

Improving target-date funds

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Target-date funds (TDFs) have become the preferred long-term investment vehicle for many defined-contribution plan sponsors and their participants. However, we find that while many TDFs aim to decrease their capital allocations to risky assets over the long term, they generally do not consider short- to medium-term risks on the path to retirement. In this paper, we identify two shortcomings in most TDFs – portfolio construction that leaves investors overly concentrated in equities, and risk management that does not adjust for market conditions.

We propose three complementary steps that may improve TDFs:

- Balancing existing sources of returns;
- Adding diversifying sources of returns; and,
- Actively managing risk through time.

Separate from the portfolio construction and risk management decisions, TDFs typically follow a glidepath – predetermined changes in asset allocation as retirement age approaches. We evaluate traditional and alternative paths, noting that the improvements to portfolio construction and risk management we describe can be applied to most glidepaths.

1. WHAT'S WRONG WITH TRADITIONAL TDF'S?

TDFs have been one of the fastest-growing segments in the defined-contribution world, with strategies growing from US\$71 billion in 2005 to US\$545 billion in June 2013.¹

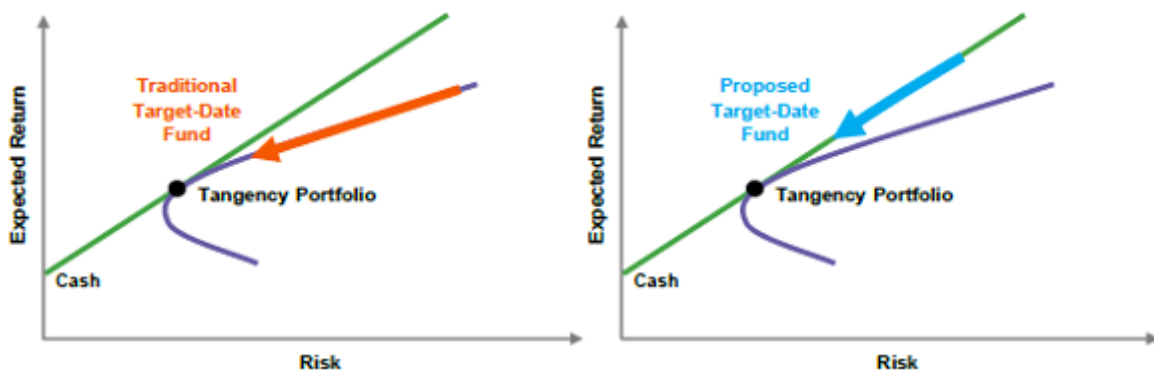
TDFs seek to provide portfolio management tailored to the investor's stage of life, generally assuming that younger investors should have higher risk tolerance, but as they age their risk tolerance decreases. To reflect these evolving risk preferences, traditional TDFs invest more heavily in equities early on and gradually shift toward bonds as the targeted retirement date approaches.

We argue that traditional TDFs have two primary shortcomings. The first is that they are not sufficiently diversified. Most TDFs glide from highly equity-concentrated portfolios (90% equities/10% bonds) for the young to more capital-balanced portfolios (50% equities/50% bonds) for the old. However, because equities tend to be significantly more volatile than bonds, even at a 50/50 stock/bond allocation, equities still contribute most of the risk in these portfolios. Thus, an older investor with a 50/50 equity/bond allocation near retirement is potentially holding a portfolio with 80% to 90% of its risk concentrated in equities.²

Modern portfolio theory tells us that in constructing any portfolio, investors should make two separate decisions. First, what is the most efficient portfolio and second, how much risk is appropriate? Excessive risk concentration implies inefficient diversification.

Figure 1 (below) shows, assuming investors can use leverage, how financial theory would dictate an investor improve his or her risk-adjusted returns. Investors can take advantage of diversification and attempt to adjust the overall portfolio risk to the desired level by combining the tangency portfolio (the one with the highest Sharpe ratio, or most return per unit of risk) with leverage or cash holdings (thus gliding down the blue arrow instead of the orange arrow).

Figure 1: Different Paths for Traditional vs. Proposed TDFs



Sources: AQR. Nobody knows what asset allocation will make up the tangency portfolio, however, empirical results (Asness, Frazzini, Pedersen, 2012) show that a risk diversified portfolio is near the tangency portfolio. For illustrative purposes only. Risk diversification does not guarantee a profit or protection against losses.

The second shortcoming is that traditional TDFs do not actively manage risk through time. Although these portfolios reduce risk over the long term, they are poorly managed over the short and medium term, thus leaving investors near retirement potentially exposed to levels of volatility that they can no longer afford to take (e.g., in the financial crisis). For any given capital asset allocation, the portfolio volatility can spike when market volatility rises. We believe it is possible to counter such scenarios by dynamically adjusting nominal position sizes to stay closer to the portfolio's volatility target. Such volatility targeting can help investors by narrowing the range of portfolio outcomes for their desired level of risk – an exceptionally valuable trait for TDFs.

1.1 Recommendation #1: Balance existing sources of risk

TDF allocations are not balanced across asset classes for young investors. While traditional TDF portfolios for older investors may appear diversified, most still derive a majority of their risk from equity markets. More risk balanced portfolios such as risk parity strategies focus

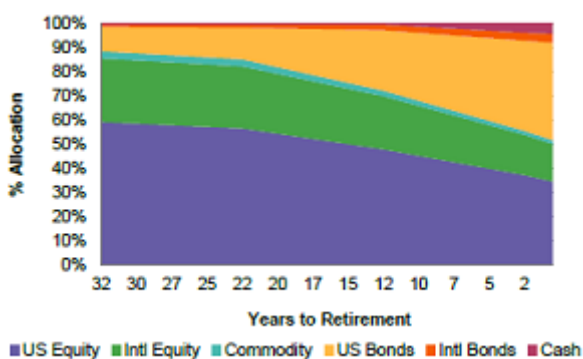
on risk diversification instead of capital diversification across asset classes.³ They seek to generate higher returns with more consistency than traditional portfolios due to better diversification properties. Risk parity strategies also have the ability to adjust notional exposures based on forecasted risk to keep asset-class and portfolio-level volatility under control.

In a companion paper, Asness, Ilmanen and Liew (2013), supported by over 100 years of data, propose what they believe to be a better way to take risk throughout the entire glidepath. Instead of shifting asset allocations, they begin with risk parity and gradually reduce the level of targeted portfolio volatility.

Specifically, they compare two approaches:

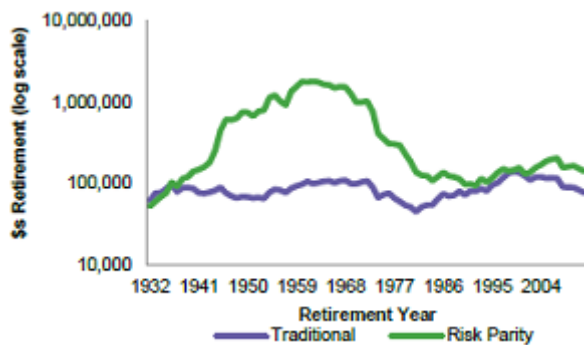
- A proxy for a traditional TDF, based on the asset allocation of the average of the three largest providers of these Funds: Fidelity, Vanguard and T. Rowe Price.⁴ Figure 2 demonstrates the average glidepath allocation. It consists mainly of stocks and bonds (very little commodities) with a gradually declining equity weight (from 90% to 50%) during an assumed 30-year working phase, during which the average empirical portfolio volatility glides from 12% to 8%.
- A risk-balanced TDF that invests in a portfolio comprising three asset classes – global stocks (for exposure to growth), global bonds (for deflation protection) and commodities (for inflation protection) – and gradually reduces the risk of this portfolio down the same 12%–to–8% path as the traditional TDF during an investor’s working period.⁵

Figure 2: Traditional glidepath allocation
(Average of the 3 largest TDF providers)



Sources: AQR, Vanguard, Fidelity, and T. Rowe Price. Average asset allocation glidepaths as of December 2012.

Figure 3: Hypothetical value at retirement for Traditional vs Risk Parity TDFs by retirement year⁶



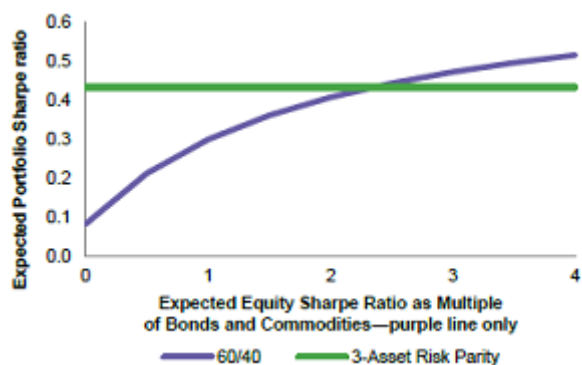
Source: AQR. Please see the Appendix for important disclosures relating to hypothetical performance.

Asness, Ilmanen and Liew (2013) study cohorts (individuals grouped by their retirement year) of worker-savers retiring between 1932 and 2012. Each TDF lasts 30 years and workers add \$1,000 to the fund each year. Consistent with current practices, the proxy for traditional TDFs switches over time from global equities to global bonds. The risk parity TDF aims to always hold a risk-balanced portfolio across stocks, bonds and commodities, with stable relative risk weights as well as gradually declining target volatility for the overall portfolio. Targeting portfolio volatility should mitigate sharp spikes in portfolio risk in general, especially during the crucial few years before retirement, when the savings pot is large and the retirement outcome could be especially sensitive to capital-market performance.

Asness, Ilmanen, and Liew compare the ending wealth of hypothetical retirement savers of both approaches for each cohort. Figure 3 (above) shows that the risk parity approach led to greater retirement wealth for virtually all cohorts, and in the few cases it did not, the two approaches yielded fairly similar ending values.

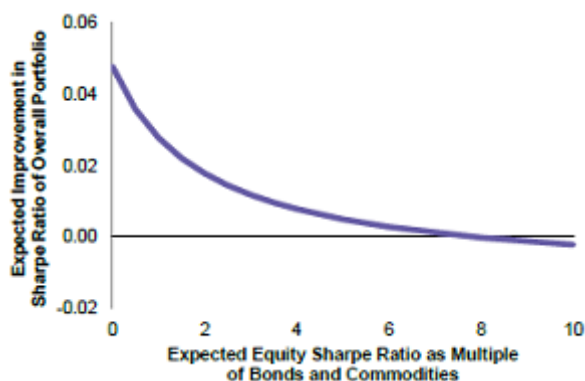
While the historical experience favors risk parity, it may be that the historical window was unduly beneficial for this approach. Asness et al. end their working paper by asking what forward-looking assumptions would be needed to expect the risk parity approach to have less retirement wealth than a more-traditional, equity-dominated approach such as a 60/40 stock/bond portfolio. Historically, the three asset classes – global stocks, bonds and commodities – have had broadly similar Sharpe ratio⁷ and near-zero correlations with one another in the long term. Assuming that long-term, near-zero correlations among asset classes continue in the future, as shown in Figure 4, investors should expect equities to have a much higher Sharpe ratio than bonds and commodities – about 2.5 times higher – before a 60/40 portfolio would have a higher Sharpe ratio than a risk parity portfolio. If equities' presumed Sharpe ratio edge is smaller, the risk parity approach would result in a higher expected portfolio Sharpe ratio due to its better risk diversification.

Figure 4: Equity Sharpe Ratio required to make 60/40 the better choice



Source: AQR. Chart is based on an assumption of zero correlation between asset classes, and an average expected Sharpe ratio of 0.25 across the three asset classes.

Figure 5: Diversification Gives Risk Parity a Low Hurdle to Add Value to 60/40



Source: AQR. Chart is for illustrative purposes only. It is based on an assumption of zero correlation between asset classes, and an average expected Sharpe ratio of 0.25 for the three asset classes.

The authors find that the evidence supports the intuition that risk parity provides a better strategic asset allocation than the equity-concentrated portfolio. Therefore, unless investors have a strong tactical view on relative asset class performance, that meaningfully deviates from historical experience, the risk parity approach should provide a better long run strategic base for TDF investors.

Risk balance – even a little bit helps

What if an investor simply added a risk-parity allocation to an existing TDF? Would this result in a better total portfolio? While we have already illustrated what would happen if a risk parity portfolio were to fully replace the traditional 60/40 portfolio, the question now remains as to what happens when a risk parity allocation is added to a traditional TDF (which is a more likely implementation).

Here, the bar is significantly lower because risk parity can be an excellent portfolio

diversifier to an equity concentrated portfolio. In fact, the strong benefits of diversification are such that investors would need very high (not to mention correct) expectations for equities to make a case against an allocation to risk parity. This is illustrated in Figure 5, which shows that by allocating 20% to a risk parity portfolio, 60/40 investors could improve their portfolio Sharpe ratio as long as the equity market Sharpe ratio is less than eight times that of bonds and commodities.

Risk parity's better risk diversification across asset classes and more-predictable portfolio risk over time when compared to a traditional 60/40 portfolio is especially valuable for the last decade before retirement, when investors have accumulated larger savings. Tail risk – a negative surprise – is a greater concern for investors near retirement as they may be less flexible to adjust future work earnings if capital markets disappoint (for example, younger investors may have more flexibility to get a second job or work more total hours). Thus, we would suggest larger risk parity allocations to TDFs in the final decade before an investor's retirement. Specifically, we believe assets should be transferred to risk parity from the equity allocation, as this would help reduce equity concentration and could help decrease exposures to equity tail events.

Figure 6 shows the hypothetical incremental improvements of a traditional 2025 TDF when adding different percentages of risk parity. The hypothetical results suggests that risk parity would have improved the realised returns, Sharpe ratios and maximum drawdowns of a TDF from 1990 to 2013.

Figure 6: Hypothetical effects of adding Risk Parity to an avg 2025 TDF as of 2012 (Jan-90 to Apr-13)

	Simulated Average 2025 Fund	Average 2025 Fund +10% Simple Risk Parity	Average 2025 Fund +10% Simple Risk Parity
Excess of Cash Return	4.1%	4.3%	4.7%
Volatility	10.6%	10.2%	9.5%
Sharpe Ratio	0.38	0.42	0.50
Max Drawdown	-40.1%	-38.0%	-33.5%
Equity Correlation	0.96	0.95	0.91

Source: AQR. Returns are gross of fees. The Simple Risk Parity Strategy is a simulated portfolio based on the MSCI World Index, the Barclays US Aggregate Government Index, and the S&P GSCI Index, representing exposures to equities, bonds, and commodities, respectively. This simulated portfolio targets an equal amount of volatility from each asset class every month. The average 2025 TDF is the simple average of the three largest providers of 2025 TDFs as of 2012 – Vanguard, Fidelity and T-

Rowe Price – and is approximately 48% S&P 500, 22% MSCI EAFE, 27% Barclays Aggregate, 2% S&P GSCI Index and 1% cash. The index weights are fixed. We do not simulate a glidepath.

1.2 Recommendation #2: Add new sources of returns.⁸

Traditional TDFs rely on two primary sources of returns: equities and bonds. More recently, some TDFs have added commodities to their asset allocations, providing many investors an additional option of allocating away from equities and into alternatives. Additionally, alternative strategies in the form of liquid mutual funds have recently become more “investor friendly,” with many offering lower minimums (or waiving minimums altogether for retirement plans), daily liquidity, increased transparency, and no performance fees. Liquid alternatives can be used in TDFs to diversify away from their primary drivers of risk and help increase risk adjusted returns. High-net-worth individuals, pension plans, endowments and foundations are among the pioneers in alternative investing and many have used alternatives in their portfolios for decades.

Today most investors, especially those focused on the long term, seek to maximise not simply return, but also risk-adjusted return. Adding alternative investments to a traditional portfolio is typically viewed as a way to do just this, as the addition of alternatives can reduce downside risk while maintaining or even increasing total expected return.

However, not all alternatives are created equal. Those that are highly correlated with traditional assets do little to improve a portfolio’s efficiency. In the real world, we have seen that many mutual funds with an “alternatives” label have a correlation of 0.8 or even higher to equities and do not offer the benefits of an uncorrelated asset.

We believe alternative investments should meet two requirements: low correlation to traditional assets and attractive expected returns. Strategies that meet these requirements tend to be “classic” hedge fund strategies that focus on relative value opportunities, typically take long and short positions in similar securities and are economically intuitive.⁹ Strategies that fall in this category include global macro, arbitrage, equity market neutral, and long/short style strategies.¹⁰

In addition to diversifying a TDF’s sources of returns, some alternative strategies have delivered strong performance in prolonged down markets without surrendering returns on the upside. We will focus on one such strategy, trend-following (or “managed futures”), as we believe this strategy should be strongly considered for near-retirement investors who need to continue seeking returns but cannot afford large drawdowns.

The primary driver of most managed futures strategies is trend-following, or momentum investing; that is, buying assets that are rising in price and selling those that are declining. There are various behavioral explanations for why trend-following has worked, including underreaction to news, anchoring, investor herding and overreaction to price moves.

Trend-following strategies may be an attractive addition to TDFs because they not only can

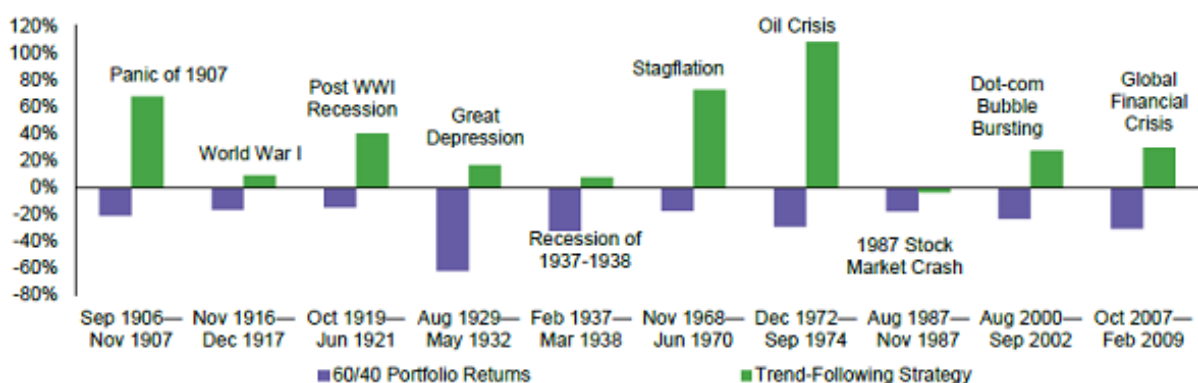
broaden the portfolio's exposure to non-equity asset classes, such as commodities and currencies, but also provide the ability to invest long and short. Additionally, trend-following strategies have exhibited low correlations to stocks and bonds over the long term.

Perhaps the most attractive characteristic of trend-following strategies are their potential to deliver in bear markets, as highlighted in Figure 7. In 9 of the 10 largest drawdowns of a 60/40 portfolio in the past 100 years, a hypothetical trend-following strategy would have delivered positive returns.¹¹ The intuition behind this result is that the majority of bear markets have historically occurred gradually over several months, rather than abruptly over a few days, which allows trend-followers an opportunity to position themselves short after the initial market decline and profit from the continued fall. In fact, the average peak-to-trough drawdown length of the ten largest 60/40 drawdowns between 1903 and 2012 was approximately 18 months, providing sufficient time for trend-based strategies to profit.

Figure 8 highlights two different scenarios: 1) Adding 10% managed futures to a traditional 2025 TDF and 2) Adding 10% managed futures plus 20% risk parity to a traditional 2025 TDF.

The addition of risk parity (as shown in Figure 6) and managed futures (as shown in Figure 8) strategies appear to improve long-run returns and Sharpe ratios while reducing portfolio volatility and drawdowns. Although the sample period since 1990 may have been exceptionally fruitful for both risk parity and managed futures, allocating into these strategies adds value to TDFs even when using more conservative forward-looking assumptions (e.g., those in Figures 4 and 5 for risk parity).

Figure 7: Hypothetical trend-following in the 10 worst drawdowns for a US 60/40 Portfolio¹²



Source: AQR. 60/40 is 60% S&P 500 and 40% US 10 Yr. Gov. bonds. Trend-Following Strategy performance is hypothetical. The trend-following strategy is constructed using an equal-weighted combination of 1-month, 3-month, and 12-month time series momentum strategies for 59 markets across 4 major asset classes – 24 commodities, 11 equity indices, 15 bond markets, and 9 currency pairs. Since not all markets have return data going back to 1903, we construct the strategies using the largest number of assets for which return data exist at each point in time. Please see appendix for description of the strategy and for disclosures relating to hypothetical performance.

Figure 8: Hypothetical effects of adding managed futures and Risk Parity to an average 2025 TDF as of 2012 (Jan–90 to Apr–13)

	Simulated Average 2025 Fund	Average 2025 Fund +10% Simple Managed Futures	Average 2025 Fund +10% Simple Mgd Futures & 20% Simple Risk Parity
Excess of Cash Return	4.1%	4.5%	4.9%
Volatility	10.6%	9.5%	8.7%
Sharpe Ratio	0.38	0.47	0.56
Max Drawdown	–40.1%	–34.9%	–30.3%
Equity Correlation	0.96	0.96	0.92

Source: AQR. Returns are gross of fees. The Average 2025 TDF is described in Figure 6. The simple trend-following strategy is the same strategy as described in Figure 7. Please see the Appendix for important disclosures relating to hypothetical performance.

1.3 Recommendation #3: Actively manage risk

Most TDFs reduce their risk over the long-term, but this can mask the short- and medium-term risks investors actually face. For example, a spike in equity-market volatility may lead young investors to sell at the wrong time, or force older investors to take more risk than they can tolerate.

Volatility targeting can be used to help stabilise portfolio risk, which in turn can help the portfolio experience fewer tail events. Such portfolios may be “easier” to hold, potentially improving the likelihood of investors being able to withstand adverse markets, and thus more likely to stick to a strategy over their investment horizon. Volatility targeting may also enable investors to embrace more risk on average and hopefully get rewarded for it in the long run. In contrast, investors in traditional portfolios, which target asset allocation and allow volatility to occasionally spike, tend to feel they have to build a cushion against sharp surprises in risk. This can lead them to sub-optimally take less risk in the long term.

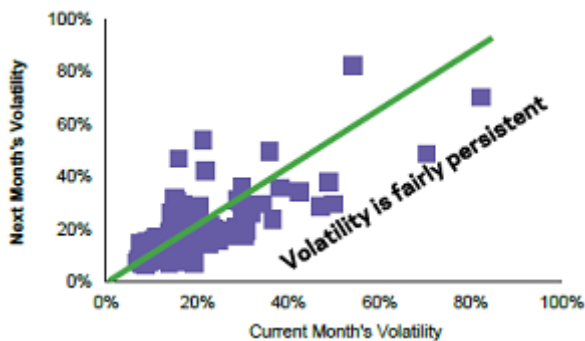
Because market volatility can be reasonably predictable over the short term, it is possible to achieve more-stable portfolio volatility through time by reducing position sizes when market volatility rises and conversely, increasing position sizes when volatility falls. Moreover, as we mentioned earlier, past crashes have not tended to come out of the blue; it takes time for

markets to turn and volatilities to rise, which has historically aided the performance of both trend-following strategies and volatility-targeting strategies that respond quickly to recent changes in market returns and risks.

Figure 9 shows how the volatility of the S&P 500 Index persists. This month's level of volatility has information that can help predict next month's volatility. A volatility-targeted portfolio invests fewer dollars when markets are more volatile and more dollars when markets are less volatile. The goal is to achieve more consistent portfolio risk, regardless of market volatility.

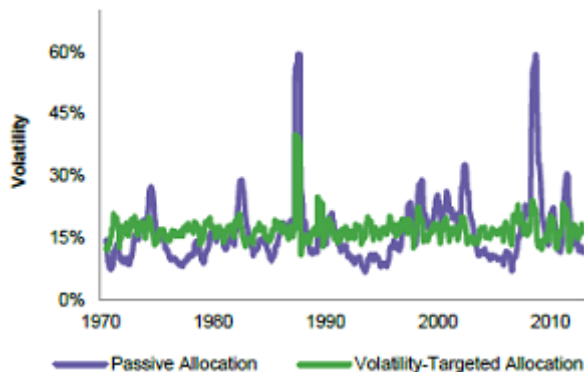
Figure 10 shows the results of taking a simplified volatility-targeted approach to investing in the S&P 500 index (blue line) vs. a passive investment approach (orange line). The hypothetical volatility-targeted portfolio is created by using the realised 60-day volatility as the next day's risk expectation. The portfolio targets 16% volatility (the average risk of the S&P 500 index over this time period). While the volatility-targeted approach does not perfectly stay at 16%, it realises more consistent risk taking than the passive approach. This risk-management tool can be highly beneficial to plan participants as it should provide more precise risk expectations through time. It is unlikely that investors expected to reach 60% volatility levels in their portfolios in 2008 (or in the case of near-retirement TDFs that had roughly half of their allocation in equities, a nearly 30% volatility level—around double the long-term realisation of the S&P 500 Index).

Figure 9: Volatility can be reasonably forecasted



Source: AQR. Based on S&P 500 daily returns from January 2001—September 2012.

Figure 10: Volatility targeting can help a portfolio maintain a more consistent risk level
Volatility of passive S&P 500 allocation (purple) and volatility-targeted S&P500 allocation (green)



Source: AQR. 1 January 1970 to 30 June 2013. Volatility-Targeted Allocation is hypothetical. Please see the Appendix for important disclosures relating to hypothetical performance.

Hurdles for risk-balanced TDF's

- **Leverage** – We believe the first and most important hurdle investors would face when implementing a risk-balanced portfolio is that it would almost certainly require the use of economic leverage. An unlevered risk-balanced portfolio may be attractive to some investors due to its higher expected risk-adjusted return, but the absolute expected returns may be too low to meet investor's desired objective. In order to increase the overall risk of the portfolio, and make lower-risk assets contribute equally to the portfolio's volatility, a modest amount of leverage is used. As we showed in Figure 1 – and as modern portfolio theory suggests – we believe this use of leverage should be rewarded in the long term. It is not that TDFs are ignoring portfolio theory; we believe many have explicit leverage constraints where they are prohibited from using leverage in their portfolios. These TDFs are essentially forced into equity-concentrated portfolios in order to target sufficient levels of risk/absolute returns. Unlike leverage risk, which can reward investors who take it, concentration risk is rarely well-rewarded in the long run.
- **Complexity** – The second challenge investors would face in implementing a risk-balanced TDF is the complexity of explaining the theory and strategy behind it to individuals who are not investment professionals. The added concept of being able to increase and decrease portfolio-level risk without changing the asset allocation may be new to plan participants.
- **Comparability** – A risk-balanced TDF should have a lower correlation to equity markets when compared with traditional TDFs that are heavily concentrated in equities. This could be problematic if investors have incorrect return expectations for the risk-balanced strategy. For example, if equities outperform all other asset classes, a risk-balanced portfolio will most likely underperform a traditional TDF. If this persists for several months (or years), plan participants for several months (or years), plan participants because they may not fully understand that this portfolio (in

theory) should outperform in the long run. This peer risk, or increased tracking error to traditional TDFs, is also a large hurdle plan sponsors and their participants would need to overcome.

The unconventionality of a full risk-balanced approach, combined with the lack of available funds, will make the near-term adoption of risk parity as a replacement for a traditional glidepath highly unlikely. Yet there is a growing appreciation among the institutional investor community that TDF portfolios are excessively dependent on equity-market performance (even at retirement). This reliance on equity risk can result in unexpectedly large losses. For individuals whose retirement coincides with a negative surprise, or tail event, the results can be long-lasting, as seen in the 2008 financial crisis.

2. GLIDEPATH DESIGNS

We propose disentangling the two primary decisions facing managers as they construct TDFs. The first is the composition of the portfolio, and the second is the risk-taking Glidepath (traditional TDFs can't make this distinction in their current form – that is, they have to change their asset allocations in order to change their desired risk targets). Our earlier ideas on improving the quality of risk-taking by adding risk parity, liquid alternatives such as managed futures and volatility targeting are complementary to the ideas that follow in the sense that they can be applied to any chosen glidepath. The following exhibits show different philosophies when approaching risk-taking by TDFs. We believe risk levels are investor-specific, so it is difficult for us to propose a single solution for all investors.

As a baseline, depicted in Figure 11, all major TDFs in the U.S. propose a glidepath investment strategy that reduces the equity-market weight in savers' portfolios along a fixed glidepath as they grow older. This gradual risk reduction is motivated by a declining amount of human capital¹³ and job flexibility as savers age.

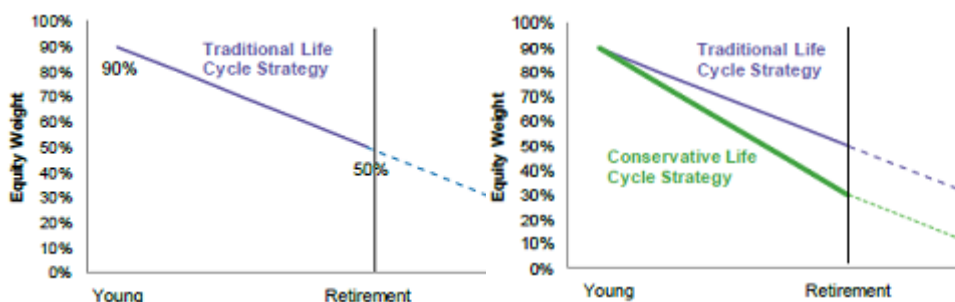
1. **Conservative Glidepath:** The idea that has received most attention is about the riskiness of traditional “through” TDFs that hold roughly half the portfolio in equities near retirement. Such funds lost 20% to 30% in 2008.¹⁴ Despite calls for more conservative approaches, such as the glidepath in Figure 12, there has been little change in practice.¹⁵
2. **Glide-Up Glidepath:** An opposite approach has recently gained attention (see Basu-Drew (2009), Arnott (2012), Estrada (2013)), but is uncommon among practitioners. Instead of reducing equity market weight as investors age, the “glide-up strategy” calls for increasing one's equity-market allocation with age (see Figure 13). The justification is largely empirical: this glide-up path would have historically led to greater wealth accumulation than the traditional approach – not just on average, but for most historical cohorts. The idea is to earn the equity premium when savings are large. Realistically, if investors could afford to glide-up, they would probably hold an allocation of 90% equities throughout the entire glidepath (this would defeat the

purpose of a TDF).

3. **Diversification–Across–Time Glidepath:** Another idea recommends even greater risk-taking at younger ages. Ayres–Nalebuff (2013) advocate a levered glidepath strategy that involves leveraging equities for young investors when savings are very small in size and the risk of drawdowns has a smaller effect on retirement–age wealth (Figure 14). The idea is to have more stable dollar risk exposure over the saver’s life.
4. **Learn–to–Take–Risk Glidepath:** In contrast, as shown in Figure 15, the U.K. National Employment Savings Trust (NEST, an automatic–enrollment defined–contribution pension program) studied behavioral research findings before deciding on its default glidepath and argued that young and inexperienced investors are actually more risk averse than middle–aged savers, and thus warrant a lower equity allocation. A closely related logic is that the savings of younger investors is initially so trivial that it is more important that they develop a habit of saving than it is for them to earn high returns on those savings.
5. **Flexible Glidepath:** Another theme is to make the glidepath flexible instead of fixed, responding to realised or prospective return environments (e.g., Basu–Byrne–Drew 2011, Yamada–Tretiakova (2011)); as shown in Figure 16. One justification is a belief in mean–reverting asset returns, which suggests that future returns may be lower following such windfall gains. Another motivation is nonlinear preferences around the portfolio target (much more pain from missing the target level of retirement income than utility gained from exceeding it). In principle, the latter idea applies symmetrically – investors should add risk back on after bad capital market outcome to enhance the probability of achieving their funding targets. Both ideas have some appeal to us: we agree that it is more important to achieve the target investment goal than to exceed it and yet we advocate systematic drawdown control rules.

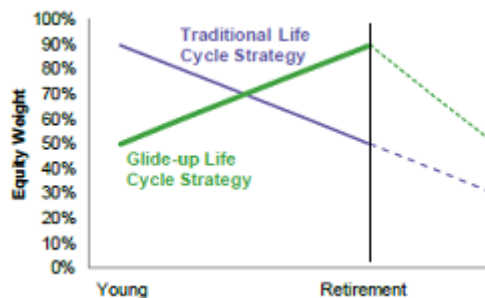
Regardless of whether or not the market widely adopts these alternative glide paths, we feel that our proposals of balancing risk, actively managing risk through time and adding diversifying sources of return can be applied to each and serve as a better starting point.

Figure 11: Traditional lifecycle fund (90 to 50) **Fig 12: Move to lower equity market exposure near retirement (Conservative Glidepath)**



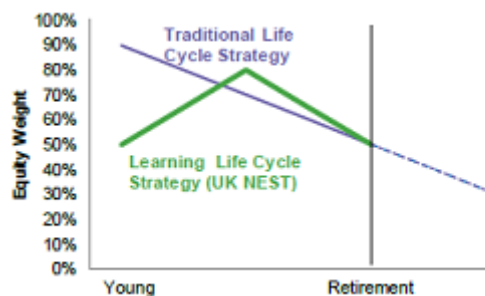
Source: AQR. For illustrative purposes only.

Figure 13: Boost equity holdings and enjoy the equity premium (Glide-Up Path)



Source: AQR. For illustrative purposes only.

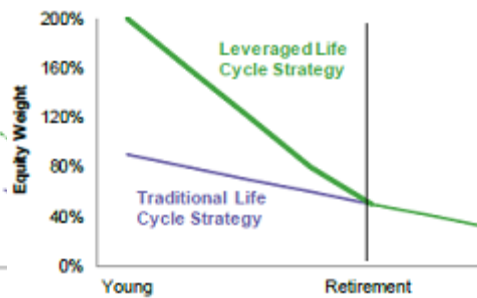
Figure 15: Let the Young Start Carefully and Learn-to-Take-Risk (Kinked Glidepath: UK NEST)



Source: AQR. For illustrative purposes only.

Source: AQR. For illustrative purposes only.

Figure 14: Lever equities when young (Diversification-across-time Glidepath)



Source: AQR. For illustrative purposes only.

Figure 16: Respond to Market Movements (Non-Fixed Glidepath)



Source: AQR. For illustrative purposes only.

3. CONCLUSION

Target-date investing has been one of the greatest recent enhancements to the defined-contribution industry. Most investors lack the expertise or time to properly manage the underlying investments in their portfolios. The development of a new method to outsource these investments to professional asset managers was certainly warranted. However, most traditional TDFs lack meaningful risk diversification and risk management throughout their stated horizons. A bold approach would be moving to a full risk parity glidepath, which evidence and economic theory suggest could result in better outcomes for many retirees. A more likely approach, and one the industry may adopt, is simply adding risk parity or uncorrelated, liquid alternative investments like managed futures to existing TDF portfolios. Other potential improvements would be to add risk management techniques such as

volatility targeting. TDFs should especially consider improving the quality of risk-taking during the decade before retirement, when investors must take risk but cannot afford large losses.

While there is much debate about the “best” glidepath for most investors, we believe holding a more risk-diversified portfolio and managing risk more actively through time is a better starting point.

ENDNOTES

1. Ibbotson Associates and Morningstar Direct.
2. Based on historical volatility and correlations from 1990—2013 from the S&P 500 and the Barclays US Agg.
3. For a more complete description of how risk parity portfolios work, see AQR's white paper “Understanding Risk Parity” and Asness, Frazzini, Pedersen's 2012 Financial Analysts Journal paper, “Leverage Aversion and Risk Parity.”
4. These are their recent “through” retirement glidepaths, not historical averages; we believe these best reflect current conventional wisdom in this industry. “To” retirement glidepaths stop de-risking at retirement, but their assets represent a small percentage of the industry.
5. We do agree with the traditional premise that risk target should fall over time (just not from equity to bond but from high volatility to low volatility). Either glidepath can be motivated by the ideas that young people have more human capital than old, as well as greater flexibility to adjust behavior if adverse outcomes materialise. See footnote 1.
6. From May 2013 version of the Asness, Ilmanen, Liew paper. Newer versions may have updated results. Please note that this study ends in 2012. Risk parity experienced significant drawdowns in May and June of 2013. Though updating Figure 3 through 2013 would not meaningfully change the results of the analysis.
7. Indeed, equities have had a lower Sharpe ratio for the past 40 to 50 years (the period over which the GSCI has existed).
8. In some countries, another key recommendation for savers is to make their retirement portfolio more bond-like well before the retirement. In the U.K., investors often buy an annuity upon retirement or soon thereafter, because in theory, real annuities are closest to the riskless asset for retirees as they ensure a floor income and hedge against inflation and longevity risks. The more bond-like the retirement portfolio will be, the more it makes sense that investors increase bond holdings over 5–10 years prior to the retirement (ideally, through forward purchases of annuities). Otherwise there can be an unnecessary risk concentration in terms of the yield environment at the time of retirement and annuity/bond

ladder purchase (e.g., lucky ones retire in 2006 when bond yields are relatively high, unlucky ones in 2011 when they are low). However, in the U.S., many investors shun annuities and retain significant equity holdings through retirement, making this risk less relevant.

9. For more detail, see “Is Alpha Just Beta Waiting To Be Discovered” by Berger, Crowell, Israel, and Kabiller (2012).

10. Long–short style strategies are supported by decades of research. These can be distilled into four main styles: value, momentum, carry, and defensive—all of which have been shown to persist through time and across multiple asset classes. For more detail, see “Investing With Style” by Ilmanen, Israel, Moskowitz (2012).

11. For more on trend–following strategies, see AQR white paper “A Century of Trend–Following Investing” by Hurst, Ooi, Pedersen (2012).

12. From AQR white paper “A Century of Trend–Following Investing” by Hurst, Ooi, Pedersen (2012).

13. Human capital in this context is the value of future income until retirement. Academics have long debated the relation between risk tolerance and age (for a summary, see Kritzman (2000)). Classical research by Paul Samuelson and Robert Merton suggested that investors should hold a constant share of their wealth in risky assets irrespective of their investment horizon or age. However, such behavior is optimal under quite restrictive assumptions. The main arguments in favor of greater risk tolerance for young investors are that (i) human capital is a larger share of the total wealth of the young, suggesting that they can take more risk with their financial wealth (as long as human capital resembles more a bond than a stock); (ii) young people have more flexibility to work harder to supplement financial returns in case investment portfolios disappoint; and (iii) young investors have more time to benefit from any mean reversion in risky–asset returns.

14. Morningstar Target–Date Series Research Paper: 2012 Industry Survey.

15. For example, see Fandetti (2013).

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