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Pension De-Risking in a Low-Rate Environment—A Better Solution

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Pension De-Risking in a Low-Rate Environment

After assessing the current environment of extremely low interest rates and its implications for defined benefit schemes, we articulate our view on how to develop a flexible de-risking framework that takes into account today's low yields. We contrast this to the more formulaic and mechanical 'glide path' concept advocated by many pension industry participants.

Defined benefit pension schemes face ample challenges in the current environment of extremely low interest rates. Most agree that low yields have caused liability-matching assets (longer-duration nominal and inflation-linked fixed income instruments) to become overvalued when evaluated in isolation. However, schemes are limited in how to act upon this overvaluation, given the embedded interest rate sensitivity also associated with scheme liabilities and funding risk.

A scheme's interest rate sensitivity should always be taken into account; however, the current level of interest rates results in a highly asymmetric profile for future fixed income returns and, more importantly, for future changes in a scheme's liability values. Lower interest rates result in reduced risk of liabilities rising significantly due to further interest rate declines and the corresponding low expected returns for fixed income holdings. Schemes that ignore this asymmetry may fail to appropriately adjust their asset allocations. As a result, the scheme's future return potential may be degraded, ultimately resulting in the need for significantly higher contributions.

Many market participants advocate de-risking plans, or 'glide paths,' whereby exposures and/or risk profiles are adjusted over time based primarily on changes in the funding level. Typically, these glide path blueprints de-risk as funding levels increase by re-allocating funds out of the growth assets and into the liability match. In normal market environments, such a shift will reduce scheme funding risk but also reduce expected returns. In the current environment of fixed income overvaluation and historically low yields, this glide path approach results in a significantly larger drop in expected returns which can result in higher contributions for the scheme.

We agree that as a scheme's funding level changes, dynamically adjusting asset allocation to maintain targeted levels of funding-level risk is appropriate. We also agree that adjusting funding risk targets as a scheme's funding level changes is often appropriate. However, we believe many glide paths are too mechanical in their approach to risk reduction, with a tendency to rely too much on increasing fixed income assets to maintain or dampen funding risk. By adhering to a risk-reduction process that relies exclusively on increasing the liability match and reducing the growth assets, the glide path structure neglects the objective of maximising return at each targeted level of risk. To achieve superior results, we advocate a more holistic and flexible approach to dynamic asset allocation, making use of multiple risk-reducing levers.

This paper articulates our alternative solution—an optimally constructed glide path that achieves the competing goals of reducing funding-level volatility *and* generating superior returns, while still reducing the risk of a significant decline in funding level. This optimal glide path solution is implemented by reducing directional equity exposure (equity beta) and replacing it with strategies that are driven by alpha and 'non-traditional betas' (such as distressed credit, hedge funds, and private investments). As outlined in our 2011 report *Pension Risk Management*, we believe pension risk-budgeting frameworks which use all levers of risk management, including structuring

risk-controlled growth assets, are preferable in most market environments. However, we find the merits of this strategy particularly compelling in the current environment of extremely low fixed income yields.

The Current Rate Environment

First, some context on the current interest rate environment is useful. We provide a frame of reference on how low current interest rates are compared to prior history and, more importantly, we evaluate the implications of these low yields on pension liability values and fixed income returns associated with liability matches.

U.K. sovereign interest rates across the yield curve are near generational lows, and are particularly low in the inflation-linked area. Interest rates have been driven lower by a pervasive rally in high-quality U.K. fixed income that has now spanned 38 years. The low level of current yields has resulted in significantly lower discount rates that have driven the present value of defined benefit scheme liabilities appreciably higher.

Scheme discount rates are primarily influenced by the level of U.K. gilt yields, with some variation among schemes in terms of the specific maturity and spread that may be applied.[1] For the purpose of explaining our case for a flexible dynamic asset allocation framework, we evaluate a worst-case scenario that could conceivably occur via further drops in nominal gilt yields and increases in liability values. Note that, conversely, this would also be considered a best-case return scenario for long-duration fixed income held as liability matches.

U.K. sovereign yields (both nominal and index-linked) have plunged to generational lows, a function of gilts and linkers being purchased as safe haven assets during and after the recent financial crisis, as well as the significant purchases of government bonds by the Bank of England. As of 31 December 2012, ten-year nominal gilts yielded only 1.83%, over 5 percentage points below their average yield since 1945 (Figure 1). Similarly extreme, 20-year nominal gilts yielded only 2.70%, over 4 percentage points below their postwar average.[2]

With gilt yields trading at depressed levels (a phenomenon common across government bonds in the developed world), the asymmetry of potential changes in yields is readily evident—gilt prices possess a finite amount of further appreciation potential versus a far larger amount of downside risk if yields revert higher to more 'normal' levels. To help quantify the potential size of further declines in gilt yields and resulting gains in gilt prices, and ultimately the related potential in scheme liabilities, we developed a rate scenario that mimics the behaviour of Japanese interest rates, which have plummeted given that country's ongoing multi-decade deleveraging.

Indeed, Japan has become the modern day example of the depth to which developed world rates can drop—severe deflation, weak economic growth, and the forces of deleveraging continue to beleaguer the country's economy. The 31 December 2012 yields on ten- and 20-year Japanese government bonds (JGBs) were a paltry 0.79% and 1.75%, respectively (Figure 2).[3] For

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[1] While we specifically address implications for schemes using a sovereign fixed income discount rate for their liabilities, this framework is broadly applicable to any scheme which might traditionally use an increased allocation to fixed income as its primary tool for de-risking its portfolio.

[2] In August 2012, ten- and 20-year gilt yields hit recent lows of 1.44% and 2.47%, respectively.

[3] In mid-2003, ten- and 20-year JGBs hit all-time lows of 0.45% and 0.76%, respectively. These lows were short-lived, as yields more than doubled within the next month or two. The 31 December 2012 yields cited above are well below the average JGB yields since 31 December 2003, and thus serve as a conservative reference for our analysis.

Figure 1. U.K. Ten- and 20-Year Gilt Yields
31 December 1945 – 31 December 2012
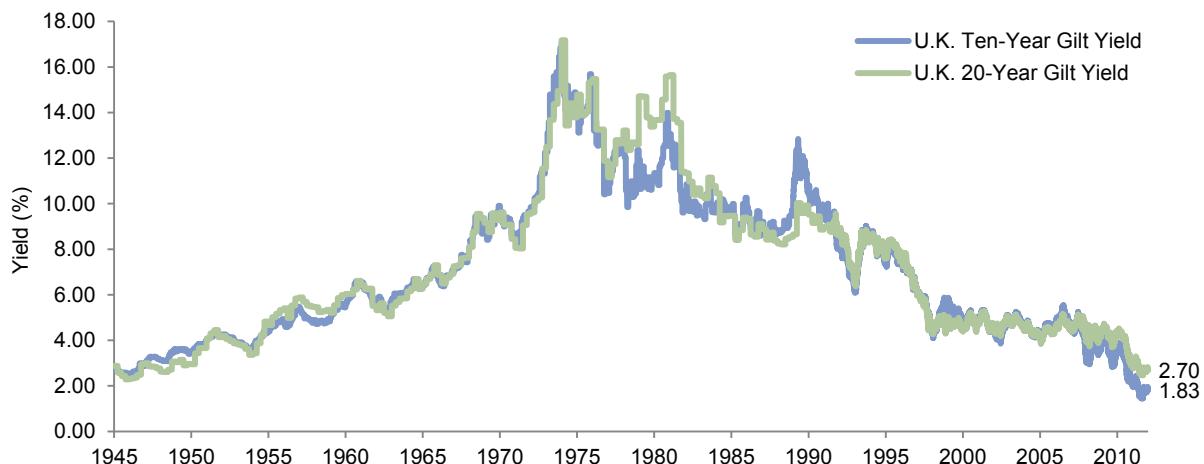
Yield and Return Under Various Scenarios

	Ten-Year		20-Year		Barclays Long Gilt Index* Total Return
	Yield (%)	*Change (ppt)*	Yield (%)	*Change (ppt)*	
31 December 2012 U.K. Gilt Yield	1.83		2.70		
U.K. "Becomes Japan" *(U.K. rates fall to JGB levels)*	0.79	*-1.04*	1.75	*-0.95*	17.67
U.K. Rates Revert to 2011 Highs	3.88	*2.05*	4.51	*1.81*	-24.72
U.K. Rates Revert to 2007 Highs	5.55	*3.72*	5.14	*2.44*	-32.09

Sources: Barclays, Barclays POINT, Bloomberg L.P., and Global Financial Data, Inc.
* Represents U.K. gilt index with maturity of ten years and longer.

Figure 2. Japanese Government Bond Ten- and 20-Year Yields
31 December 1945 – 31 December 2012
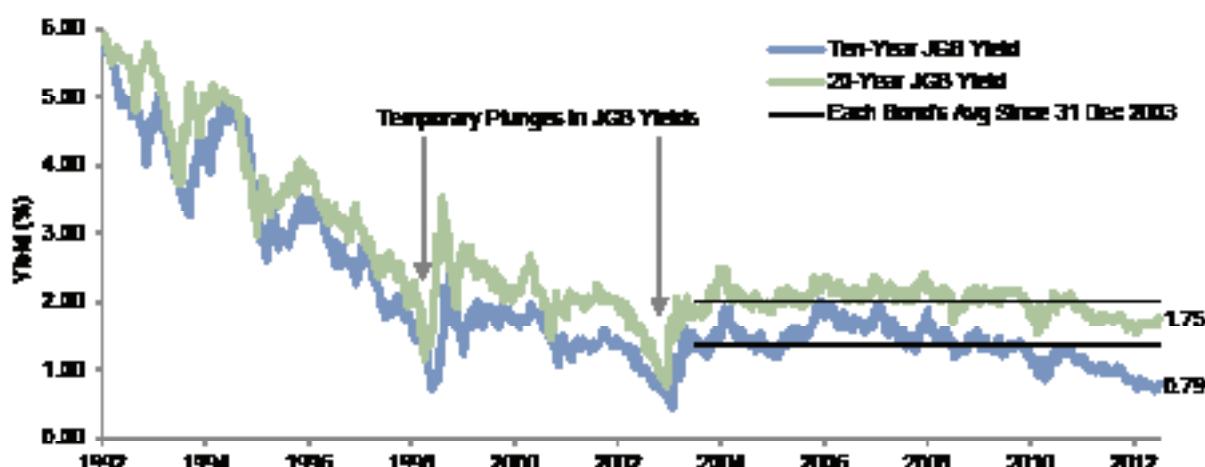
Source: Bloomberg L.P.

the purpose of this analysis, we view these Japanese rates as a reasonable boundary for further downside in nominal gilt yields, under a hypothetical assumption that the United Kingdom follows the same painful Japanese deleveraging path.[4] Assuming this worst-case economic scenario occurred, U.K. ten- and 20-year gilt yields would drop 104 basis points (bps) to 95 bps across the longer end of the curve.

Such a drop in gilt yields (assumed instantaneously) would result in an 18% gain for the Barclays Long Gilt Index. If Japan were the appropriate precedent, the 18% return could essentially be considered the best-case scenario for gilts, and correspondingly, the worst-case scenario for potential increases in a scheme's liabilities resulting from changes in gilt yields.[5] Although this is a rather unpleasant thought, it is modest and manageable relative to the massive drop in rates and massive increase in liabilities which occurred in the last decade.

Conversely, if yields reverted to the higher levels seen in 2007 or 2011, this rate spike would induce a significant decline of 25% to 32% in the index. Importantly, this implies expected declines of a similar magnitude in pension scheme liabilities.

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[4] Many schemes use linkers as part of their liability-matching assets, due to the inflation sensitivity associated with wages and cost of living adjustments embedded in benefits. As of 31 December 2012, the yield (real rate) on ten-year U.K. index-linked gilts was -0.83%, whereas Japanese real yields were essentially the same as nominal yields given near-zero inflation. Thus, the 'worst-case' scenario if U.K. real rates converged to Japan would actually be a rate rise, suggesting a fall in liability values.

[5] Estimated liability change stated here and later in this paper is highly related to an individual scheme's liability duration—schemes with lower duration than the index referenced will experience less sensitivity, while schemes with higher duration will experience greater sensitivity.

Clearly, schemes must maintain caution when choosing to express any kind of asset allocation position based on capital markets expectations, remaining mindful of significant duration sensitivities embedded within pension liabilities. However, it is clear the current environment presents a highly asymmetric profile—schemes that elect to increase or maximise liability matches are doing so at extremely depressed yields and are locking in very low future returns. Earning such lower asset returns, larger contributions will ultimately be necessary. Importantly, schemes increasing liability matches today are doing so at a time when funding-level tail risk from potential declines in interest rates is significantly lower, as rates quite simply have less potential for further declines given their already low levels.

Concept of the 'Glide Path'

Defined benefit schemes have already faced significant challenges in the current low interest rate environment. As liabilities have increased, scheme funding levels have declined, and schemes have been forced to make large contributions. This understandably caused many schemes (particularly those that are more risk averse due to broader enterprise level factors) to focus on better controlling and reducing liability relative risks, which encouraged the design of de-risking 'glide paths.' Many in the pension community have advocated a risk-reduction glide path concept whereby a scheme would formulaically shift its allocation over time out of the growth assets and into liability-matching assets as funding levels increase.

We unequivocally agree that as a scheme's funding level changes, it is appropriate to map out targeted risk and return levels. To adjust targeted risk and return levels,

there is clearly an associated need to adjust scheme exposures. However, we advocate a more holistic approach to de-risking and glide paths.

The core premise for a glide path is that as a scheme moves toward being fully funded, the scheme can or should assume less risk, while still meeting return targets. De-risking is particularly important given the asymmetric cost/benefit profile of a scheme's funding level. Specifically, if the scheme benefits from an outsized increase in its funding level and has a significant surplus, such gains cannot be extracted out of the scheme for an extended period of time. Conversely, if the scheme experiences outsized declines in its funding level, it necessitates additional and more immediate capital contributions to offset the funding level deterioration.

A review of the method in which most glide paths have been constructed shows that moving from 'Point A' to 'Point B' typically involves a shift out of the growth assets into the liability match on a straight-line, pro rata basis as the funding level increases. While such de-risking glide path approaches may seem appealing in terms of their simplicity, they often do not define targeted risk or return levels. Additionally, these mechanistic glide paths do not explicitly address the degradation in expected returns that results from shifting allocations out of the growth assets and into the liability match. Finally, they often do not appropriately incorporate current market conditions.

The Solution—An Alternative Glide Path

A glide path can be constructed to manage and reduce funding risk via multiple mechanisms as funding levels grow. Ultimately, the goal for the glide path should be to maximise expected return at each targeted (and reduced) level of risk. A holistically constructed glide path will:

◆ Be superior in achieving the dual goals of maximising returns and reducing targeted funding-level volatility; and

◆ Reduce the risk of a large drawdown in a scheme's funding level.

This superior glide path is driven not only by appropriate sizing of the growth assets, but also by defining and controlling the risk in the growth assets. These risk-controlled growth assets emphasise active strategies which rely on manager skill and non-traditional beta over mere directional equity market exposure.

The current environment of extremely low market yields only accentuates the merits of this approach. As shown, long-duration gilt yields are very low. Further, we observe that asset classes outside of fixed income (including public equities and real assets) are generally priced at valuations at or above fair value based on long-term metrics. Thus, with muted asset return expectations and a lower risk of a significant decline in discount rates that would cause a significant increase in liability values, we believe higher active risk strategies such as low-beta hedge fund exposures and select private investment strategies are capable of offering expected returns that are attractive from a risk/return perspective.

Glide Path Allocation Comparison

To illustrate our premise, we compare two potential de-risking glide paths. The first uses long-duration fixed income[6] ('liability match') and publicly traded global equities,[7] with the former growing and the latter shrinking as funding level increases. This asset allocation progression will be referenced as the 'Traditional Glide Path' going forward, and is intended to mimic the more mechanical roadmap that many have advocated. The second glide path ('Holistic Glide Path') represents an example of a holistic approach which maintains a lower liability match than the Traditional Glide Path and incorporates more active strategies such as low-beta hedge fund exposures and select private investments. Our comparison of these two glide paths focuses on their funding-level risk and expected returns; we also use historical stress tests to observe each glide path's performance under real market scenarios. Note that these glide paths target risk levels appropriate for closed schemes—in practice, each scheme should create a custom glide path based on its unique circumstances and risk tolerance.

Glide Path Risk Comparison

The Holistic Glide Path was intentionally calibrated to match the funding-level volatility of the Traditional Glide Path at each point along the funding-level continuum. However, the primary difference between the two glide paths is the means through which they seek to de-risk the scheme. The Traditional Glide Path de-risks by shifting exposures toward the liability match portion as the funding level increases. Conversely, the Holistic Glide Path seeks to de-risk via a combination of increasing the weight of the liability match and allocating funds away

from public equities to strategies with less equity market risk ('equity beta') but higher active risk (such as can be found in select low-beta hedge funds). Thus, the Holistic Glide Path holds the immediate advantage of using multiple levers to adjust risk, whereas the Traditional Glide Path has only one lever to adjust risk (Figure 3).

With multiple levers of risk reduction at each point of the glide path, the Holistic Glide Path generally uses lower amounts of liability match compared to the Traditional Glide Path. However, Figure 4 demonstrates that the expected funding-level risk[8] of the Holistic Glide Path and the Traditional Glide Path is identical at various funding levels. Thus, even though the Holistic Glide Path may have up to 8% less invested in the liability match, identical risk reduction can be achieved through investment in strategies with lower beta and higher active risk. It is important to point out that there are a number of glide paths that could be constructed with similar volatility; for simplicity, we have chosen to evaluate two very different approaches.

Glide Path Return Comparison

Of course, we acknowledge an alternative de-risking path should only be considered if it is expected to generate higher returns, perform better across a greater diversity of market environments, and/or meaningfully mitigate other forms of risk, such as funding-level tail risk. The next step of our analysis uses Cambridge Associates' long-term equilibrium expected returns for each asset class to determine expected return for the total fund at each point of the competing glide paths.

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[6] For this analysis, the liability match is assumed to be split 50/50 between gilts and linkers (same maturity as FTSE® U.K. Gilt 15+ and Index-Linked 5+, respectively).
[7] With 50% of foreign currency exposure hedged.

[8] The funding-level risk depicted represents the standard deviation of expected asset returns versus the expected changes in the liability. It therefore represents the risk (volatility) of under/overfunding by incorporating both asset and liability sensitivities.

Figure 3. Asset Allocation of Traditional and Holistic Glide Paths at Various Funding Levels

Traditional Glide Path

Funding Level	Global Equities	Liability Matching
85%	40.0%	60.0%
90%	35.0%	65.0%
95%	30.0%	70.0%
100%	15.0%	85.0%
105%	10.0%	90.0%

Holistic Glide Path

Funding Level	Global Equities	Low Beta HF	Private Assets	Liability Matching
85%	15.0%	24.5%	8.5%	52.0%
90%	7.5%	27.0%	8.5%	57.0%
95%		28.5%	8.5%	63.0%
100%		8.5%	8.5%	83.0%
105%		0.5%	8.5%	91.0%

Legend: ■ Global Equities ■ Low Beta HF ■ Private Assets ■ Liability Matching
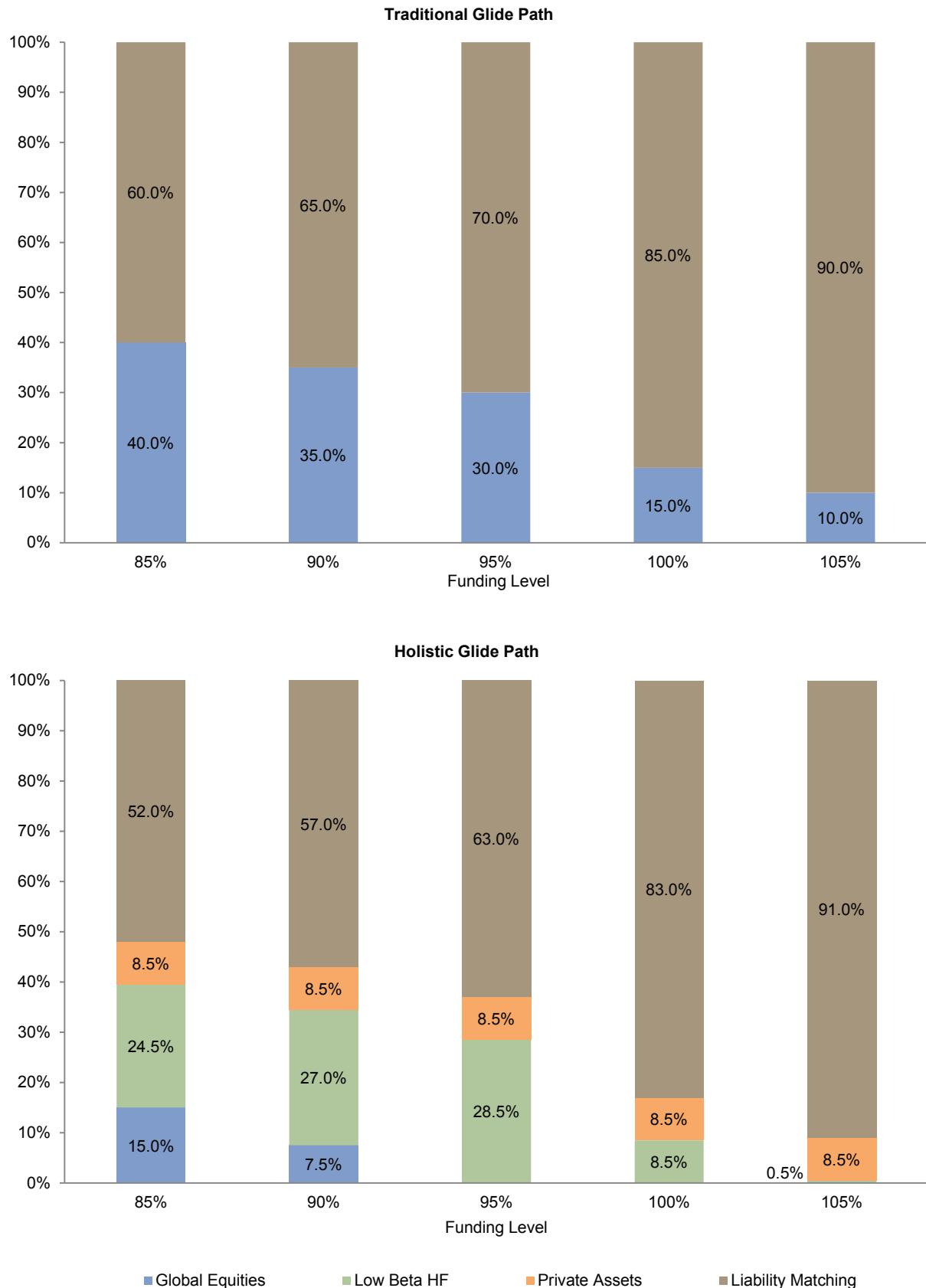
Figure 4. Funding Level Volatility
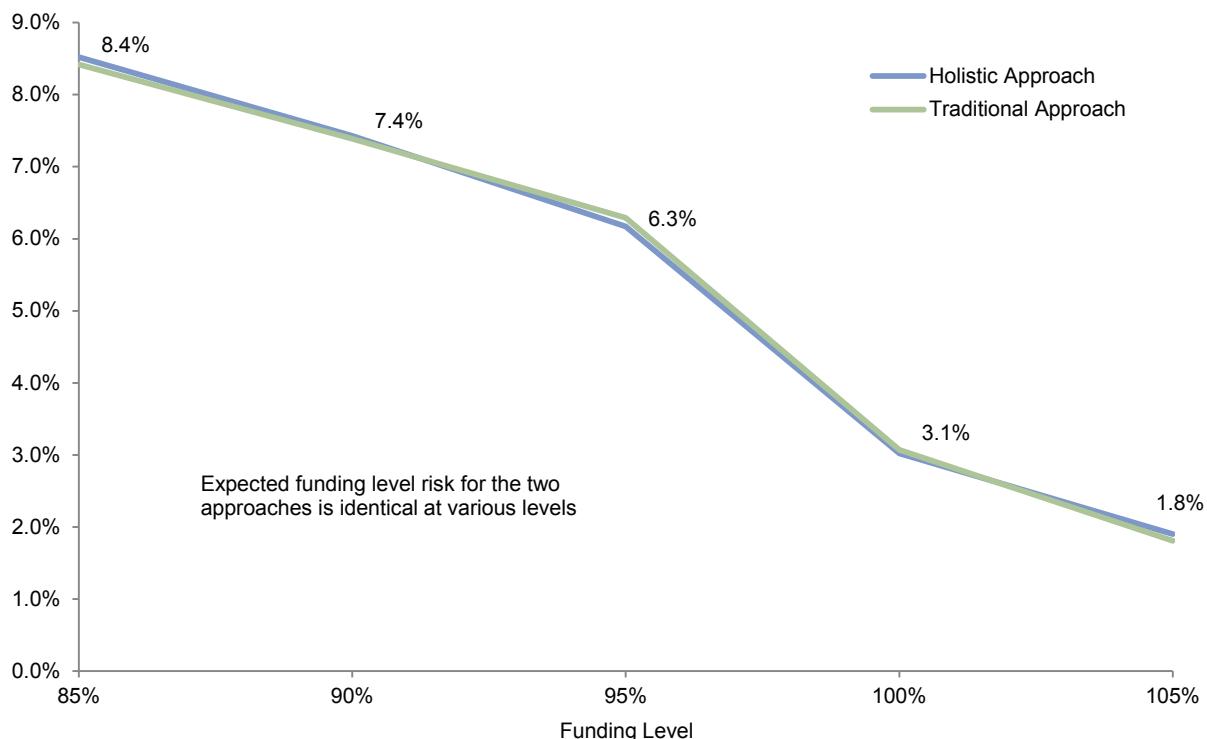
Based on our long-term return assumptions for a 'Normal Environment', the baseline expected return of the Holistic Glide Path is modestly lower than the Traditional Glide Path at each funding level point (Table 1). However, our long-term equilibrium expected returns are based mostly on market beta, and do not include an estimate of manager value add or alpha beyond any non-traditional beta one might expect from investing in the average manager in these strategies. This is an important omission when discussing strategies such as low-beta long/short equities and arbitrage hedge funds since a scheme's implementation of these strategies will only be successful if the manager roster generates significant value added.

To help incorporate the important component of hedge fund alpha, we have included an additional row in Table 1 labeled as the 'Holistic Glide Path + 300 bps Targeted Hedge Fund Alpha,' where we have

added what we believe is an appropriate estimate for hedge fund alpha. For reference, Cambridge Associates' clients with low-beta hedge fund programs generated approximately 320 bps of average annual alpha for the most recent ten years.[9] If a scheme generates this level of hedge fund alpha, the Holistic Glide Path has expected returns at least as high or higher than the Traditional Glide Path at the same levels of funding-level volatility, as true alpha is an independent component of total return.

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[9] Alpha calculation based on the average return of C|A hedge fund advisory programs with beta less than 0.3 (measured relative to MSCI ACWI IMI [net] since program's inception) for the 31 October 2001 to 30 June 2012 period. Note this sample consists of both discretionary and nondiscretionary clients; thus, the performance noted may be attributable to factors other than C|A's advice as C|A's clients may or may not follow this advice. As a result, the experience of a client that follows C|A's advice may differ materially from the performance presented. Past performance is not necessarily a guide to future performance.

Our long-term return assumptions are based on equilibrium capital market conditions. Unfortunately, the market environment today is not reflective of equilibrium, particularly as it relates to fixed income yields. For the purpose of this paper, we developed return assumptions for each asset class assuming valuations revert to normal levels over the next ten years ('Current Market Environment'). This addresses the unique valuations embedded in capital markets at present.

In our Current Market Environment analysis, the expected returns for all points on the glide paths are well below 6% (Table 2). These expected returns glaringly highlight the difficulty most schemes will face in achieving targeted returns in the current market environment. To hit the targets in this market environment, most schemes will either have to take more funding risk or pursue a different strategic approach, such as the Holistic Glide Path, which is a superior way to generate higher expected returns at a targeted level of funding-level volatility.

As shown in our analysis, if a scheme can generate the targeted level of hedge fund alpha, the Holistic Glide Path's expected return is in most cases significantly higher than that of the Traditional Glide Path in the current market environment. Evaluated from a different perspective, expected returns from the Holistic Glide Path (within the Current Market Environment) will equal the Traditional Glide Path if an investor can structure a low-beta hedge fund program that achieves about 127 bps of alpha.[10]

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[10] For reference, the average of C|A's low-beta hedge fund client programs has exceeded this 127 bp alpha hurdle 98% of the time on a rolling three-year basis over the last ten years. Note this sample consists of both discretionary and nondiscretionary clients; thus, the performance noted may be attributable to factors other than C|A's advice as C|A's clients may or may not follow this advice. As a result, the experience of a client that follows C|A's advice may differ materially from the performance presented. Past performance is not necessarily a guide to future performance.

Table 1. Absolute Nominal Return in Normal Environment

Funding Level	85%	90%	95%	100%	105%
Traditional Glide Path	7.0%	6.8%	6.6%	6.1%	5.9%
Holistic Glide Path	6.4%	6.2%	5.9%	5.9%	5.9%
Holistic + 300 bps Targeted Hedge Fund Alpha	7.2%	7.0%	6.7%	6.1%	5.9%

Table 2. Absolute Nominal Return in Current Market Environment

Funding Level	85%	90%	95%	100%	105%
Traditional Glide Path	3.5%	3.2%	2.8%	1.7%	1.4%
Holistic Glide Path	3.3%	2.9%	2.4%	1.7%	1.4%
Holistic + 300 bps Targeted Hedge Fund Alpha	4.1%	3.7%	3.3%	1.9%	1.4%

A fair criticism of our analysis might be our lack of alpha assumptions for any asset classes other than hedge funds, which may unfairly favor the Holistic Glide Path relative to the Traditional Glide Path. One reason we did not extrapolate an alpha assumption to other asset classes is many schemes implement their liability match and equity assets passively (thus, there will be no alpha). While we typically advocate at least some active management in public equity and fixed income (as well as tactical positioning), it is clear that alpha assumptions are unique to each scheme. For the Traditional Glide Path to achieve expected returns that match those of the Holistic Glide Path (with assumed hedge fund alpha), the Traditional Glide Path would have to garner a substantial amount of alpha on its equity and liability-matching assets. Using our Current Market Environment assumption at the 90% funding level as a reference, a scheme would have to earn 226 bps of alpha on its equity mandates and 100 bps on its fixed income mandates for the expected return of the Traditional Glide Path to match the expected return of the Holistic Glide Path (with hedge fund alpha). It would be an understatement to call the expectation of such alpha generation for these more efficient asset classes extremely ambitious.

Glide Path Tail-Risk Comparison

Another important distinction between the two glide path approaches is their success in mitigating significant drawdowns in funding level due to poor market performance. As we have seen over the past decade, large and sudden drops in funding levels are painful for schemes, as significant increases in contributions are required to offset the large declines in funding levels. Risk/return evaluations with forward-looking assumptions are useful exercises, but they fail to take into account the real life

impact of drastic funding level drawdowns. The most recent financial crisis provides an excellent stress test, as global equities lost 40% of their value from 30 September 2007 through 31 March 2009.[11]

For the purpose of this analysis, we assume a scheme starts with a funding level of 90%, and the asset allocation follows the previously described glide paths. Contrary to what many would have expected, the Holistic Glide Path approach better preserved the funding level than the Traditional Glide Path during the most recent crisis (Figure 5). Despite the Holistic Glide Path holding lower liability-matching assets, it benefited from significantly lower equity beta that resulted from a risk-controlled and diversified growth portfolio—a powerful tail-risk reducer given the extremely poor performance of public equities during this time period.

As a final component of our analysis, we compare the two approaches in a strongly positive environment for equity markets with moderately rising discount rates (to isolate the low-beta effect of the Holistic Glide Path). For this purpose, we use the three-year period ending 31 December 2007, when global equity prices rose 48% (cumulatively), while liability values increased by 25%.[12]

We again begin the simulation at an initial funding level of 90%. Although the strong equity tailwind results in an increase in the funding level for the Traditional Glide Path, the Holistic Glide Path approach not only manages to keep up with the Traditional

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[11] Represents the cumulative return for this period for the MSCI All Country World (Net) Index in GBP terms, with 50% of foreign currency exposure hedged.

[12] Represents the cumulative return for this period for the MSCI All Country World (Net) Index in GBP terms, with 50% of foreign currency exposure hedged. Liability stream is represented by a 50/50 split of long duration U.K. gilts and linkers with an annual spread of 2%.

Figure 5. Funding Level Preservation: Traditional Glide Path Versus Holistic Glide Path
Assumed Initial Funding Level of 90%
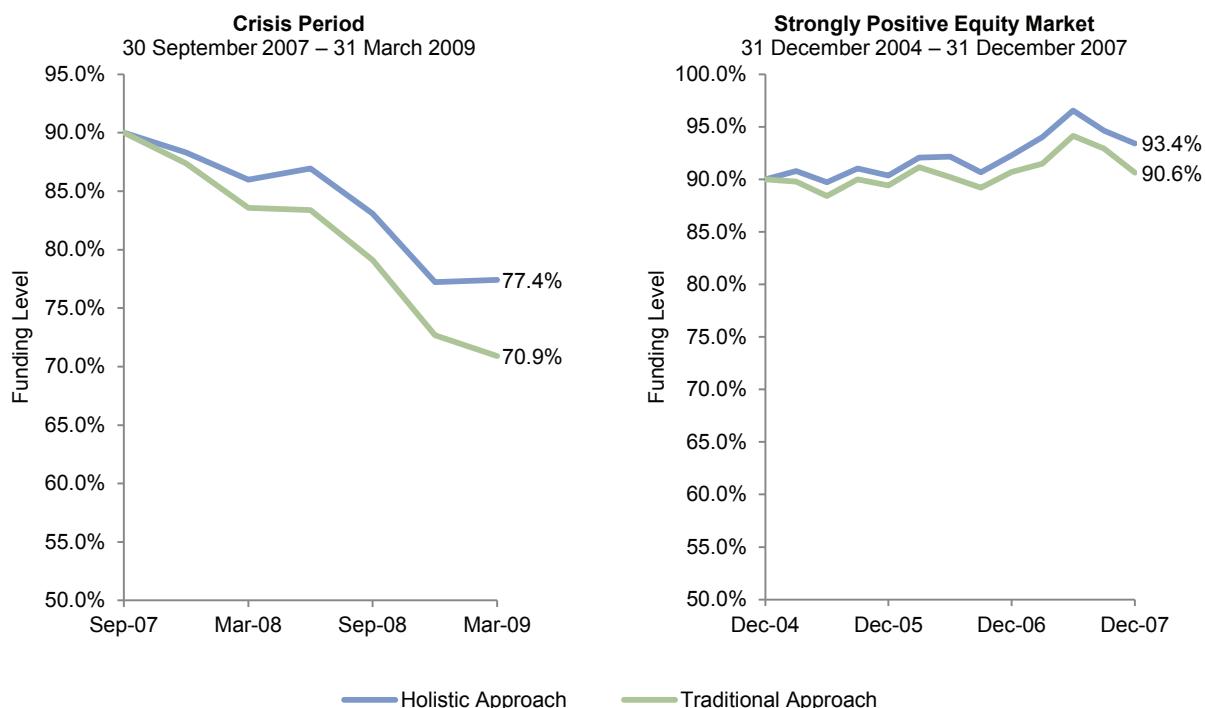
Glide Path, but actually results in a slightly higher funding level. This outperformance is driven by the Holistic Glide Path's lower allocation to the lower-returning liability-matching assets, as well as the alpha produced by the low-beta hedge fund exposures.

We would be remiss if we did not address the scenario of a significant increase in interest rates over the next decade. In such a scenario, we would expect the Holistic Glide Path to generate higher returns and higher levels of funding than the Traditional Glide Path, given lower exposure to liability-matching assets. This may be particularly true if higher rates were accompanied by a decline in equity markets.

Holistic Glide Path Considerations

We believe the holistically constructed glide path framework is capable of generating higher expected returns across varying market environments at targeted risk levels,

while simultaneously reducing pension scheme tail risk. However, the implementation of such a glide path results in several key considerations in terms of implementation, resources, and the assumption of active risk.

One key challenge of a Holistic Glide Path is that higher active risk strategies result in significant implementation complexity. Most institutional-quality investment vehicles that seek to de-emphasise directional market influence (beta) are usually more complex in nature, and may involve higher exposures to less traditional asset classes and strategies, as well as higher investment management fees.

Additionally, a scheme must allocate significant internal or external resources to adequately implement the more Holistic Glide Path. A scheme with greater implementation complexity will necessitate a greater amount of investment resources dedicated to manager due diligence,

implementation, risk management, and monitoring.

Finally, significant skill is required to successfully generate meaningful alpha over long periods of time, an important consideration in implementing a Holistic Glide Path approach. While we believe appropriate resources, manager selection skill, and a robust investment decision-making process can reward significant exposures to active manager risk with superior risk-adjusted returns, we note that alpha is ultimately a 'zero-sum game' for market participants in aggregate. Alpha generation is not easily attainable and requires a robust and disciplined investment process.

Summary

Extremely low market yields have challenged the funding levels of defined benefit pension schemes, as plummeting discount rates have resulted in significant increases in liability values and large scheme contributions. However, the risk of further liability increases appears moderate relative to the experience of the past decade, even when evaluating a liability's worst-case scenario where interest rates fall to the very low levels currently seen in Japan.

We agree with others in the pension community that it is appropriate to develop de-risking strategies and glide paths which attempt to control or reduce funding risk as a scheme experiences increases in its funding level. However, we believe many de-risking glide paths are too inflexible because they rely heavily upon the lever of adding to liability-matching assets to reduce funding-level volatility. This traditional approach, while easy to understand and implement, fails to adequately consider the degradation of expected returns resulting from mechanistically adding to the liability match. Furthermore, this traditional

approach often ignores rigorous evaluation of funding-level tail risk and current market conditions.

An alternative approach, a Holistic Glide Path, uses multiple risk-reduction levers in addition to simply increasing the liability match, including the substitution of allocations to higher active risk strategies and non-traditional betas for equity market exposure. As we have shown, holistically developed glide paths can match the targeted funding risk levels of more traditional glide paths. Furthermore, if low-beta high active risk strategies such as hedge funds can generate an attractive amount of alpha, holistically constructed glide paths are capable of earning higher returns than more traditional glide paths. In addition, due to a much lower exposure to equity beta, the Holistic Glide Path can demonstrate superior preservation of the funding level in stressed equity market conditions. Importantly, the Holistic Glide Path would better position a scheme to capture the positive effects of rising rates on funding levels as it maintains lower levels of matching assets. The approach works very well not only when a scheme is de-risking, but also when a scheme chooses to increase its risk. In this paper, we have focused on the increased use of alternative asset strategies in the growth portfolio; however, we would note that significant adjustment can be made within traditional long-only exposures that improve the risk profile of a plan's growth portfolio.

Effective implementation of the more holistic glide path is complex. As such, it requires a pension scheme to deploy adequate resources for proper manager selection, implementation, and monitoring, as well as a robust investment process to ensure effective implementation of the more holistic strategy. ∎

Average Low-Beta Hedge Fund Program

◆ Low-beta hedge fund program return is the average of all low-beta hedge fund programs advised on by Cambridge Associates for which we had adequate data for the period 30 April 1997 to 30 June 2012. We included all low beta programs including those that were not under advisement at the start of the period or ended before the end of the period to eliminate survivorship bias. Low beta is defined as any program whose beta factor exposure to global equity markets (as measured by MSCI ACWI IMI) is less than or equal to 0.3 since inception of the program. Factor exposure was calculated by regressing program returns against returns of MSCI ACWI IMI and considering only those programs where the t-statistics of the factor exposure was greater than or equal to 2.0. A total of 181 programs met the criteria of being a low-beta hedge fund program. The average low-beta hedge fund program return

series was derived by taking the equally weighted average of each of these programs' returns each month.

Average Realized Alpha Calculation

◆ Average realized alpha was calculated by taking the average of the difference of trailing three-year average annualized compound returns of the average low-beta hedge fund program and a constructed benchmark.

◆ The constructed benchmark is the return stream of MSCI ACWI adjusted for betas of 0.3. While some programs have had lower equity beta exposure, we use 0.3 beta to provide a more conservative estimate of program alphas.

◆ Although the average alpha gives readers one measure of potential value add, the dispersion around the average is also important. Too wide of a distribution around the average could signify an inconsistent alpha experience during the measurement period. The graph below displays the level of historical variation in the alpha stream.
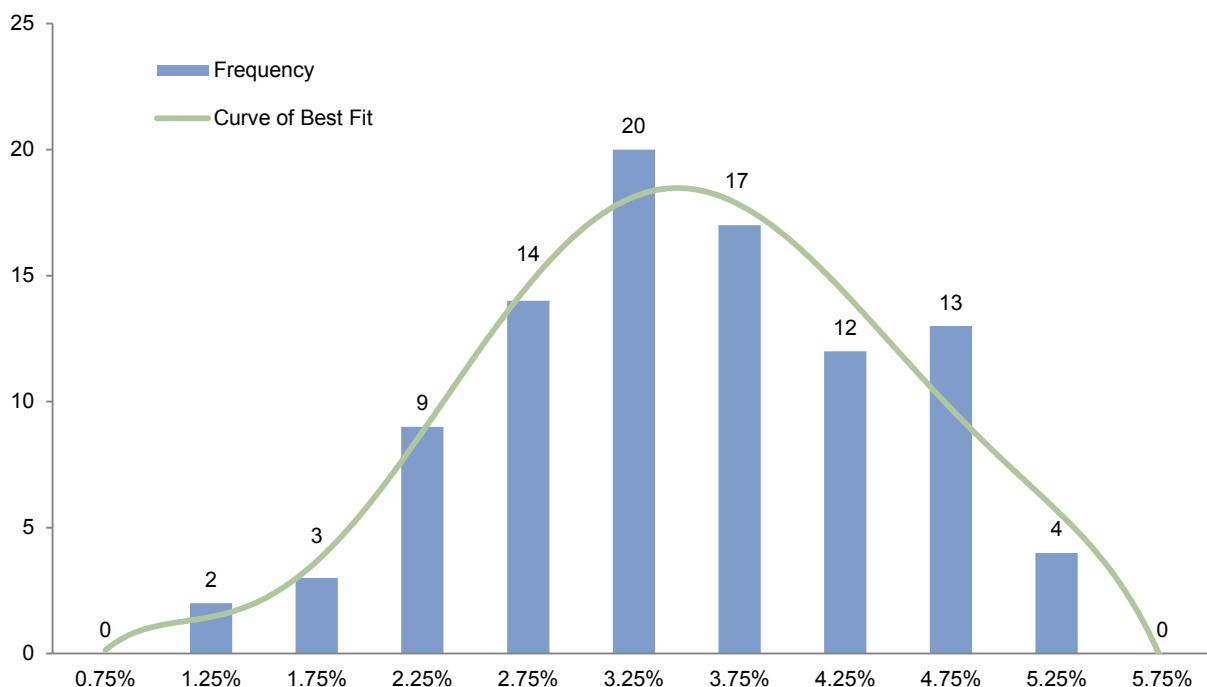
- As demonstrated in the histogram, the dispersion of alpha stream is symmetric about the average of 3.25% (bell-shaped curve around the average), with sample standard deviation of 0.94% and median of 3.22%; therefore, the alpha experience has been fairly concentrated around the average, with no large negative surprises. The 'normalness' of the experience is also demonstrated by the fact that the holistic approach ends up with a terminal funded status very close to that of the average (as demonstrated by the funded status stress test exhibits in the text) when the simulation is run for every single eligible low-beta hedge fund program rather than the average.

Return Assumptions

- Tables 1 and 2 reflect the following asset class assumptions:
    - **Global Equity**: The geographic composition of this asset class is the same as of that of MSCI ACWI as of 31 December 2012. The asset class has 50% of its currency exposure hedged in GBP terms against other currencies.
    - **Low-Beta Hedge Fund**: Return assumption was derived by assuming a beta exposure of 0.3 with respect to global equity. Cash is assumed to earn a nominal return of 4%.
    - **Private Assets**: This asset class consists of 70% private equity and 30% oil & gas. Private equity has an expected return of 10.3% while oil & gas has an expected return if 8.2% (in compound terms, inflation 3%). The asset class has global currency exposure.
    - **Liability Match**: This asset class consists of 50% long gilts and 50% long linkers. Both are denominated in GBP terms.

Assumptions in a Normal Environment

- Equilibrium return assumptions developed by Cambridge Associates were used to derive nominal return figures listed in Table 1. The below table lists the underlying return assumptions (all in compound terms, inflation 3%).

Equilibrium Return Assumptions

Asset Class	Nominal Return
Global Equity	9.3%
Low-Beta Hedge Fund	5.6%
Private Assets	9.7%
Liability Match	5.5%

Assumptions in Current Environment

- Return figures in current environment were developed with the underlying assumption that valuations and fundamentals would return to fair value conditions over the next ten years (as of 31 December 2012). The below table lists the underlying return assumptions for figures mentioned in Table 2 (all in compound terms, inflation 3%).

Return Assumptions in Current Environment

Asset Class	Nominal Return
Global Equity	7.8%
Low-Beta Hedge Fund	4.4%
Private Assets	8.5%
Liability Match	0.7%