portfolio construction forum

Breaking the risk on/risk off cycle

Plato Milliman | August 2014

The Global Financial Crisis highlighted the shortcomings of traditional asset allocation in managing portfolio risk and underscored typical fear led human behaviour. For those nearing or in retirement, the GFC also highlighted the impact of sequencing risk. Bonds did provide some correlation benefits when growth asset class correlations approached one in the GFC, but historically low absolute and real interest rates and tapering risk place question marks on the role of bonds going forward. This paper reviews an alternate approach to managing a risk on/risk off world, allowing investors to maintain or increase exposure to growth assets while experiencing a smoother ride.

INTRODUCTION

For several decades, financial practitioners have been offering tried and true advice: stay invested in the market; continue saving and investing in your portfolio across all market conditions; when the market goes down, ride out the storm – eventually, growth will return and the damage to a portfolio will be repaired. This advice was completely correct when baby boomers were in their thirties and forties. However, this approach simply does not work for clients nearing or in retirement. When an individual must use a portfolio to meet current income needs, it is not always possible to "ride out the storm".

To solve the retirement income problem, a risk management strategy must be included in clients' portfolios for two main reasons. The first reason is behavioral. During periods of financial crisis, individual investors are inclined to panic. They tend to sell assets after large market declines and move to cash. This hurts long-term returns, as they lock in significant losses. If this were the only problem, financial practitioners might be able to address this issue without adopting a risk management strategy. Practitioners could focus their efforts on counseling. However, in the authors' opinion, a second reason makes the adoption of a risk management strategy more critical. This is the fact that market declines combine with withdrawals from a portfolio in a destructive way. This sequence-of-returns problem mathematically puts portfolios on an inescapable downward trajectory, ultimately resulting in portfolio depletion.

Conversely, the incorporation of a risk management strategy into a portfolio that is used to fund retirement income is likely to actually increase portfolio returns over time, providing investors the potential to draw more reliable lifetime income from their portfolios. By reducing losses during periods of financial turbulence, a portfolio is able to sustain withdrawals and benefit to a larger degree from a market recovery.

POOR TIMING

The Global Financial Crisis experience has highlighted the devastating effect of a very poor investment return on a retiree's investment balance and expected retirement income stream. And not only did many investors get their savings hit by the GFC, but many took risk off the table at around the worst possible time. Investing in response to the prevailing market sentiment (the "herd") can negatively impact portfolio returns. During periods of financial crisis, many investors tend to panic. They often sell assets after large market declines and move to safer asset classes, such as cash, effectively locking in significant losses. And similarly, as market sentiment improves, investors tend to switch back into risky assets after they have risen, the exact opposite to the motto of "buy low/sell high". In fact, research from the US finds that the average retail investor is quite a poor market timer. Morningstar (2012) found that the average return on US stock funds was 10.3% per annum between January 2002 and December 2012, whilst the average investor return in those funds was only 7.6% per annum, 2.8% per annum lower. For the more volatile international stock sector, the results were even worse, with the investor average return underperforming the fund category average return by 4.1% per annum over the same period.

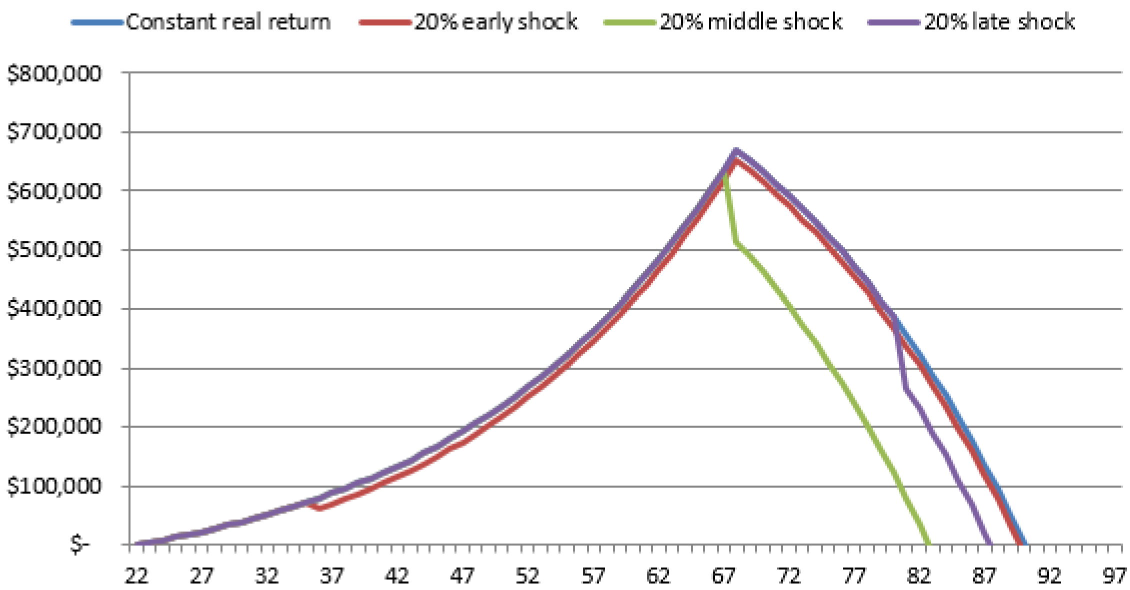
SEQUENCING RISK

To illustrate investment sequencing risk, the hypothetical example of Sarah is used. Sarah enters the workforce at age 22, earning $50,000, and contributes 12% of salary into super throughout her working life. Sarah receives a 1% real increase in salary each year until she retires at age 67. Once retired, Sarah expects to consume 60% of her final year salary each year in real terms. Sarah invests in a balanced fund throughout her entire life, and expects to earn a 4.5% pa real return on the investment each year. Figure 1 charts the expected value of Sarah's superannuation investment balance in real (current) dollars. Sarah's balance is expected to grow to around $650,000 by retirement, and then fall to zero around age 90. Please note that the assumptions used do not allow for any other income such as the age pension in our calculations. In the absence of the age pension, Sarah would face longevity risk if she lives longer than 90. Collecting some aged pension in retirement can obviously mitigate longevity risk, but relying completely on the aged pension can be dangerous if governments reduce aged pension benefits as has recently been announced.

In addition to providing the expected return Figure 1 also provides a simplified example of the impact of investment risk. It is assumed that there is a once in an investment lifetime risk of earning a −20% real return, whilst returns in all other years are still 4.5% pa real. The once in a lifetime negative return is about the size of the return experienced by a typical

Australian balanced fund in the GFC. Depending on where in one's lifetime the GFC return occurs will have a large impact on how long Sarah's retirement money lasts. To illustrate this, returns are "shocked" at different times, specifically at age 35, 67 and 80.

Figure 1: Sequencing risk: expected superannuation balance of Sarah incorporating the risk of a -20% shock return.

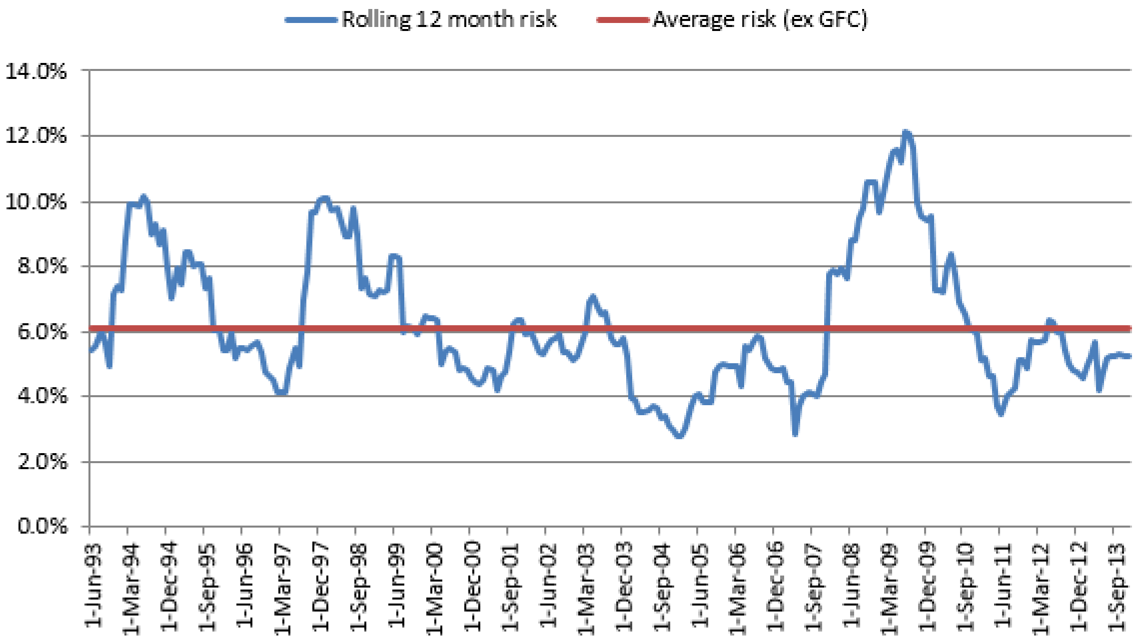


Sources: Plato Investment Management

The early "GFC shock" at age 35 has little impact on how long Sarah's expected retirement income lasts. This early loss cuts expected retirement income by less than one year. However, if the same "GFC shock" occurs at age 67, the impact is significant, reducing expected retirement income by around eight years, and this impact could be more devastating if Sarah then switched to a safe asset, locking in her losses. Encountering the "GFC shock" in late retirement has less of an impact, with a "GFC shock" at age 80 reducing expected retirement income by less than three years.

Figure 2 clearly shows the impact of sequencing risk. It is quite low when one starts investing for retirement, increases in size as one approaches retirement, and then reduces the longer one is retired. The "best time" to endure a once in a lifetime negative return would either be in one's very first year of investing, when investment balance is negligible or in one's very last year of retirement when investment balances are almost fully depleted. The very worst time to experience a large negative investment return is when your investment balance is at its peak, which for most people is expected to be at the time of retirement. The five to 10 years either side of retirement have been called the "retirement risk zone", as this is when sequencing risk is at its peak.[1]

Figure 2: Rolling annual estimated risk of an Australian balanced fund
June 1992 to December 2013



Source: Plato Investment Management

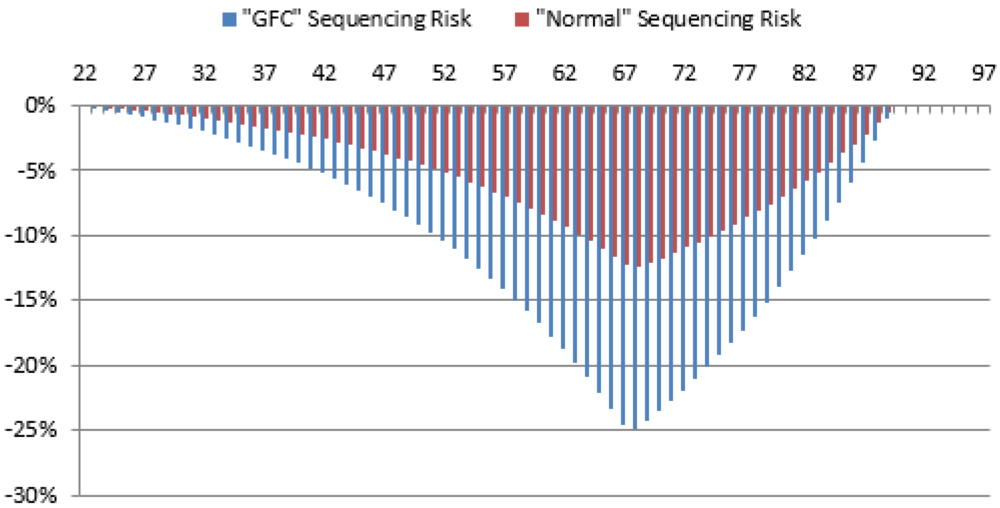
ASSESSING THE MAGNITUDE OF SEQUENCING RISK

So far only simplified examples of the impact of sequencing risk have been used. The 20% shock number was chosen because it roughly matches the GFC experience for Australian balanced fund investors. To estimate the magnitude of the worst potential expected investment return, the standard deviations of returns for a simulated Australian 60/40 balanced fund are estimated.[2] Over the period, the standard deviation of returns was just over 6.9% per annum, but excluding the volatile GFC period (2008-2009) the standard deviation was 6% per annum. Figure 2 displays both the average risk (ex GFC) and the estimated rolling annual risk of the balance fund, highlighting that at the height of the GFC, this risk exceeded 12%.

In assessing risk, it's normal to consider the impact of a large outlier event, such as a two standard deviation event. If investment risk is 6% per annum, a two standard deviation event is 12% below expected or, in this example, 12% below the expected 4.5% per annum real return, or a real loss of 7.5%. However, if investment risk spikes to 12% during the GFC, this suggests that a two standard deviation event is 24% below the expected return of 4.5% per annum, or -19.5% real, which is pretty much spot on with the GFC experience.

Figure 3 displays the two standard deviation "impact" of sequencing risk on Sarah's retirement balance at age 67 based on normal (ex GFC) and "GFC" risk of an Australian balanced fund, depending on when the two standard deviation event occurs. Sequencing risk is very small when one starts work, increases to a peak at retirement, and then falls more sharply after one retires.

Figure 3: Estimated sequencing risk as a percentage of retiring superannuation balance for Sarah by year of shock return using "normal" investment risk and peak "GFC" risk.

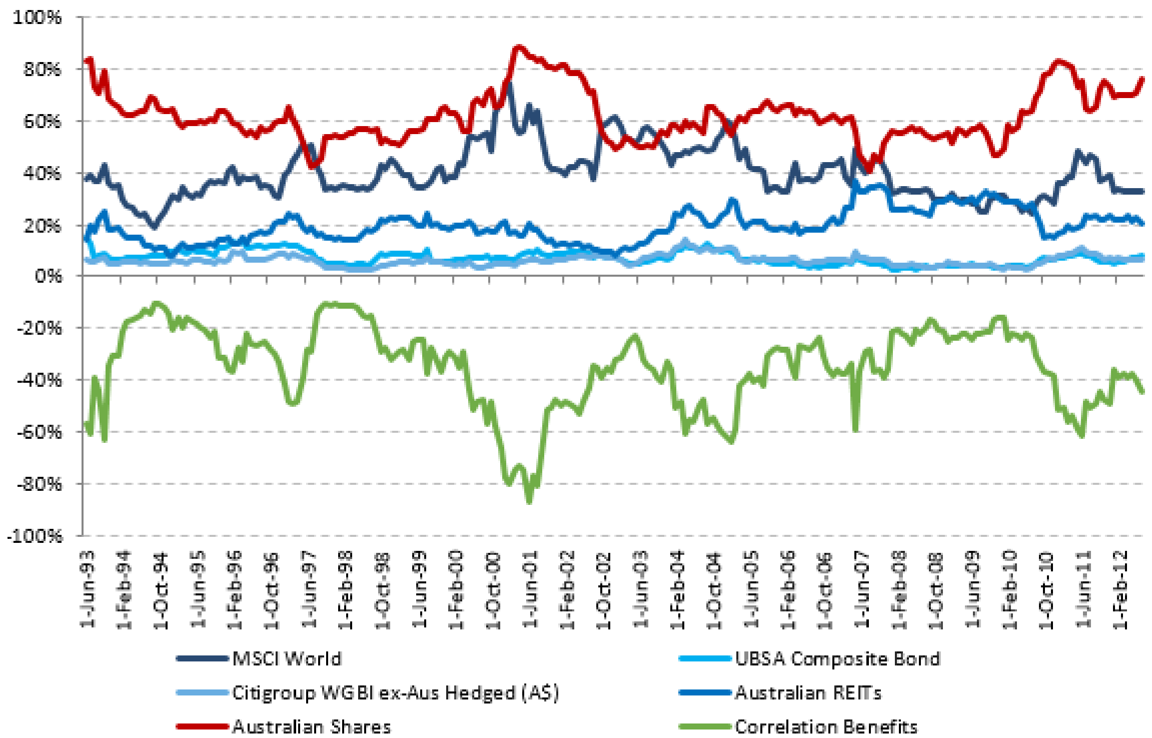


Source: Plato Investment Management

Figure 4 below sheds more light on the dynamic nature of the risk of a balanced fund, by looking at the individual asset class contributions to a typical Australian balanced fund, as well as the benefits of low correlations between asset classes. The individual asset class risk contributions are calculated as the asset class weight, times the asset class standalone risk. Collectively, these sum to greater than the total risk of the balanced fund as they don't take into account any diversification benefits. The difference between the collective sum of the individual asset class risks and the balanced fund risk is classified as the diversification benefits of the balanced fund.

The diversification benefits are a negative number, representing an overall reduction in risk. Figure 4 clearly shows that this diversification risk reduction varies through time, ranging from -15% to around -80%. Unfortunately, the lower levels of diversification benefits tend to coincide with periods of market crises. In the GFC period, when equity market correlations moved towards one, diversification benefits reduced risk by only around 20%. Similar periods of high correlations and low diversification benefits occurred in 1994 during the bond and equity market sell-down, and in 1997 during the Asian crisis.

Figure 4: Asset class contributions and diversification benefits to the rolling annual estimated risk of an Australian balanced fund
June 1992 to December 2013



Sources: Plato

The experience of the GFC and other smaller crises suggests that relying on diversification alone to effectively manage risk is fraught with danger. In crises, most risky asset classes tend to decline together, with resultant correlations approaching one. At the same time, measures of absolute risk or expected absolute risk such as the VIX "fear" index tend to spike. So, just when one needs the benefits of diversification the most, it tends to fail, leading to outcomes that significantly exceed expectations on the down side of the distribution.

This has lead some commentators to look to techniques such as risk parity, where the risks between bond and equity exposures are much more balanced. However, the bond market melt-down of 1994 highlighted that bonds and equities can both lose value at once. And, in a world of record low interest rates, the merits of leveraging up bond exposures to offset equity risk exposures need to be very carefully thought through. If bonds overshoot during tapering, the next crisis could be a combined bond and equity market sell-off similar to the one experienced in 1994.

ARE TARGET DATE/LIFE CYCLE FUNDS THE ANSWER?

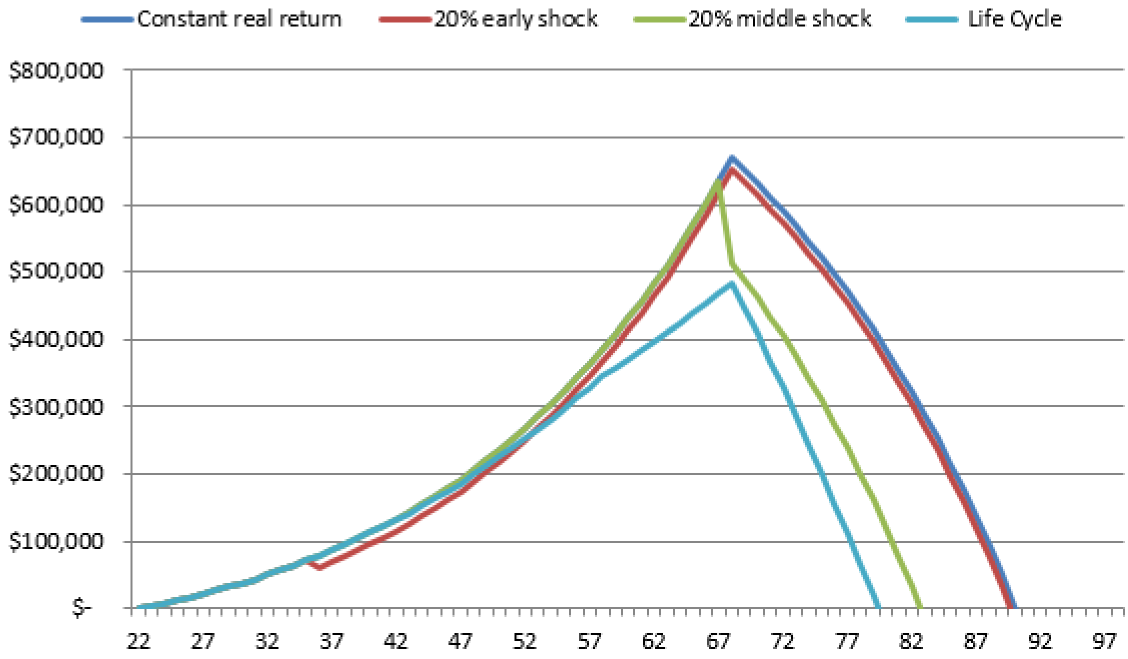
Investment risk is at the heart of sequencing risk, so reducing investment risk as one gets closer to retirement can reduce the impact of sequencing risk. In the US, target date funds (with the target date the year of one's expected retirement) have become quite popular as a way of reducing investment risk as one approaches retirement. These funds progressively reduce growth asset exposure as one approaches retirement.

In Australia, a number of Australian institutions have started to build what are here being called life cycle funds. To provide a simple analysis of these types of strategies, Figure 5 considers what happens if Sarah invests in a life cycle fund that progressively reduces growth asset exposure, expected returns and expected risk starting from age 40. Prior to age 40, the fund is the same as the balanced fund in Figure 1 – but, by age 58, the fund has permanently moved to a lower risk asset allocation expected to deliver a 2% per annum real return.[3]

Figure 5 shows the impact of reducing investment risk as one approaches retirement, based on the above return assumptions. Not surprisingly, reducing investment returns when one has the most money invested significantly reduces investment balances, and the expected retirement income stream. This life cycle investment mix actually reduces the expected life of Sarah’s retirement income stream by more than 10 years, a very high price to pay for reducing sequencing risk.

The life cycle approach can potentially deliver significantly poorer outcomes than experiencing the worst possible sequencing risk, although please note that this is just one hypothetical life cycle approach, not all life cycles are the same. However, approaches which significantly reduce expected returns when the most money is being invested, will be expected to reduce retirement income streams.

Figure 5: Mitigating sequencing risk for Sarah by adopting a life cycle approach to investing



Source: Plato Investment Management

In Figure 5, it is assumed that life cycle or target date funds are unaffected by a severe GFC market downturn. While life cycle funds tend to reduce growth asset exposure, they do not eliminate it altogether. Experience from the GFC suggests that many US target date funds performed quite poorly in calendar 2008. Morningstar's US Target Date Research Series (2010) found that vast majority of 2010 target date funds fell more the 20% in 2008, with the worst falling over 40%.

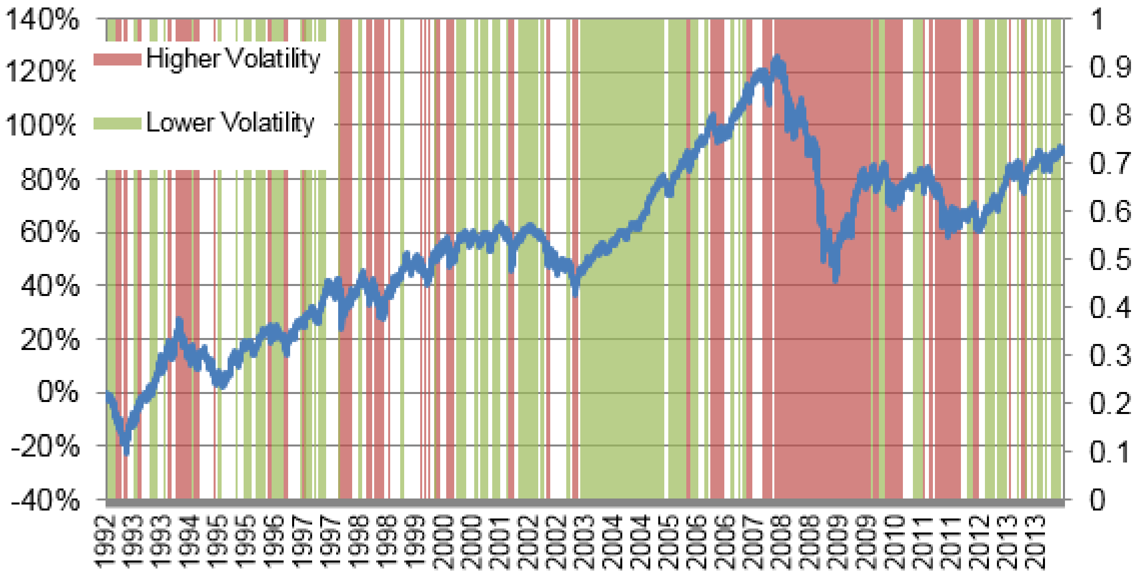
A DIFFERENT WAY TO MANAGE RISK

Figures 2, 3 and 4 demonstrated that the traditional means of managing risk failed during the GFC as well as in other risk episodes such as the bond market sell-off in 1994. Most strategic asset allocations are based on long-run average risk and average correlations, but as Figures 2, 3 and 4 demonstrate, both risk and correlations are dynamic not static.

If risk is dynamic in nature, it suggests that risk management also needs to be dynamic in nature. For dynamic risk management to work, one needs to be able to predict what risk levels are likely to be, rather than react to risks after the horse has bolted. There is significant evidence that risk levels are predictable – in fact, far more predictable than future returns.

Figure 6 highlights that periods of both high and low risk tend to cluster. There were extended periods of higher than average volatility in the GFC (2008/09) and the Greek crisis (2011) and, to a lesser degree, in the bond market sell-down (1994) and the Asian Crisis (1997). There was a long and extended period of lower than average volatility in the bull market of 2003 to 2005. Markets now appear to have returned to a lower than average period of volatility. Importantly, periods of higher volatility tend to be associated with declining or bear markets, and periods of lower volatility tend to be associated with rising or bull markets.

Figure 6: Periods of high and low volatility for the S&P/ASX200 Index
1992-2013



Source: Milliman

Unlike asset returns, risk does tend to be predictable. One way to smooth out investment risk is to adopt a simple volatility targeting approach to risk management. During the GFC and other periods of market turbulence, Figure 6 highlights that volatility levels stayed at elevated levels for considerable periods of time, during which the Australian equity market generally fell. A strategy of targeting around average risk levels would have reduced risk during much of the GFC period and, by so doing, would have likely reduced downside losses. If one targets average risk levels of around 12% per annum for an Australian equity strategy, whenever forecast risk is above 12%, the volatility targeting strategy would put in place risk hedges to reduce risk levels back to the 12% target.

The best way to hedge risk for an Australian equities portfolio would be to sell SPI futures. They are very liquid, exchange traded, cheap to implement, keep the underlying equity strategy in place, and also have the benefit of retaining franking credits so long as the "45 day rule" is respected. The volatility management process is designed to keep the risk level of a fund from increasing significantly during periods of market turbulence and simulations show that the process will significantly reduce volatility and draw-downs in volatile markets.

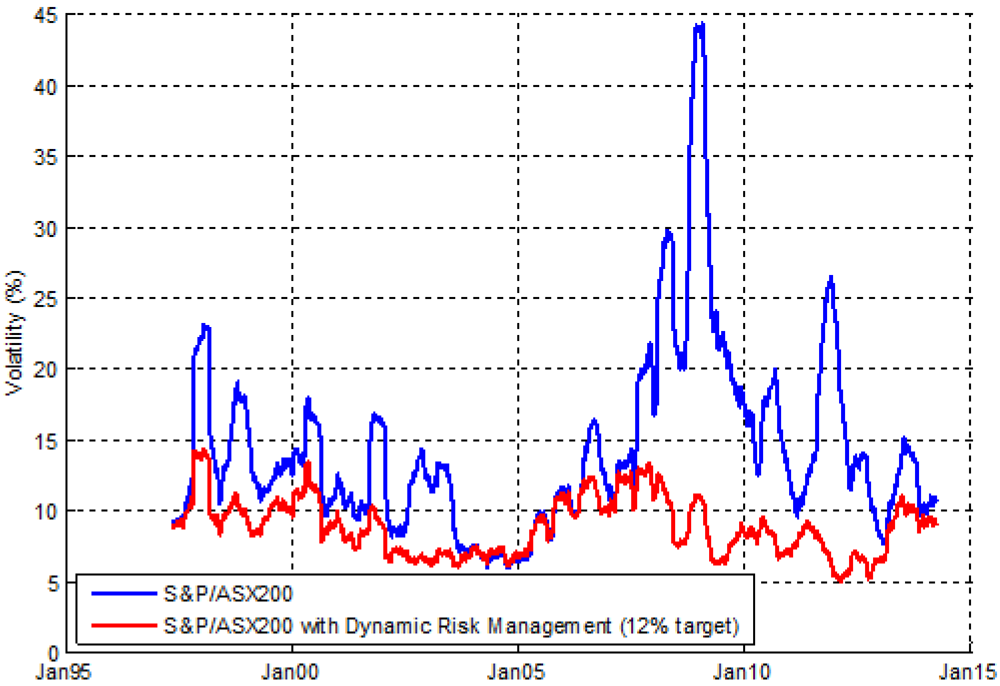
But, volatility targeting alone may not be enough to avoid large draw-downs. It simply reduces their magnitude.

In an attempt to further reduce losses during periods of significant and sustained market decline, an additional futures-based risk management process founded on strategies commonly used by major financial institutions can be used. This capital protection strategy adjusts futures positions daily, subject to market-based thresholds, in an effort to preserve the capital of a fund on a rolling five-year basis. In a severely declining market, futures gains may be harvested and reinvested in growth assets in an effort to maximise long-term returns. Unlike the simple volatility targeting strategy, the capital protection strategy takes into account the path of investment returns, and thus can put more hedging in place should investors have already lost money.

Combining the volatility targeting strategy and the capital protection strategy together forms the basis of a sophisticated dynamic risk management process. This type of hedging strategy is already used in a variety of funds to help investors weather market turbulence. It is used as a strategy in US mutual funds and target date funds to seek to improve clients' likelihood of meeting retirement income goals. It is also used within variable annuities with guaranteed living benefit riders that are intended to give clients guaranteed lifetime income. The goal of the dynamic risk management strategy is to stabilise the volatility of a fund around a target level, such as 12% per annum, and to reduce the downside exposure of a fund during periods of significant and sustained market decline. An additional advantage of the volatility management process is to earn additional returns based on the tendency of market volatility to decrease during extended periods of favorable market returns.

Figure 7 displays the results of applying the dynamic risk management to an Australian equity portfolio. Figure 7 displays the rolling risk (90-day standard deviation) of the S&P/ASX200 Index versus a risk managed index portfolio based on a 12% target volatility. It highlights that a dynamic risk management process can considerably reduce volatility in periods of higher than normal risk, generally maintaining risk levels at or below 12%.

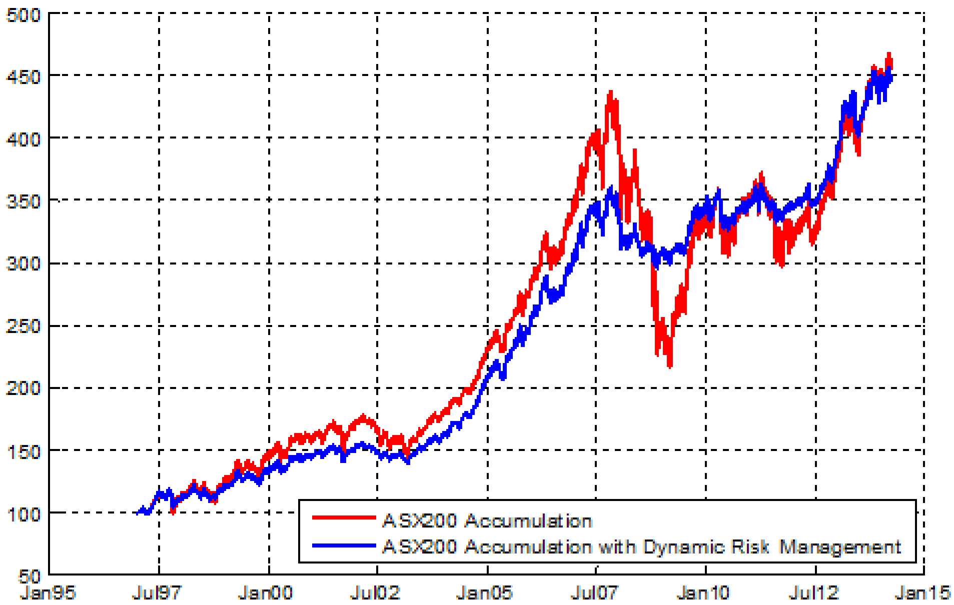
Figure 7: Rolling risk of the S&P/ASX200 Index and simulated S&P/ASX200 with dynamic risk management
January 1997 – December 2013



Sources: Milliman, Plato Investment Management. Volatility estimated using a 90-day trailing standard deviation of daily returns.

Figure 8, depicts the cumulative performance of a dynamic risk management process simulated over an Australian equity market index portfolio. The dynamic risk managed strategy captures most of the upside, but significantly reduces draw downs during the GFC, but over the whole period provided broadly similar returns to the underlying index portfolio. The simulated dynamic risk management process delivers significant risk reduction with only slightly lower overall returns.

Figure 8: . Cumulative value of the S&P/ASX200 Index (ASX200) and the S&P/ASX200 with dynamic risk management.
January 1997 to December 2013



Source: Milliman, Plato Investment Management. Accumulated returns rebased to 100 at 1-Jan-1997.

CONCLUSION

Managing risk can significantly reduce drawdowns in volatile investment regimes, thus significantly reducing the impact of sequencing risk. More importantly, funds managed this way can expect to earn around the same long-term return as normal funds, because periods of high risk are generally associated with large negative returns.

Poor return sequencing (sequencing risk) can significantly increase longevity risk for those unlucky enough to experience very poor returns in the retirement risk zone. Some balanced funds experienced losses in the order of 20% or more during the GFC which would have had a significant impact on expected retirement income for someone about to retire. The levels of losses experienced in the GFC were inconsistent with long run average risks and correlations, representing something like a three or four standard deviation event. However, it has been shown that market risks are not stable. Risk levels tend to rise in times of crisis, and the correlation benefits of a "balanced fund" tend to fall. Put bluntly, diversification – the traditional method of managing investment risk – tends to fail at precisely the time investors need it most.

One different way to manage investment risk is to adopt a dynamic risk management approach which takes into account the dynamic nature of investment risk over the cycle, dynamically managing the risk of an investment, reducing growth asset exposure in risky periods, and thus reducing the impact of sequencing risk.

An additional benefit of dynamic risk management is that it reduces the likelihood of a human fear response of making a poor capital allocation decision at the wrong time in the case of a crisis.

This paper has shown that dynamic risk management can be an important tool in providing reliable investment returns. Market declines combined with withdrawals can deplete investors' portfolios. This sequence of returns risk cannot be effectively addressed with static equity/bond portfolios in today's low interest rate environment. Including a protection strategy in an investor's portfolio is an excellent choice to address the sequence-of returns problem. In fact, this approach allows investors to use the same risk management techniques that major financial institutions have been successfully using for years.

ENDNOTES

1. Milevsky and Salisbury, "Asset Allocation and the transition to income: the importance of product allocation in the retirement risk zone", 2006, available at http://www.math.yorku.ca. Note that this zone nicely ties in from where transition to retirement strategies start.

2. 35% S&P/ASX200, 20% MSCI World (ex Aust unhedged), 5% A-REITs, 15% UBSA Composite Bonds, 15% Citi WGBI (Ex- Aust) Hedged (A$) and 10% UBSA Bank Bills over the period June 1992 to December 2013.

3. This is one of many possible life cycle or target date fund variations, but most follow a similar pattern of de-risking as one moves toward retirement. Investors should evaluate each particular fund based on its particular risk and return parameters.

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