cohorts of investors.

The issue with any single lifetime investment strategy is that it has to fit a number of objectives:

- Generate a sufficient real return to meet the members' ultimate drawdown needs;
- Control volatility in the latter years as the member approaches retirement;
- Be sufficiently simple as to be able to be implemented and communicated to reasonably sized cohorts of members (both at the outset and on an ongoing basis);
- Not generate outcomes that might encourage negative behavioural biases (e.g. switching out of the strategy at the wrong point in time);
- Able to be implemented across a very large group of members (e.g. a large percentage of the population); and
- Be cost effective.

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The underlying logic of a typical Lifecycle model is to allocate between growth and defensive assets depending on how close a member is from their retirement. Younger members, given their longer investment horizon and ability to recover from market down turns, have a greater exposure to growth assets – predominantly equities. As a member approaches retirement, their portfolio undertakes a gradual transition along a "glide-path" away from growth assets and towards defensive assets in order to protect the accumulated wealth. The aim of this is to increase the degree of certainty in the outcomes a member is able to achieve and to prevent extreme drawdown scenarios for those who are close to retirement. Intuitively, the Lifecycle investment model makes sense as it reduces "risk" (defined as exposure to growth assets) as the member ages. In reality, the member ends up with an exposure throughout their lifetime which is on average 70/30 (or thereabouts) but changes significantly with age.

Another alternative is to reconsider the 70/30 portfolio and allow greater variation in the exposures coincident with asset class return and risk expectations. We will refer to these approaches as valuation based asset allocation approaches. While through time the investor (we use the term investor interchangeably with member) also has an average exposure of around 70/30, the weights can vary significantly from that. In this case, we could suggest that the weights vary according to risk, but where risk is defined as the potential for loss from an asset class, not a function of the asset class name.

The advantage of these approaches, along with the 70/30 portfolio, is that they are all relatively simple, cost effective and, based on history, have generated reasonable real outcomes through time.

The purpose of this paper is to investigate these alternatives and determine the extent to which they can really meet the requirements for a single investment strategy in the accumulation phase.

What is the risk?

The primary aim of a single investment strategy is to generate decent outcomes across different member cohorts (i.e. some form of predictability for members joining at different times). In this regard, there are two major risks that members face:

1. "Sequencing" risk – given that members have different levels of capital at different times (in general they have more capital as they approach retirement), the impact of the investment return and timing of that investment return can have a substantial impact on the outcome.

2. "Pricing" risk – asset classes can go through prolonged (e.g. 10 years +) periods of sub-par returns. This is generally a function of buying an asset class when it is expensive.

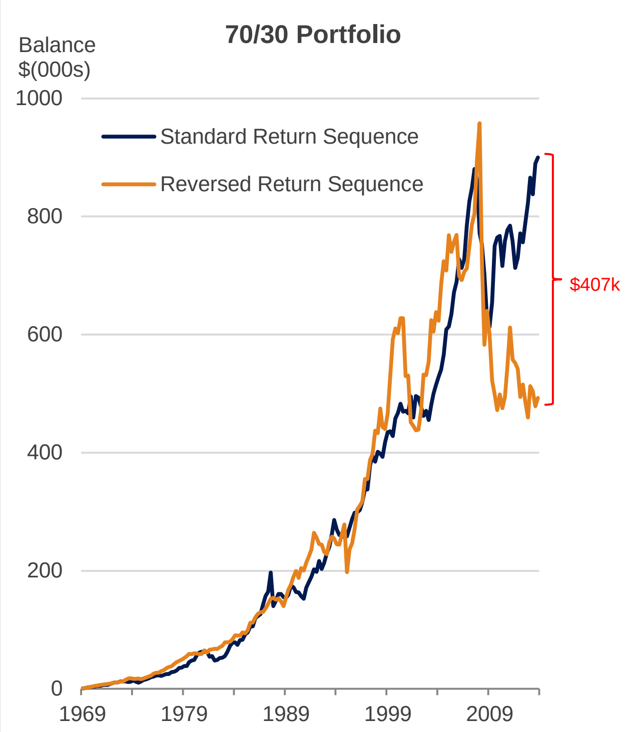
The aim of the Lifecycle model is to lower the "risks" for members approaching retirement by setting them along a glide-path allocation. Thus, the model makes the implicit assumption that risk is measured by a portfolio's allocation to growth assets ie lower equities = lower risk. While the Lifecycle model does usually result in lower portfolio volatility for an ageing member, it is still susceptible to other issues such as pricing risk and sequencing risk, which may prevent the member from achieving their investment objective.

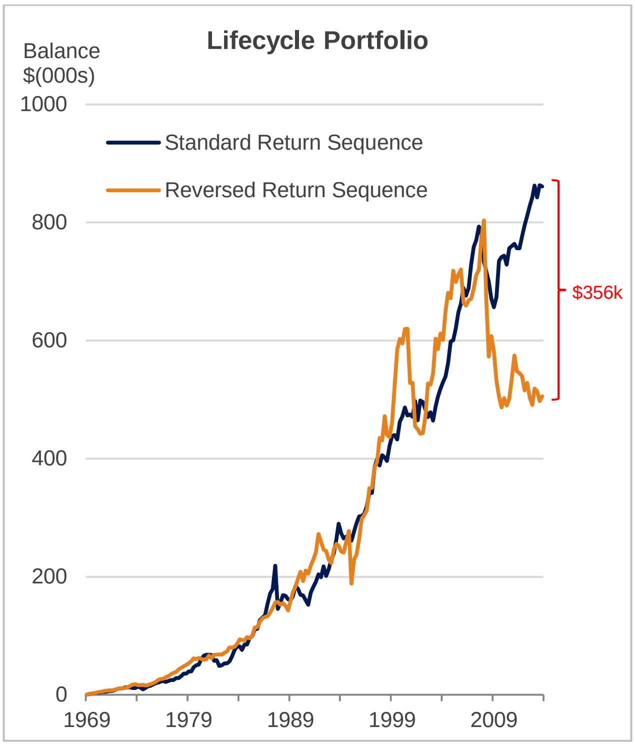
Valuation based approaches to asset allocation aim to control sequencing and pricing risks by specifically allocating assets based on the expected return and risk of those asset classes. These can (and do) vary considerably through time. The issue with valuation based approaches is to determine the driver of the asset allocation and the degree to which the asset class exposures should vary.

Sequencing Risk

Sequencing risk refers to the risk associated with the order in which investment returns are generated. Members typically face the greatest risk as they approach retirement, given that their investment balances are relatively high, while their time horizon to recover from large drawdowns diminishes. An example of sequencing risk can be seen in Chart 1 which compares a standard sequence of returns from 1969 to 2013, with the equivalent set of returns that have their orders reversed. The standard return sequence produces a final investment balance that is over $400,000 greater than the reversed sequence under the 70/30 approach, and over $350,000 greater under the Lifecycle approach.

Chart 1: Impact of sequencing risk





Assumptions: A 45 year investment period from January 1969 to December 2013. The 70/30 portfolio has a constant asset allocation of 70% to Australian Equities, 25% to Australian Bonds and 5% to Cash. The Lifecycle portfolio begins with an asset allocation of 81% to Australian Equities, 17% to Australian Bonds and 2% to Cash. The allocation becomes gradually more defensive after the 25th year, until it reaches an allocation of 35% Australian Equities, 45% Australian Bonds and 20% Cash. For additional assumptions please refer to the Appendix.
Source: Schroders, Global Financial Data, ABS

The higher allocation towards defensive assets within the Lifecycle model seeks to address the issue of sequencing risk. Nevertheless, the results in Chart 1 indicate that the glide-path allocation is not able to completely mitigate the issues associated with sequencing risk. This is further reinforced by the experience of US Lifecycle funds (also known there as target date funds), which experienced significant drawdowns during the GFC; even funds targeted towards investors who were close to retiring experienced losses of 25% - 30%. Ultimately, a joint hearing between the Department of Labor and the SEC was held to address concerns that “investors were unprepared for their funds’ level of financial risk” (Morningstar, 2009).

Furthermore, even though a Lifecycle model may dampen portfolio volatility, it also relinquishes the potential for large upside gains for members approaching their retirement. Our previous paper “Life Cycle Funds – Just Marketing Spin” (Cooper, 2011), explores in further detail how higher investment returns in the latter stages of the accumulation phase will have a greater positive impact on the final outcome, than higher returns in the early stages of the phase.

Another source of risk is the characteristics and specific design issues associated with the individual Lifecycle models. The following factors associated with Lifecycle strategies can lead to vastly different investment outcomes:

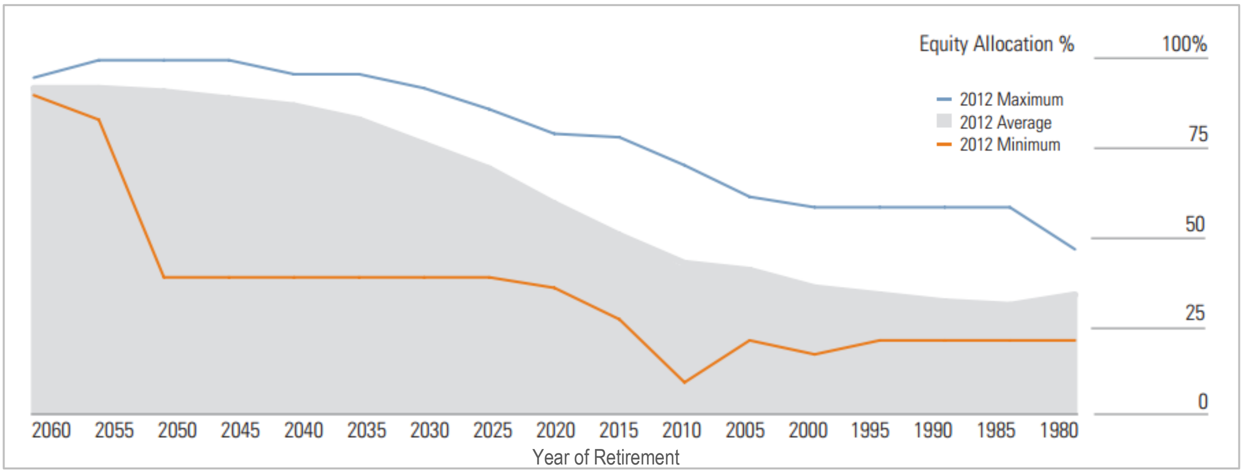
- Average asset class exposure – while all Lifecycle portfolios lower their exposure to growth assets over time, the average allocation between growth and defensive assets over the entire investment period can differ between portfolios.

- Glide path trajectory – some Lifecycle portfolios begin lowering their risk profile immediately ie when a typical member is in their 20s, whereas others don’t begin the process for over 30 years ie when a member is in their 50s.

- Cohort classification – Lifecycle funds in Australia often categorise members into cohorts or buckets which span an entire decade based upon their birth year and therefore is assumed appropriate for a long time period for a reasonably large spread of ages. This issue is further compounded by the uncertainty around a fixed retirement date for many members, which can lead to a structural mismatch between the Lifecycle model’s allocation and what is most suitable for the member.

The first two points are captured in Chart 2, which shows the average, maximum and minimum equity allocation of US Lifecycle (target date) funds. The chart reveals that there is typically a difference of 20% - 50% in the equities exposure between the most aggressive and defensive Lifecycle funds, in spite of the fact that they are “tailored” towards members with an identical year of retirement.

Chart 2: Divergent glide-paths amongst Lifecycle funds



Source: Morningstar (2013), asset allocation figures as at 31 December 2012.

These issues underscore how the characteristics and design of a Lifecycle portfolio will have a considerable impact on investment performance, which ultimately leads to increased uncertainty around being able to achieve a sufficient income stream for retirement.

Pricing Risk

Current market pricing and valuations should be a key determinant of the assets an investor allocates to, as they provide an indicator of potential expected returns and drawdowns i.e. if equities are already expensive, the potential for future returns is lower, while the probability of a drawdown is greater. Lifecycle models that adopt mechanical ‘one size fits all’ approaches to asset allocation irrespective of market conditions and valuations will subject the investor to significant pricing risk. [1]

Take the following example:

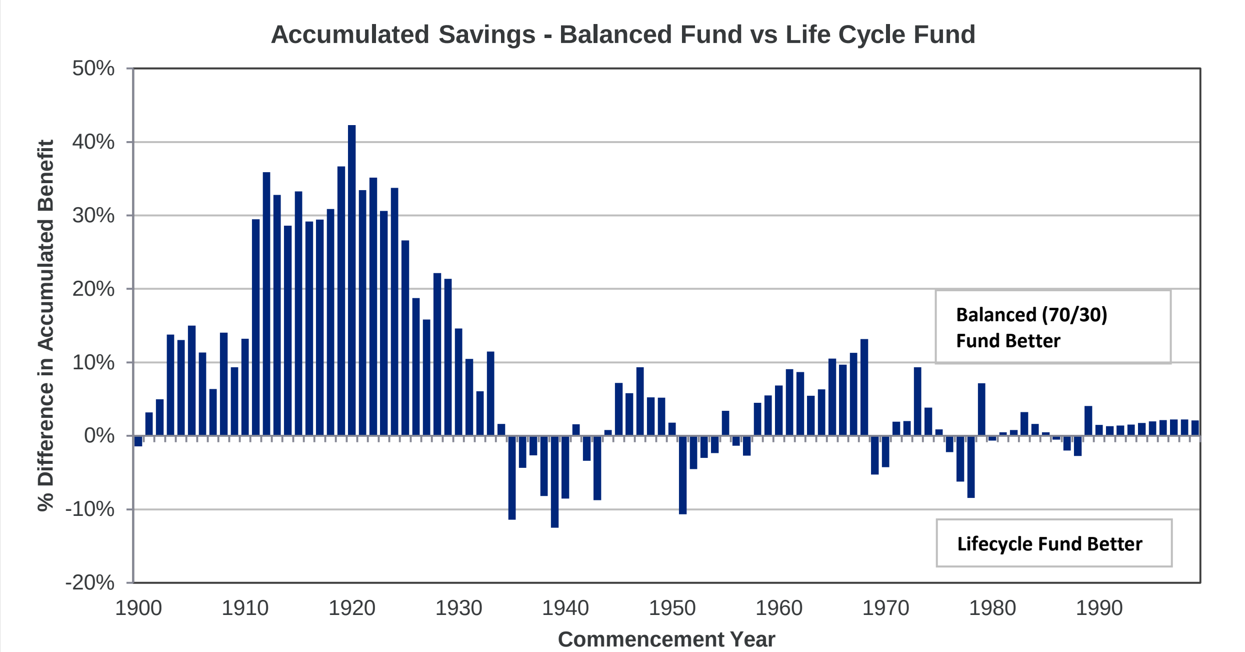
- A young investor is heavily allocated towards equities during a period when equities structurally underperform and bonds structurally outperform; and

- As the investor ages and their asset allocation becomes more defensive, changing financial market conditions result in equities structurally outperforming and bonds structurally underperforming.

In such a situation, a Lifecycle model would underperform a balanced fund, highlighting its reliance on the path dependency of returns and its inability to consistently deliver strong investment returns throughout different market conditions. This is demonstrated in Chart 3 which is from a previous paper “Life Cycle Funds – Just Marketing Spin” (Cooper, 2011). It compares the relative performance of Lifecycle and 70/30 funds on a year by year basis. The results show that, on average, the final balance of the 70/30 strategy was almost 12% higher than the Lifecycle strategy.

Chart 3: Accumulated savings of Balanced (70/30) and Lifecycle funds

[1] We note that while some Lifecycle funds do factor in valuations in their asset allocation decision, the divergence away from the glide-path is rarely material enough to have an impact on long term investment performance.



Source: Schroders, Datastream
Assumptions: See "Life Cycle Funds – Just Marketing Spin" for full details

Table 1 shows a breakdown of the 3 year annualised equity returns for the US market based on a simple valuation metric - the Shiller P/E - which measures current market price relative to average inflation adjusted earnings over the past 10 years. It's immediately clear there is a large discrepancy in the annualised returns under different Shiller P/E scenarios with the average 3 year return when the Shiller P/E is less than 10 being over 4 times higher than when the Shiller P/E is greater than 20. Additionally there have never been any negative 3 year returns when the Shiller P/E is lower than 10, whereas when the Shiller P/E is greater than 20 the market has produced negative returns 32% of the time.

Table 1: Unconditional and conditional return distributions for the US equity market from December 1899 to December 2013

	Unconditional	Conditional		
		PE < 10x	10x < PE < 20x	PE > 20x
Number of Observations	1333	229	762	342
Average 3 Year Return p.a.	9.9%	17.1%	10.3%	4.2%
Max 3 Year Return p.a.	42.4%	42.4%	39.9%	32.8%
Min 3 Year Return p.a.	-42.7%	0.4%	-14.3%	-42.7%
Frequency < 0% p.a.	15%	0%	12%	32%
Frequency between 0% p.a. and 10% p.a.	33%	23%	35%	36%
Frequency > 10% p.a.	51%	77%	52%	32%
Return Range*	85.1%	42.0%	54.2%	75.5%

* Maximum 3 year return p.a. less minimum 3 year return p.a. based on monthly data
Source: Global Financial Data, Schroders

In the context of any multi-asset portfolio, regardless of whether it follows a Lifecycle, balanced or valuation based investment approach, bonds play a critical role in the asset class mix. Bonds provide a steady source of income and can help to diversify away risk from growth assets. Pricing is also a vital factor in determining future bond returns, as demonstrated in Table 2 which analyses historical bond returns relative to their real yield. We separate real yields into 3 categories: when real yields are more than 1 standard deviation below their long run average (low), when real yields are within 1 standard deviation of their long run average (medium), and when they are more than 1 standard deviation above their long run average (high). Similar to equity returns under various Shiller P/E conditions, there are noticeable differences for bond returns i.e. the average 3 year return for bonds when the real yield is high is 8.7% p.a., as opposed to 2.5% p.a. when the real yield is low. Having a higher real yield also reduces the likelihood of having a negative return, with bonds producing no negative returns when real yields are high, as opposed to 9% of the time when real yields are low.

Table 2: Unconditional and conditional return distributions for the US bond market from December 1899 to December 2013

	Unconditional	Conditional		
		Yield < -1 SD (low)	-1 SD < Yield < +1 SD (medium)	Yield > +1 SD (high)
Number of Observations	1333	270	788	275
Average 3 Year Return	4.9%	2.5%	4.4%	8.7%
Max 3 Year Return	23.6%	8.4%	19.0%	23.6%
Min 3 Year Return	-2.9%	-2.2%	-2.9%	1.3%
Frequency < 0% p.a.	4%	9%	4%	0%
Frequency between 0% p.a. and 10% p.a.	85%	91%	90%	68%
Frequency > 10% p.a.	10%	0%	6%	32%
Return Range*	26.4%	10.6%	21.8%	22.3%

* Maximum 3 year return p.a. less minimum 3 year return p.a. based on monthly data
Assumptions: Yields and returns are based upon US 10 year treasury bonds. Real yields are based upon inflation expectations which are calculated as 2/3 weighted against the 10 year trailing average YoY US CPI and 1/3 weighted against current YoY US CPI, The long run average real yield is 1.59% and standard deviation is 1.55%.
Source: Global Financial Data, Schroders

While portfolio risk is typically measured by volatility, the figures from our relatively simple equity and bond pricing frameworks emphasize that pricing risk / valuations should also be strongly considered when making an investment decision. The concern with using volatility as being the only measure of portfolio risk is that it treats upside volatility as a negative, whereas it should actually be welcomed by investors. By supplementing the decision making process with valuations, investors have the potential to reduce the likelihood of any drawdowns, while also being able to enhance portfolio returns, irrespective of how close they are to retirement.

Comparisons

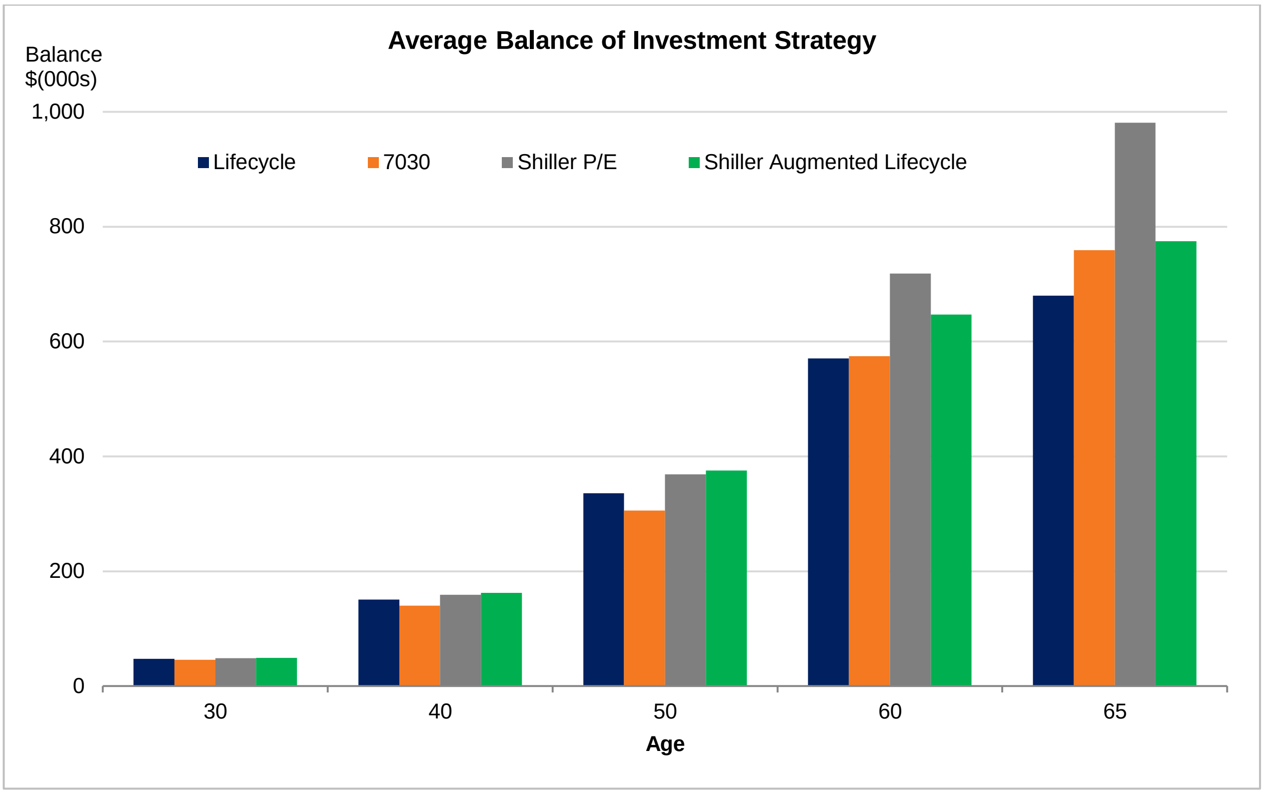
In order to gain further insight into Lifecycle and valuation based models, we undertake an empirical comparison of the following investment strategies:

- A **Lifecycle model** utilising a generic glide path asset allocation. The model begins with an aggressive allocation of 81% to equities, 9% to utilities, 8% to bonds and 2% to cash. It gradually becomes more defensive after the 25th year. By the time a member is approaching retirement the allocation is 35% equities, 4% utilities, 41% bonds and 20% cash.
- A **70/30 balanced model** which assumes a constant allocation of 70% to equities, 7.5% to utilities, 15% to bonds and 7.5% to cash
- A **Shiller P/E / valuation based model** where the asset allocation becomes more defensive as the 4 year trailing average Shiller P/E increases.
- A Lifecycle investment model, which also utilises Shiller P/E valuations to tilt asset allocation away from the standard glide-path – **a Shiller Augmented Lifecycle model**. When the 4 year trailing average Shiller P/E is less than 12, the equities allocation is increased by 10%, while the fixed income / cash allocation is decreased by 10%. Conversely, when the measure is greater than 20, the equities allocation is decreased by 10%, while the fixed income /cash allocation is increased by 10%. The P/E values of 12 and 20 are chosen as they represent the approximate values of one standard deviation below and above the long run average respectively.

In our analysis, we assume that members have a 45 year working life starting at 20 and finishing at 65, where they make constant contributions to their investment at 9% of their salary. The salaries are based upon the mean 2012 earnings for full time workers, but adjusted by a person's age. We ensure that the average exposure to equities across the 45 years is approximately 70% across all four investment strategies in order to ensure a like for like comparison. To maximise the historical data available for analysis, we use a four asset class model based on the US markets from 1900. While it would have been ideal to have included Australian data in our analysis, the lack of reliable Australian earnings data prior to the 1960s would have severely limited the number of investment periods available for analysis. Furthermore, we believe that the US market is a relatively accurate proxy for the Australian market, particularly over an extended investment horizon. A complete list of assumptions used in the model can be found in the Appendix.

We take a look at investment performance in Chart 4 which shows the average balance for each investment strategy at different stages of a person's working life. This is based upon the average figure of 276 observations, with the first observation starting in January 1900 and ending in December 1944, and the last observation starting in October 1968 and ending in September 2013. Evidently it is clear that on average, the Shiller P/E investment model outperforms the others, producing a final balance that is significantly higher than the other strategies. The Shiller Augmented model generally provides stronger results than a 70/30 approach, while the Lifecycle model performs, on average, the worst. When comparing various models, it becomes apparent that incorporating valuations into the investment decision framework can result in consistently stronger investment returns.

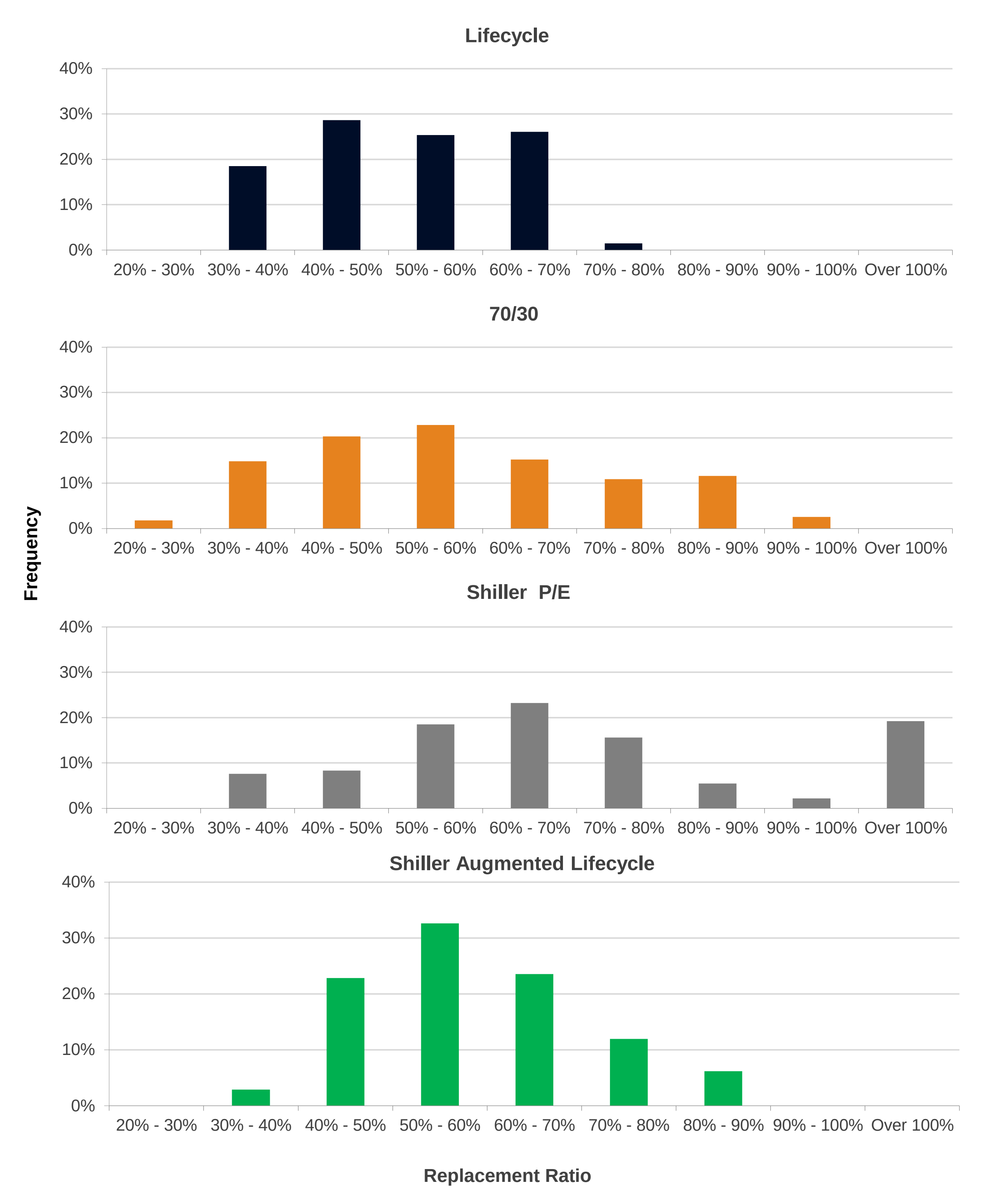
Chart 4: Average balance of investment strategy at different ages



While Chart 4 demonstrates the average expected balance based on historical data from 1900, the actual experience for members will have differed significantly from year to year, depending upon market conditions. Consequently it is also important to observe the distribution of results, as well as being able to present the investment outcome in a more meaningful manner for retirees. To do this we convert the final balance to a replacement ratio – the member's post retirement income relative to their pre-retirement income, and then plot the distribution of the replacement ratios for each investment strategy as shown in Chart 5 below.[2]

Chart 5: Frequency distribution of replacement ratios by investment strategy

[2] See Appendix for assumptions used to calculate the replacement ratio



The chart suggests that a Lifecycle strategy does offer a higher level of certainty around the dispersion of replacement ratios, as well as being to offer a degree of downside protection for the portfolio, indicated by the higher minimum replacement ratio that is able to achieved with the Lifecycle model relative to the 70/30 model. Nevertheless, this comes at the expense of relinquishing significant upside performance, as the 70/30 model is much more likely to achieve a replacement ratio greater than 70%. Additionally, the Lifecycle model consistently underperforms both the Shiller P/E and Shiller Augmented Lifecycle models. When it comes to investment certainty, the dispersion of the Shiller P/E model is relatively wide (albeit skewed to the upside), while the Shiller Augmented Lifecycle model produces a dispersion that is relatively consistent with that of a standard Lifecycle model. This implies that supplementing a more rigid glide-path allocation, through allowing for valuation based shifts in asset allocation, can result in performance that is consistently higher than a standard Lifecycle model, while maintaining the degree of certainty around the final investment outcome.

Where to from here?

For members, the preferred single lifetime investment strategy should be one that is aligned with their objective. The primary shortcoming of the Lifecycle model is that it automatically determines a member's risk preferences depending on their age / how closer they are to retirement, while also automatically assuming that the allocation to growth assets is an accurate proxy for risk. These simple assumptions of complex investment objectives and dynamic financial market conditions can lead to a mismatch between a member's objectives and what the Lifecycle model is able to achieve, ultimately resulting in sub-optimal retirement outcomes for members.

Our analysis of historical data supports this notion by showing that a standard Lifecycle model typically underperforms a balanced model and significantly underperforms a Shiller P/E model. Additionally, our results indicate that incorporating even a simple and mechanistic valuation based overlay into a standard Lifecycle framework (i.e. the Shiller Augmented Lifecycle model) can lead to consistent outperformance of a standard Lifecycle model, while maintaining lower levels of portfolio volatility and drawdowns for members approaching their retirement.

While Lifecycle models are an evolution from the standard balanced approach, a more in depth examination of the framework suggests that they are not necessarily an improvement. The overall strong performance of both the Shiller P/E and Shiller Augmented Lifecycle models emphasizes the importance of incorporating pricing and valuations into any investment framework.

Appendix

Bibliography

Bibliography of prior research pieces on Objective Based Investment Strategies (and related topics) from Schroder Investment Management Australia Limited referred to in this paper. Copies available from Schroders on request:

- 2007, 2008, 2009, “CPI+5 White Paper”
- January 2009, “It’s about risk, not return”
- April 2009, “What price complexity”
- August 2009, “Keeping it simple, back to the future for Asset Allocation”
- February 2011, “Complexity Adding Value”
- August 2011, “Post Retirement – Time to Focus on the Endgame”
- September 2011, “Life Cycle Funds – Just Marketing Spin”
- March 2012, “Why SAA is Flawed”
- April 2012, “Asset Allocation - How flexible do we need to be?”
- May 2012, “Understanding the Journey to Retirement”
- October 2012, “Risk Parity – No Free Lunch”
- November 2012, “Avoiding the valuation traps in Strategic Asset Allocation”
- February 2013, “Searching for the Holy Grail in Asset Allocation”
- May 2013, “It’s not all about Income”
- August 2013, “CPI+3.5% white paper”
- September 2013, “Effective investment strategies for retirement”

Additional sources used in this paper

Data sourced from Global Financial Data:
- Australia Consumer Price Index
- Australia Total Return Bills Index
- Australia 10-year Government Bond Total Return Index
- Australia S&P/ASX 200 Accumulation Index
- United States BLS Consumer Price Index NSA
- S&P 500 Total Return Index (w/GFD extension)
- S&P 500 Utilities Total Return Index
- USA Total Return T-Bill Index
- USA 10-year Government Bond Total Return Index
- USA 10-year Bond Constant Maturity Yield

Other sources of information used in this paper:
- ABS Catalogues 6302.0 and 6310.0
- Robert Shiller’s Yale University webpage
- Morningstar Target-Date Series Research Paper 2009 Survey
- Morningstar Target-Date Series Research Paper 2013 Survey

Financial Model Assumptions

General Assumptions

The following assumptions are made for our comparison of the different investment models, as well as for the analysis of sequencing risk:
- Members / Investors are assumed to have a 45 year working life.
- The average equities exposure of each investment strategy over the 25 years is approximately 70%.
- Contributions are assumed to be in constant 2012 dollars, but adjusted by a person’s age. They are also assumed to be 9% of an employee’s salary over their entire working life
- Asset class returns are calculated in real terms
- Final balances are presented in 2012 dollars
- Investment management fees are assumed to be 0.90% pa and contributions are taxed at 15%.
- All analysis is conducted using quarterly data

For the asset allocation assumptions made within each investment strategy please refer to the following page.

Asset Class Benchmarks

Asset Class	Benchmark
Equities	S&P 500 TR Index
Utilities	S&P 500 Utilities TR Index
Bonds	US 10Y Gov TR Index
Cash	US T-Bill TR Index

Source: Global Financial Data

Lifecycle Investment Strategy

The table below shows a cross-sectional sample of the Asset Allocation for the Lifecycle Investment strategy. It begins with an aggressive allocation towards equities of 81% in order to maximise returns during the initial years of the investment period. This allocation towards equities begins to decrease along a glide path from age 45 onwards, until it reaches 35%.

Age	Allocation			
	Equities	Utilities	Bonds	Cash
20	81.0%	9.0%	8.0%	2.0%
30	81.0%	9.0%	8.0%	2.0%
40	81.0%	9.0%	8.0%	2.0%
50	69.0%	8.5%	12.0%	10.5%
60	42.0%	4.0%	34.0%	20.0%
64	35.0%	4.0%	41.0%	20.0%

70/30 Investment Strategy

The 70/30 Investment Strategy assumes a constant allocation for the entire investment horizon irrespective of a member's age or market valuations.

Asset Allocation - US Market	
Equities	70%
Utilities	7.5%
Bonds	15%
Cash	7.5%

Shiller P/E Investment Strategy

The Shiller P/E Investment Strategy is a valuation based measure that takes the 4 year trailing average of the Shiller P/E as a basis for the asset allocation. The 4 year trailing average figure is used to filter out noise which could lead to constant switches in allocation, as well as to prevent the model from shifting allocation too early on in during a market cycle. As the Shiller P/E increases, an indication of the Equities market becoming more structurally expensive, the allocation towards Equities decreases.

Shiller PE Range	Allocation			
	Equities	Utilities	Bonds	Cash
Under 10	85%	9%	4%	2%
10 - 15	80%	8%	7%	5%
15 - 20	65%	7%	20%	8%
20 - 25	45%	6%	38%	11%
25 - 30	30%	5%	51%	14%
30 - 35	15%	4%	64%	17%
Over 35	5%	3%	72%	20%

Shiller Augmented Lifecycle Investment Strategy

The Shiller Augmented Lifecycle Investment Strategy takes a hybrid approach between the standard Lifecycle strategy and the Shiller P/E strategy. It uses the default glide-path asset allocation of the Lifecycle strategy, but allows for portfolio tilts of 10% depending on the 4 year trailing average of the Shiller P/E.

Shiller P/E Range	Equities	FI & Cash
Under 12	+ 10%	-10%
12 - 20	No Change	No Change
Over 20	-10%	+ 10%

Replacement Ratio Assumptions

The following assumptions are made to calculate the replacement ratio:

- The investment balance is required to last for 25 years
- Final salary is assumed to be $62,608 p.a. This is based on ABS weekly earnings for all persons aged 60 – 64 years in 2012 dollars
- CPI is a constant 2.5% p.a.
- Investment return is a constant 4.0% p.a. (i.e. real 1.5% p.a.)

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