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Getting More from Less in Defined Benefit Plans: Three Levers for a Low-Return World

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Abstract

As global interest rates hover near historic lows, defined benefit pension plan sponsors must grapple with the prospect of lower investment returns. This paper examines three levers that can enhance portfolio outcomes in a low-return world. The levers include: increased contributions; reduced investment costs; and increased portfolio risk. We use portfolio simulations based on a stochastic asset class forecasting model to evaluate each lever according to two criteria—its magnitude of impact and the certainty that this impact will be realized. Our analysis indicates that increased contributions have the greatest and most certain impact. Reduced costs have a more modest, but equally certain impact. Increased risk can deliver a significant impact, but with the least certainty.

Keywords

Low-return environment, defined benefit pension plans, active equity management, factors, private equity, hedge funds

Disciplines

Economics

Comments

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Chapter 4

Getting More from Less in Defined Benefit Plans: Three Levers for a Low-Return World

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As fixed income yields hover near historic lows, defined benefit (DB) pension plan sponsors must grapple with a rise in the present value of their plan liabilities and a fall in prospective investment returns. Our asset class projections illustrate the change. From 1926 through 2016, a portfolio with a 60 percent allocation to global equities and 40 percent to global fixed income generated an annualized real return of 5.5 percent. For the ten years through 2026, we estimate that the median return for the same portfolio will be about two percentage points lower, as illustrated in Table 4.1.

The prospect of lower returns has reshaped retirement plan sponsor expectations. In 2014, 42 percent of corporate DB plans surveyed by Stockton (2016) projected median long-term returns of more than 7 percent.[1] In 2015, only 31 percent expected returns of more than 7 percent.[2] Even as expected returns decline, most plans are underfunded. J.P. Morgan (2015) estimates that DB plans sponsored by companies in the Russell 3000 Index have an aggregate funded ratio of 80.5 percent. The present value of every dollar in pension obligations, in other words, is backed by about 80 cents in assets. Public sector plans face even greater challenges. Aggregate assets in the largest public plans, according to actuary and benefits consultant Milliman, equaled an estimated 69.8 percent of total plan liabilities as of 2016. Novy-Marx and Rauh (2014) explore the funding shortfall through another lens, estimating that state and local pension plans would need to increase contributions over the next 30 years by 2.5 times to fund legacy liabilities and future service accruals.

This chapter examines three levers that plan sponsors can use to improve their funding levels in a lower-return future. Sponsors can either increase contributions, reduce costs, or increase risk. While we explore these levers in the context of a total return investment strategy, we typically encourage well-funded corporate DB plans to adopt a liability-driven investment (LDI)

TABLE 4.1 Future returns may not look like those from the past: Implications for a 60 percent equity/40 percent fixed income allocation

	Historical return (%)		Projected return, 2016–2026 (%)		
	1926–2016	2000–2016	25th Percentile	50th Percentile	75th Percentile
Nominal	8.5	4.9	3.1	5.6	8.1
Real	5.5	2.7	1.2	3.8	6.4

Note: The historical returns for our hypothetical portfolios are based on data for the appropriate market indexes through September 2016. The projected returns reflect the following allocation: 60 percent global equity and 40 percent global fixed income. The subasset allocation for equities is 60 percent US equity and 40 percent global ex-US equity, unhedged in USD, rebalanced annually. The subasset allocation for fixed income is 70 percent US bonds and 30 percent global ex-US bonds, hedged in USD, rebalanced annually. Projected returns at each percentile are based on 10,000 simulations generated by the Vanguard Capital Markets Model®

Source: Authors' computation.

strategy. An LDI strategy changes the concept of risk from a focus on return volatility to a focus on the stability and level of the funded ratio (Stockton 2014). Even so, total return is an important focus for many pension plans. If a plan with a long time horizon can tolerate a total return strategy's attendant contribution volatility, the sponsor can benefit from the potential for lower total contributions over the life of the plan. Cash balance plans and hybrid pension plans, which combine final-pay and cash balance plans, often default to total return strategies, as do most public pension plans.

We evaluate each lever according to its magnitude and certainty of impact. We define 'magnitude' as the change in the expected value of a $100 million portfolio over a ten-year investment horizon. 'Certainty' refers to the change in the projected dispersion of portfolio values. In what follows, we start with an overview of the motivations and investment rationales for each of the three levers and conclude with a hierarchical assessment of their potential impact on portfolio returns, risk, and expected values. We also detail the impact of risk-oriented investment decisions on a hypothetical DB plan's funded ratio.

Increase Contributions for a Significant and Certain Impact on Portfolio Value

An increase in contributions is the most reliable strategy to improve DB plan funding levels. Every additional dollar in contributions immunizes a dollar of future liabilities against the vagaries of capital market returns. The decision to increase contributions must compete with other uses of

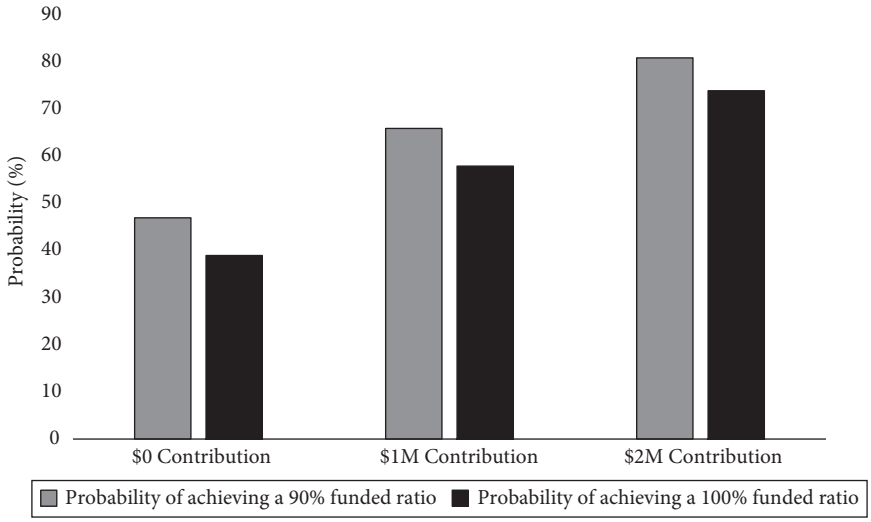

Figure 4.1. The impact of annual contributions on funded ratios

Note: We model three scenarios to show how increased contributions can minimize the risk that a plan sponsor will be unable to meet its pension obligations. We simulate projected funded ratios for a 60 percent equity/40 percent bond portfolio that starts with $60 million in assets and liabilities of $73.4 million. We assume annual contributions of $0, $1 million, and $2 million over a ten-year period. Contributions are made at the end of each year.

Source: Authors' calculations.

corporate cash flow such as capital investment and returns to shareholders, but the benefits to active and retired participants are clear.

Consider a DB plan with $60 million in assets and $73.4 million in liabilities. Its funded ratio is 82 percent. In this simplified illustration, the portfolio manager initially allocates 60 percent of plan assets to global equities and 40 percent to global bonds. We model changes in the portfolio's value over a ten-year period to illustrate the impact of additional contributions.[3] Figure 4.1 presents the probabilities that a portfolio will achieve a 90 percent or 100 percent funded status assuming three levels of annual contribution: $0; $1 million; and $2 million.

Increased contributions have a certain impact, and if the contributions are large enough, the magnitude of impact can be high. Annual contributions of $1 million raise the probability of reaching full funding from 47 percent to 66 percent over a 10-year period. Contributions of $2 million per year yield an 81 percent probability, increasing the sponsor's flexibility to implement LDI strategies that limit the plan's vulnerability to changes in interest rates and asset and liability values.[4] We recognize that competing demands for cash can make higher contributions impossible or

unattractive for some plan sponsors, but it is worth remembering that this is a powerful lever.

Reduce Costs for a More Modest but Certain Impact on Portfolio Value

Whether a pension plan retains the services of in-house or external portfolio managers, the only guarantee is that those services have a cost. The future performance delivered by those managers is uncertain. All else equal, reducing costs has a certain and positive impact on the future value of a portfolio. The short-term benefits are relatively modest. Over time, however, a modest reduction in costs can deliver significant long-term benefits as annual savings compound.

Table 4.2 quantifies the impact of costs on a portfolio with an initial value of $100 million. We assume a return of 7 percent per year before fees, a figure consistent with plan sponsors' expectations in Stockton's survey. Net of 100 basis points in annual fees, the portfolio's value would grow to about $178 million after 10 years. If fees had been 50 basis points, however, the portfolio would have accumulated an additional $9 million in assets. Over 30 years, annual savings of 50 basis points would translate into more than $90 million in additional assets.

The concept of reducing costs is simple, yet its impact is surprisingly powerful. This is particularly true for plan sponsors with a long time horizon. The compounded annual savings make bigger dents in funding shortfalls with every passing year. Over 30 years, for example, a 50-basis-point difference in annual costs compounds to more than 9,000 basis points (91 percentage points) in cumulative return.

TABLE 4.2 The black magic of compounding costs: Projected value of a $100 million portfolio

	Portfolio values ($ million)		
Cost (basis points)	10 years	20 years	30 years
0	196.7	387.0	761.3
25	191.9	368.1	706.3
50	187.1	350.2	655.4
75	182.6	333.2	608.3
100	178.1	317.1	564.8

Note: These calculations assume a return of 7 percent per year before fees.

Source: Authors' computation.

Increase Risk for a Potentially Significant but Uncertain Impact

Boosting contributions and cutting costs address inflows and outflows to deliver certain growth in a portfolio's long-term value. Increasing portfolio risk is a different strategy: it seeks to accelerate the rate at which portfolio assets grow.

While increased risk can have a greater impact than increasing contributions and reducing costs, the certainty of success is lower. Among the widely used risk-oriented strategies are: (1) increased allocations to global equities; (2) style factor tilts; (3) allocations to traditional active equity management; and (4) allocations to alternatives.

We assume that an increase in a portfolio's strategic equity allocation would be achieved through passively managed, market capitalization weighted index portfolios. The other options—style factor tilts, traditional active management, and alternatives—represent forms of active management. These strategies introduce active risk, but with the exception of some alternatives, produce no change to a portfolio's broad strategic allocation. We review the investment cases for each risk-oriented strategy.

Higher equity allocation. Raising a plan's strategic equity allocation represents a move along the efficient frontier to a riskier portfolio, with a higher expected return, as illustrated in Figure 4.2. A higher expected return can help a plan close funding shortfalls, but the higher volatility associated with this expected return also diminishes the certainty that this benefit will be realized.

Style factor tilts. A static allocation to style factors seeks to improve the risk and return characteristics expected from a portfolio's allocation to broad asset classes. Although researchers have identified a number of potential style factors, we focus on three—size, value, and credit. Ilmanen (this volume) explores the use of several other factors in retirement-plan portfolios. Size, value, and credit are notable for both the extensive literature documenting each and the empirical research on their performance. Table 4.3 includes possible risk-based or behavioral explanations for the persistence of their excess returns (Banz 1981; Fama and French 1992, 1993; Pappas and Dickson 2015).

Like any active strategy, the use of factor tilts demands both a conviction that the factors represent an enduring opportunity to earn a return premium and the patience to stick with this conviction through factors' inevitable periods of underperformance.[5]

Actively managed equity funds.[6] Traditional active management is another option for plan sponsors. Stockton found that most DB plan sponsors invest a majority of their assets in actively managed portfolios, as is typical for institutional investors.[7] Survey respondents reported that, on

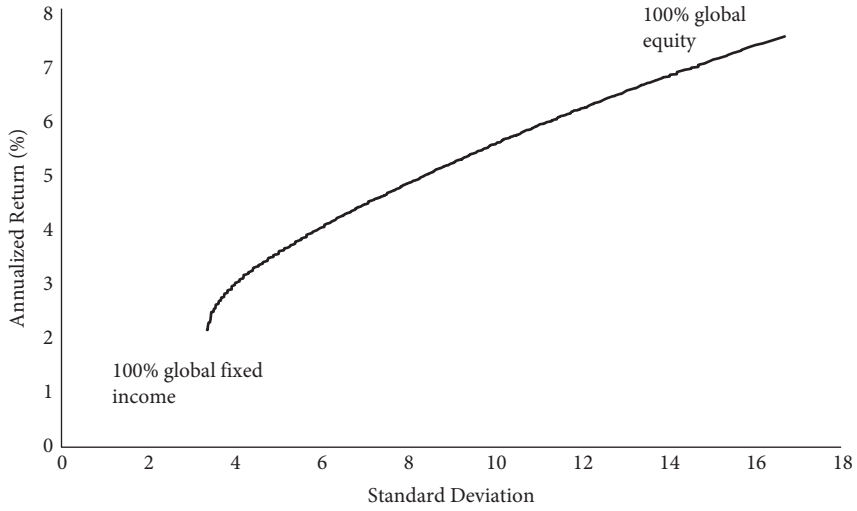

Figure 4.2. The efficient frontier for a portfolio of global equities and global fixed income

Note: Calculations reflect median asset class return projections for the ten years through 2026.

Source: Authors' calculations.

TABLE 4.3 Possible return rationales for select equity and fixed income risk factors

Factor	Risk explanation	Behavioral explanation
Value (equity)	Cyclical risk of positive correlation between economic activity and security's returns.	Recency bias leads to investors shunning distressed firms and overpaying for recent growth.
Size (equity)	Cyclical risk of smaller firms being more exposed to changing, negative economic activity and default risk.	N/A
Credit (fixed income)	Default and downgrade risk; positive correlation to economic activity.	N/A

Sources: Banz (1981); Fama and French (1992, 1993); Pappas and Dickson (2015).

average, 66 percent of equity and 72 percent of fixed income assets were actively managed.

Three elements need to be present for active management to be successful: talent, cost, and patience. Talent is paramount. On average, the odds that an active manager will outperform a relevant benchmark are low. In the 17 rolling 3-year periods for the 20 years ending 2016, only 15 percent of US equity funds, on average, outperformed their benchmarks. When those

results are weighted by assets under management rather than the number of funds, the odds improved to 38 percent.

Although talent is key to beating the odds against outperformance, low cost is another requirement, not simply because of the mathematical reality that lower costs equal higher net returns. In an analysis of various portfolio characteristics, Wallick et al. (2015b) found that cost is the most powerful predictor of future outperformance.[8]

Even if an investor identifies talent and secures it at a low cost, success requires patience. Active managers typically produce inconsistent patterns of returns, as illustrated in Figure 4.3. Of the 2,085 US-domiciled active equity funds in existence at the start of 2000, only 552 (26 percent) outperformed their prospectus benchmark over the subsequent 15 years. Of that 26 percent, almost all (98 percent) failed to outperform their benchmarks in at least four calendar years over the 15-year period. More than 50 percent of these top performers delivered seven or more years of underperformance. Only those investors patient enough to hang on through these periods of weakness managed to realize the superior long-term returns delivered by these exceptional managers.

Alternative investments. Alternative investments are widely used in DB plans. These investments include both non-traditional asset classes such as real estate and commodities and specialized investment vehicles such as private equity and hedge funds. On average, plan sponsors allocate 11 percent

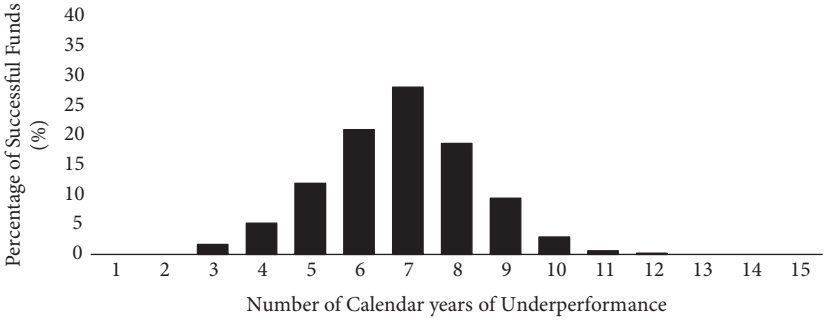

Figure 4.3. Even successful funds had multiple periods of underperformance: Distribution of 552 funds that outperformed their index, 2000–2014

Note: Data are as of December 31, 2015. Successful funds are those that survived for the 15 years and also outperformed their prospectus benchmarks. Our analysis was based on expenses and fund returns for active equity funds available to US investors at the start of the period. When multiple share classes existed, the oldest and lowest-cost single share class was used to represent a fund. Funds that were merged or liquidated were considered underperformers for the purposes of this analysis. The following fund categories were included: small-cap value, small-cap growth, small-cap blend, mid-cap value, mid-cap growth, mid-cap blend, large-cap value, large-cap growth, and large-cap blend.

Source: Vanguard calculations, using data from Morningstar, Inc.

of portfolio assets to alternatives (Stockton 2016). Of the corporate plans that invest in alternatives, 89 percent expected to maintain or increase their allocations; the remaining 11 percent were considering a reduction in these allocations.

We consider two alternative strategies: hedge funds and private equity. Neither is a separate asset class; rather, they are a repackaging of publicly or privately traded traditional asset classes. Both strategies represent a form of active management. As with traditional active management, talent is key because the spread between winners and losers is extreme, as illustrated in Figure 4.4. In alternatives, however, the selection challenge is greater

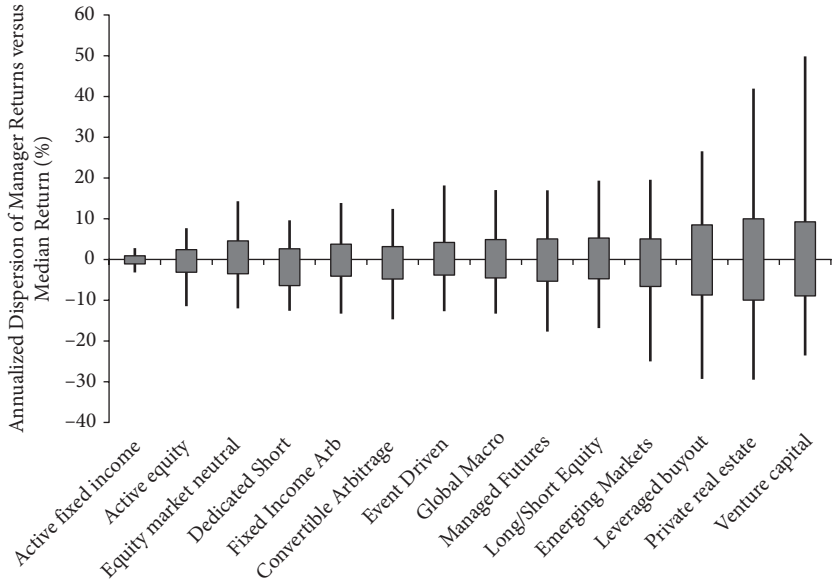

Figure 4.4. Manager dispersion with private alternative investments is significantly higher than with traditional asset classes

Note: Public US active fixed income and active equity distributions were based on data provided by Morningstar, Inc., for mutual funds domiciled in the United States from January 1, 1994, through July 31, 2014. Equity-market neutral, dedicated short bias, fixed income arbitrage, convertible arbitrage, event-driven, global macro, managed futures, long/short equity, and emerging markets' distributions were based on data provided by Lipper TASS, for hedge funds in existence from January 1, 1994, through July 31, 2014. All funds are US-dollar-denominated, adjusting for survivorship bias in each category. Leveraged buyout, real estate, and venture capital distributions based on data provided by Preqin. Each distribution was based on an internal rate of return (IRR) calculation from a series of annual cash flows from each fund. For private equity funds that had not yet distributed 100% of the fund's capital back to the limited partners, IRR calculations were based on an ending net asset value. Each distribution has been adjusted so that the median resides at point zero, to isolate the dispersion.

Source: Authors' calculations, using data from Morningstar, Inc., Lipper TASS, and Preqin.

because of the limited access to many managers and the higher due diligence hurdles for complex (and at times opaque) strategies.

Wallick et al. (2015b) found that hedge funds generally did not deliver long-term outperformance relative to a portfolio balanced between global equities and global fixed income.[9] Their conclusions about private equity were similar. The researchers nevertheless noted that vehicles such as venture capital and leveraged buyout (LBO) funds could deliver a 'liquidity risk premium,' the reward investors expect for locking up their money over a specified period. Absent this expected premium, however, Wallick et al. (2015b) found that the median venture capital fund has trailed the returns of the public equity markets, while the median LBO had more or less matched them. Other researchers have reached similar conclusions. (Moskowitz and Vissing-Jorgensen 2002; Cochrane 2005; Kaplan and Schoar 2005; Conroy and Harris 2007; Phalippou and Gottschalg 2009).

These analyses take place within a total return framework, but the LDI case for alternatives may be no more compelling. Bosse (2012) showed that alternatives allocations (real estate investment trusts and commodities, in particular) funded from a portfolio's fixed income holdings produced a notable increase in funding ratio volatility. If funded from the equity allocation, the alternatives allocation must be significant (24 percent of portfolio assets in the analysis) to produce a modest decline in the volatility of portfolio assets relative to plan liabilities (−3 percent).

A Decision Hierarchy for Plan Sponsors

When we examine increased contributions, reduced costs, and increased risk in a quantitative framework, a decision-making hierarchy emerges. Table 4.4 details the magnitude and certainty of impact for the three levers. Increased contributions deliver the most powerful combination of certainty and impact. Reduced costs have a smaller impact, but a high certainty that the impact will be realized. Cutting costs is a productive strategy in any investment environment. In ideal circumstances, increased risk has a significant and positive impact, but the likelihood of realizing this impact is uncertain.

We test each lever's impact on a $100 million portfolio with an initial allocation of 60 percent global equities and 40 percent global fixed income. For each lever, we generate 10,000 potential portfolio outcomes over a 10-year period, based on asset class projections from the Vanguard Capital Markets Model® (Davis et al. 2014).

Increased contributions. This lever is conceptually simple, though finding the funds for higher contributions can be devilishly difficult in practice.

TABLE 4.4 Quantifying the decision hierarchy for plan sponsors

Panel A. Simulated 10-year performance of a $100 million portfolio with an allocation of 60 percent global equities and 40 percent global fixed income, rebalanced annually.

Expected annualized return (%)	Projected portfolio values ($ million)			
	25th percentile	50th percentile	75th percentile	IQR
5.70	136.0	174.1	220.9	84.9

Panel B. Each lever's incremental impact on portfolio performance.

	Change in median return (pp)	Change in portfolio values ($ million)[g]			
		25th percentile	50th percentile	75th percentile	IQR
Increase contributions[a]					
+$.5 million	–	+5.9	+6.7	+7.7	+1.8
+$1.0 million	–	+11.8	+13.3	+15.6	+3.8
Reduce costs[b]					
−25 basis points	+0.25	+3.3	+4.1	+5.1	+1.8
−50 basis points	+0.50	+6.5	+8.1	+10.0	+3.5
Increase risk					
10 pp increase in equity allocation	+0.52	+1.3	+8.7	+19.9	+18.6
10 pp private equity allocation[c]	+0.33	+3.7	+3.7	+5.8	+2.1
Static factor tilts[d]	+0.12	+2.6	+1.9	+2.2	−0.4
10 pp allocation to active equity[e]	+0.05	+0.9	+0.8	+1.2	+0.3
10 pp hedge fund allocation[f]	−0.38	+1.1	−6.2	−15.0	−16.1

Notes:

[a] We assume that contributions are made into the portfolio annually at the end of each year over the horizon.

[b] We analyze each lever relative to a cost-free portfolio. To evaluate the impact of reducing costs, we model an increase in costs (+25 and +50 basis points) relative to the initial portfolio. An alternative approach would be to assume costs of, say, 75 bps for the original portfolio and then deduct costs of 25 and 50 basis points. The two approaches produce approximately the same results.

[c] We assume that private equity provides a 2-percentage-point liquidity premium relative to public equity. We adjust the strategy's volatility to match the Sharpe ratio of the broad public equity market and assume that private equity returns have a correlation of approximately 0.9 with US equity returns, consistent with Vanguard research.

[d] We replace 10 percentage points of the broad equity allocation with 5-percentage-point long-only allocations to the value and size factors. We replace 10 percentage points of the fixed income allocation with the long-only, cap-weighted credit factor.

[e] We replace 10 percentage points of the broad equity allocation with active equity. We assume excess returns of 0.5 percentage point. Active fund excess return distributions are simulated based on statistical estimations from historical manager excess return data and are added to broad market US equity projections to form an active manager return distribution.

[f] We replace 10 percentage points of the broad equity allocation with 5 percentage point allocations to market neutral and multi-strategy hedge funds.

[g] The 25th, 50th, and 75th percentile columns correspond to terminal asset value distributions for each lever. The interquartile range (IQR) of projected portfolio values measures the dispersion, or degree of certainty, associated with each lever.

Source: Authors' computation.

Increased contributions produce no incremental change in the returns produced by portfolio assets or in the volatility of those returns.

But higher contributions of $0.5 or $1 million have a significant impact on portfolio values. Relative to the original portfolio, annual contributions of $1 million produce a median expected increase in portfolio value of about $13 million at the end of the 10-year period. This lever is the most powerful and predictable of the three levers available to plan sponsors.

Reduced costs. Next, we illustrate the impact of costs by assessing fees of 25 and 50 basis points on the original cost-free portfolio. Lower costs (all else equal) lead to higher returns, with no incremental increase in return volatility. The impact on portfolio value at the end of the 10-year period is more modest. Even so, it is larger than intuition might suggest because of the compounding of annual cost savings. The longer the time period, the greater the power of this compounding benefit.

Increased risk. The impact of increased risk varies by strategy. Compared with increased contributions and reduced cost, the certainty that this impact will be realized is low. To test each approach, we implement a 10 percent allocation to the risk-oriented strategy, funding it from the original portfolio's relevant asset class. Our assumed return premiums are consistent with averages found in empirical research (Wallick et al. 2015a). We review the impact of each risk-oriented strategy, from greatest to least.[10]

Increased equity allocation. A 10-percentage-point increase in the portfolio's strategic allocation to global equities adds an incremental 0.52 percentage point to annualized expected returns and an additional $8.7 million to the portfolio's projected median value at the end of the 10-year period. This move along the efficient frontier also produces higher volatility. In the original portfolio, the difference between simulated terminal values at the 25th and 75th percentiles (the interquartile range, or IQR) is about $85 million. When the equity allocation increases by 10 percentage points, the IQR increases to about $104 million.

Private equity allocation. A 10-percentage-point allocation to private equity has the next greatest impact, adding an annualized 0.33 percentage point to returns and $3.7 million to the median portfolio's terminal value. The dispersion of portfolio values increases modestly, an interquartile range of $87 million, compared with $85 million in the original portfolio. A caution is in order: these summary statistics mask the challenge of selecting private equity funds that can, in fact, deliver these benefits. There is no investable beta for private equity funds—no indexed vehicle that captures the risk and return characteristics of the category. Success depends on picking above-average performers from a category with a high dispersion of outcomes.

Style factor tilts. A 10-percentage-point allocation to equity style factors and a 10-percentage-point allocation to credit in the fixed income allocation increase expected annualized return and modestly reduce the dispersion of returns. (Our analysis is based on long-only implementations of factor tilts.) The benefits reflect the potential persistence of style factor premiums and the factors' less-than-perfect correlation with the broad equity and fixed income markets. The effect is modest, however, and it is important to note that factors' excess returns can be highly cyclical. Plan sponsors must have an ex-ante belief in the persistence of any factor premiums and the patience to pursue these premiums through good periods and bad.

Active equity allocation. A 10-percentage-point allocation to traditional active equity strategies has limited impact on portfolio risk and return. Again, our simulation is based on assumptions about active management as a category. The performance and impact of a given manager can, and does, vary widely.

Hedge fund allocation. We model two widely used hedge fund strategies: market-neutral and multi-strategy. A 5-percentage-point allocation to each, funded from the original portfolio's equity allocation, reduces the portfolio's expected annualized return, while producing a sizable decline in the volatility of returns. The hedge fund allocation reduces the difference between 25th and 75th percentile portfolio values to about $69 million, compared with an IQR of $85 million in the original portfolio.[11]

Commentary

Some plan sponsors will no doubt use return premium assumptions and allocation strategies that differ from those used here. In general, however, we would expect most assumptions to yield similar relative impacts for the risk-oriented strategies. A decision to increase the portfolio's equity allocation is likely to be the most consequential. This conclusion is consistent with Brinson et al. (1986), who found that a broadly diversified portfolio's strategic asset allocation was the primary driver of its performance. Subsequent research by Ibbotson and Kaplan (2000) and Scott et al. (2017) reached similar conclusions.

The other risk-oriented strategies represent portfolio implementation decisions that, on average, will have less impact on performance. It is possible, of course, for an aggressive allocation to an exceptional active manager or private equity fund to have an outsized impact on portfolio performance, but this alluring possibility would be an outlier. Our hierarchical framework can help plan sponsors set reasonable expectations for the potential magnitude and certainty of each risk-oriented strategy.

The Impact of Investment Decisions on DB Plan Funding Ratios

Our decision hierarchy has examined investment returns in a traditional mean-variance portfolio construction framework. Many total-return-oriented plan sponsors also assess the impact of investment decisions on critical pension plan metrics such as the funding ratio.

Table 4.5 presents incremental changes in the expected funding ratio and its dispersion resulting from risk-oriented strategies. Our conclusions are similar to those presented above. An increased equity allocation produces the greatest impact, but with the least certainty. Private equity, factor tilts, and active management produce a more limited increase in the funding ratio and modest changes in the dispersion of the expected funding ratio. Hedge fund strategies reduce the expected funded ratio status, with a decrease in the dispersion of the funding ratio.

Conclusion

It is widely believed that we are in an era of more modest returns than those produced by global equity and fixed income markets over the past few decades. Lower returns intensify pressure on all investors to meet their

TABLE 4.5 Risk-oriented strategies and ten-year change in funded status

Panel A. Projected funded status for portfolio with an allocation of 60 percent global equities and 40 percent global fixed income, rebalanced annually, and an initial funding ratio of 82 percent.

Projected funded status (%)			
25th percentile	50th percentile	75th percentile	IQR
66.6	97.5	137.0	70.4

Panel B. Each risk-oriented lever's incremental impact on a portfolio's funded status.

	Change in funded status (percentage points)			
	25th percentile	50th percentile	75th percentile	IQR
10 pp increase in equity allocation	+0.1	+6.2	+15.6	+15.5
10 pp private equity allocation	+2.8	+3.8	+5.5	+2.7
Static factor tilts	+1.0	+1.4	+0.8	−0.2
10 pp allocation to active equity	+0.8	+0.9	+1.4	+0.6
10 pp hedge fund allocation	+1.1	−4.2	−12.2	−13.3

Note: The 25th, 50th, and 75th percentile columns correspond to terminal asset value distributions for each lever. The interquartile range (IQR) of projected funded status measures the dispersion, or degree of certainty, associated with each lever.

Source: Authors' computation.

goals. Blanchett et al. and Reilly and Byrne in their chapters in this volume explore savings, working, and Social Security claiming strategies to help individuals fund retirement liabilities in a lower-return future. The challenges for DB plans may be more daunting because of their relatively inflexible obligations.

Plan sponsors can use three levers to enhance a portfolio's chances of meeting these goals: increased contributions, reduced costs—a smart strategy in any return environment—and increased risk. Many sponsors will need to use a combination of the three levers. Our analysis provides a framework and a reasonable set of parameters for assessing the magnitude and certainty of impact delivered by each.

Notes

1. The survey included responses from 178 corporate DB plan sponsors. Plan size ranged from $20 million to $50 million (11%) to more than $5 billion (8%), with an average plan size of approximately $1 billion and total plan assets across the entire survey of approximately $180.9 billion.
2. The expected return on assets (EROA) for corporate DB plans is a component of pension expense for the sponsor company's income statement. Public plans use EROAs to discount their funded future liabilities. EROAs are intended to be very long-term, typically 30 years, and based on median (expected) results.
3. Reality is more complicated than this hypothetical illustration. Contribution levels are a function of both regulation and plan sponsor goals. For a US corporate plan with a funding deficit, for example, the Pension Protection Act of 2006 mandated a minimum contribution equal to roughly one-seventh of the shortfall.
4. See Sparling (2014) for an overview of derisking strategies triggered by changes in plan funding status.
5. Regarding the uncertainty associated with using factors, Pappas and Dickson (2015) note that there is 'conjecture over whether the historical returns associated with certain factors will persist in the future. For example, Lo and MacKinlay (1990), Black (1993), and Harvey et al. (2014) contend that the empirical evidence is a 'result of data mining' (Pappas and Dickson 2015: 8). Before implementing a tilt using one of these factors, plan sponsors should maintain a clear understanding of either the risk explanation, behavioral explanation, or both. For example, if the behavioral explanation holds for a factor, but the risk explanation does not, the return premium could narrow if investors change their behavior in the future. Factor tilts also raise questions about how to implement that tilt—long-only, or long-short, beyond the scope of this analysis.
6. Our analysis of traditional actively managed strategies does not include fixed income funds. For fixed income, our analysis of risk-oriented strategies uses a static tilt to the credit risk premium. This treatment is consistent with research from Bosse et al. (2013), who found that a 'persistent overweighting to corporate

credit risk, and not dynamic or tactical portfolio management (i.e., alpha, or manager skill), has been the primary driver of performance for funds benchmarked to the Barclays US Aggregate Bond Index.'

7. For example, the NACUBO (2015) Commonfund Study of Endowments found a passive/active mix for domestic equity of 29 percent/71 percent in 2015.
8. Wallick et al. (2015b) analyze the relationship between alpha and various quantitative portfolio characteristics. Only the expense ratio and portfolio turnover provide a statistically significant explanation of alpha. 'More than any other quantifiable attribute we have examined, lower costs are associated with higher risk-adjusted future returns—or alpha' (Wallick et al. 2015a: 1). Simply selecting a fund from the lowest- rather than the highest-cost quartile increased the likelihood of outperforming a relevant index in the subsequent five years by more than 50 percent (a 40% chance versus 26%).
9. Wallick et al. (2015a) analyze funds of hedge funds, because these are professional managers who are paid to construct a high-quality collection of hedge funds for clients. This objective is similar to what numerous institutional investors would be attempting to do for their own portfolio. The authors also analyzed individual hedge funds over the same period using the same database and found that 56 percent outperformed a traditional portfolio of 60 percent equity and 40 percent fixed income.
10. These conclusions reflect our assumptions about the implementation approaches and return premiums associated with the risk-oriented strategies. For plan sponsors that use different assumptions, the results of the analysis may vary. But this framework is not intended to identify an optimal strategy. Rather, it outlines a process that plan sponsors can use to evaluate the various options.
11. Although some hedge fund strategies have less volatility than broad market equities, they introduce consequential new risks such as a high degree of manager risk.

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