Vanguard

Survey of Defined Benefit Plan Sponsors

Vanguard Research | October 2016

Kimberly A. Stockton

- Since 2010, when Vanguard conducted its first survey of defined benefit (DB) plan sponsors, a number of market and regulatory factors have driven DB funding ratios lower and plan maintenance costs higher. Interest rates remain stubbornly low. New mortality assumptions reflecting longer life spans have increased liability value and duration for most plans. At the same time, Pension Benefit Guaranty Corporation (PBGC) premiums have been on the rise since 2013, and are scheduled to increase each year through 2019.

- Our results for the third survey reflect this challenging environment. A much larger percentage of corporate DB plans were closed or frozen in 2015 relative to our 2010 survey. In addition, many sponsors of these plans are looking for exit strategies. Our results show an increased focus on funding in order to minimize variable PBGC premiums, manage impact to sponsor company financials, and facilitate eventual plan termination. At the same time, most of those with open plans remain committed to maintaining their plan, but these sponsors continue to implement risk and cost management strategies.

Summary of findings

Risk perception and management

In general, concerns about pension plans increased in 2015 relative to our second survey, in 2012. The percentage of respondents indicating that a pension issue was extremely or very important increased for all but one issue in 2015. Funded status risk and cost of the pension plan are still the top concerns for plan sponsors. However, costs are a much bigger concern in the 2015 survey than they were in 2012.

Stubbornly low interest rates continue to be the most important risk consideration for sponsors in the 2015 survey. The importance of longevity risk increased substantially from 2012, likely in response to changes in mortality tables used to value pension liabilities.

Investment policy

The investment objectives of our survey respondents reflect their concerns about funded status risk. Minimizing volatility in plan contributions/funding ratio and obtaining full funding are the most common primary investment objectives for plan sponsors. Obtaining full funding is the second most common, up from third in the 2012 survey.

Asset allocations are little changed from 2012 results, which averaged 48% equity/39% bonds/2% cash/11% alternatives. Vanguard's analysis of asset allocation by plan status reveals a positive trend seen more broadly in the industry: frozen plans nearer to termination with lower pension risk. Another positive trend is that bond durations as reported in the 2015 survey are longer than reported in 2012, consistent with increasing adoption of liability-driven investing (LDI).

In a new question in the 2015 survey, we asked about the active/passive asset allocation. Our results are consistent with other surveys and institutional investors in general. Nearly two-thirds of equity assets and three-fourths of fixed income assets are invested in actively managed investment vehicles.

The trend toward more LDI continues in the 2015 survey. About 80% of plan sponsors reported using at least one LDI strategy to manage pension plan risk in 2015, an increase from 68% reporting this in 2012. Another new question in the 2015 survey asked what challenges are associated with LDI. The top two responses were: a low interest rate environment and new mortality assumptions.

Notes on risk and the Vanguard Capital Markets Model®

IMPORTANT: The projections and other information generated by the Vanguard Capital Markets Model (VCMM) regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results, and are not guarantees of future results. Distribution of return outcomes from VCMM, derived from 10,000 simulations for U.S. equity returns and fixed income returns. Simulations as of December 31, 2015. Results from the model may vary with each use and over time. For more information, please see the appendix.

All investing is subject to risk, including the possible loss of the money you invest. Diversification does not ensure a profit or protect against a loss. Investments in bonds are subject to interest rate, credit, and inflation risk. Foreign investing involves additional risks, including currency fluctuations and political uncertainty. U.S. government backing of Treasury or agency securities applies only to the underlying securities and does not prevent share-price fluctuations. Investments that concentrate on a relatively narrow market sector face the risk of higher share-price volatility.

There is no guarantee that any particular asset allocation or mix of funds will meet your investment objectives or provide you with a given level of income. Past performance is no guarantee of future returns. The performance of an index is not an exact representation of any particular investment, as you cannot invest directly in an index.

In the 2015 survey, sponsors reported using a lower expected return on assets (EROA) for the current year (7.3%) than for the prior year (7.7%). Vanguard Capital Markets Model (VCMM) forecasts of 30-year returns based on reported asset allocation are consistent with current-year EROAs reported in 2015.

In 2015, for about 94% of plan sponsors, acceptable downside variation in the plan's funded status was less than 10%, yet their asset allocations remained aggressive. VCMM forecasts expect the funding ratio volatility to be higher than this for the average pension plan.

Plan status and design

With respect to plan status, compared with 2012, significantly fewer DB plans were open and active in 2015. The change relative to Vanguard's 2010 survey is even more dramatic. The number of open plans reported dropped from 59% in 2010 to 30% in 2015. At the same time, the number of plans that are closed or frozen has doubled over these five years.

Nearly two-thirds of surveyed corporate plan sponsors intend to make changes to their plan design or status, compared with fewer than half in 2012. However, these changes may entail more derisking strategies than actual plan status changes. While fewer respondents indicated planned freezes or terminations in 2015 than in 2012, many had planned other risk-reduction strategies. For example, 27% planned to offer a lump-sum window and 11% planned to purchase a group annuity.

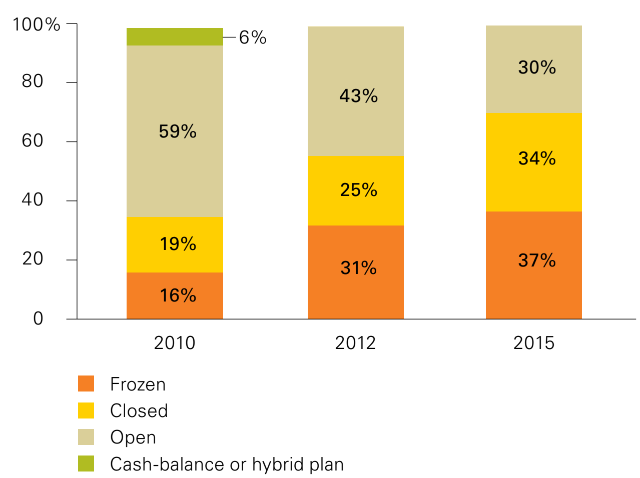
In each survey wave, impact on company financials, high plan cost, and high cost volatility were the top three considerations for making changes to plan design or status. In 2015, however, impact on company financials was the primary reason, by the largest margin, followed by high cost and cost volatility.

Introduction

Vanguard's *Survey of Defined Benefit Plan Sponsors, 2015*—the third in a planned series of surveys—was conducted to evaluate how sponsors are managing plans in the current market and regulatory environment and to identify trends relative to Vanguard's 2012 survey results. We received responses from 178 corporate DB plan sponsors with decision-making authority. 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. For more details on respondent demographics, see Appendix I.

Vanguard's survey results reflected the long-term industry trend of declining open and active plans. Nevertheless, the pace of the trend identified in our results was fairly striking, as shown in **Figure 1**. In contrast to the 2010 survey results, most respondent plans (about 70%)

Figure 1. Sponsors' current defined benefit plan status



Notes: Cash-balance or hybrid plan was not asked about in the 2012 and 2015 waves. Data may not add up to 100% because of rounding.

Source: Vanguard.

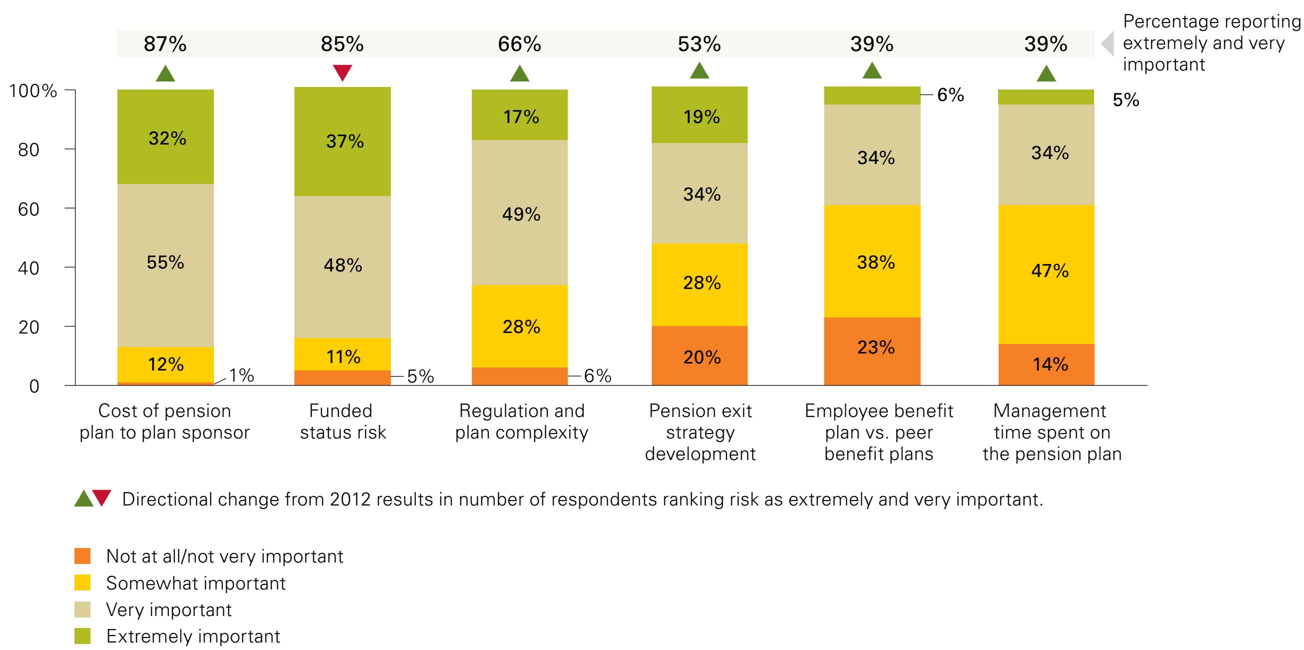
in 2015[1] were closed or frozen. The percentage of frozen plans rose from the 16% reported in Vanguard's September 2010 survey to 37% in 2015, roughly a 130% increase. The percentage of open and active plans reported declined dramatically as well. Only 30% of plans reported being open and active in 2015, compared with 59% in 2010. (Note that in the remainder of this paper, comparisons of "2010," "2012," and "2015" refer to Vanguard's 2010, 2012, and 2015 surveys/results.)[2]

Risk perception and management

As plan sponsors faced continued market and regulatory challenges, their concerns about risks associated with their pension plans generally increased from 2012. Our 2012 and 2015 surveys asked sponsors how concerned they were about various pension issues. As shown in **Figure 2**, with the exception of funded status risk, the percentage of respondents indicating a pension issue was "extremely important" or "very important" increased for each issue in 2015.

Figure 2. Concerns associated with pension plan, 2015

Sponsors rated their concerns in terms of importance.



Notes: Organizations with frozen plans are more likely to rate "Funded status risk" and "Pension exit strategy development" higher and "Employee benefit plan versus peer benefit plans" lower compared with those with open and active or closed plans. Data may not add up to 100% because of rounding.

Source: Vanguard.

1 Survey results were completed on June 5, 2015.

2 Our results are point-in-time summary responses from three different samples of DB plans. These and all results are not necessarily indicative of the broad DB market, and will reflect sampling error.

Respondents' top concern in 2015 was the cost of their pension plan, closely followed by funded status risk, defined as uncertainty or variability in the pension plan funding ratio. These were also the top two concerns mentioned in Vanguard's 2012 survey, but with some differences. In 2012, funded status risk was the largest concern and pension cost was an almost distant second. As costs for DB plans have continued to increase, so, too, has concern about this issue. A recent study from the Bureau of Labor Statistics found the per-hour-worked costs of providing access to defined benefit plans increased 64% in goods-providing industries, and 68% in service-providing industries, in the seven years ended March 2015.[3]

Also, consistent with a larger percentage of plans moving closer to termination, our results reflected sponsors' growing concern about developing a pension exit strategy. While this was fourth on the list in both 2012 and 2015, concern about this is deepening—53% called it extremely or very important in 2015, up from 44% in 2012.

Our 2010, 2012, and 2015 surveys queried sponsors about the types of pension risks that were important to them. Sponsors in our 2015 survey told us that interest rates continue to be the most important risk consideration—with equity market risk and expected long-term plan costs tied for second. Interest rates are always a critical risk factor for pension plans, but a prolonged low-interest-rate environment has increased plan liabilities, resulting in lower funded status, and possibly higher pension cost, regardless of the *undiscounted* benefit obligation. Despite an uptick in 2013, long-term interest rates and discount rates headed lower again in 2014, and had not recovered to year-end 2013 levels as of midyear 2015, when the survey was conducted.[4]

With regard to other risks that sponsors are thinking about, concern about inflation risk continues to decline. This is not surprising, given that inflation has been and is expected to be modest for the near future.[5] Longevity-risk concern rose in the 2015 survey, likely in response to the new mortality tables issued by the Society of Actuaries in October 2014, which reflected increased longevity and thus increased liabilities. Equity market risk was still the second-largest risk concern in 2015, but the percentage of respondents citing this risk as extremely or very important declined from 2012. In mid-2015, the United States was in its seventh year of a bull market, which could have influenced the lower levels of concern. Many investors exhibit "recency bias," which is the tendency to think that trends observed in the recent past will continue. **Figure 3**, on page 6, shows results from Vanguard's three surveys on the types of pension risk that matter to sponsors.

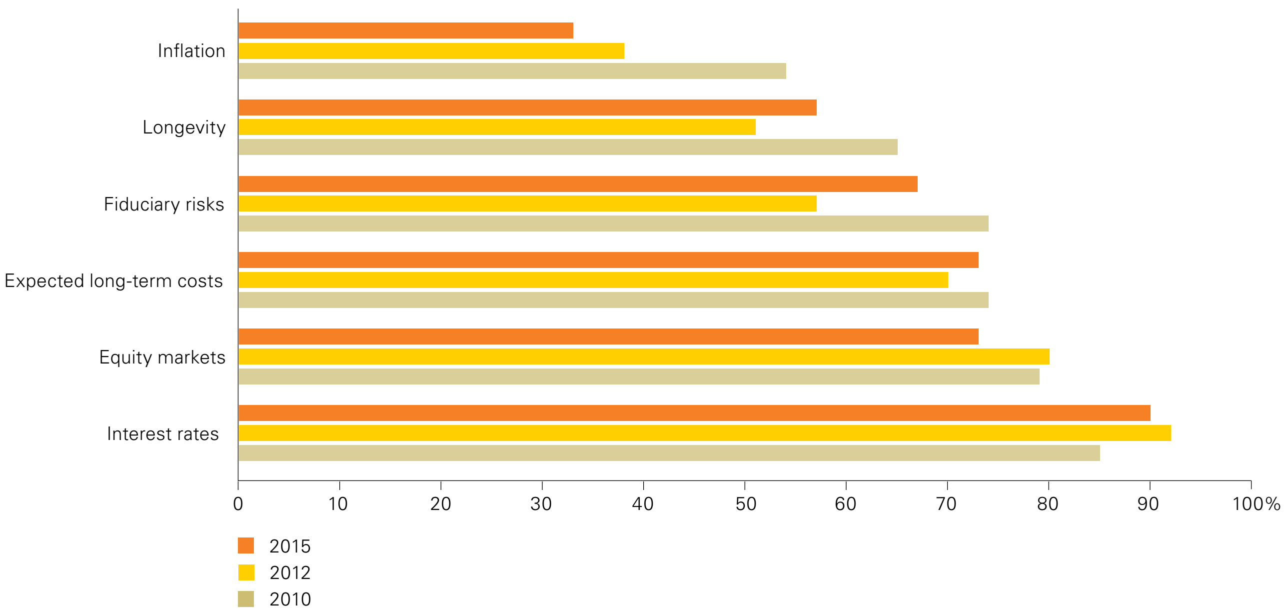
3 The study found specifically that access costs, defined as the costs to employers per employee hour worked for providing access to defined benefit plans, increased from $2.73 per employee hour worked in March 2008 to $4.48 in March 2015 in goods-providing industries, and from $1.79 to $3.00 over the same period in service-providing industries. See Works (2016).

4 The Citigroup Pension Liability Index (CPLI) ended 2014 at 3.95%, 100 basis points lower than its 4.95% level at year-end 2013. As of May 31, 2015, the CPLI was at 4.15%.

5 Vanguard's current view is that as the labor market continues to tighten, through 2016 and beyond, broader price inflation will eventually move closer to the Federal Reserve's official 2% target, which is well below the historical average for core CPI from 1960–2015 of just under 4%. See Davis, et al. (2015).

Figure 3: Types of risk

Percentage of respondents rating a pension risk as extremely/very important



Source: Vanguard.

Investment policy

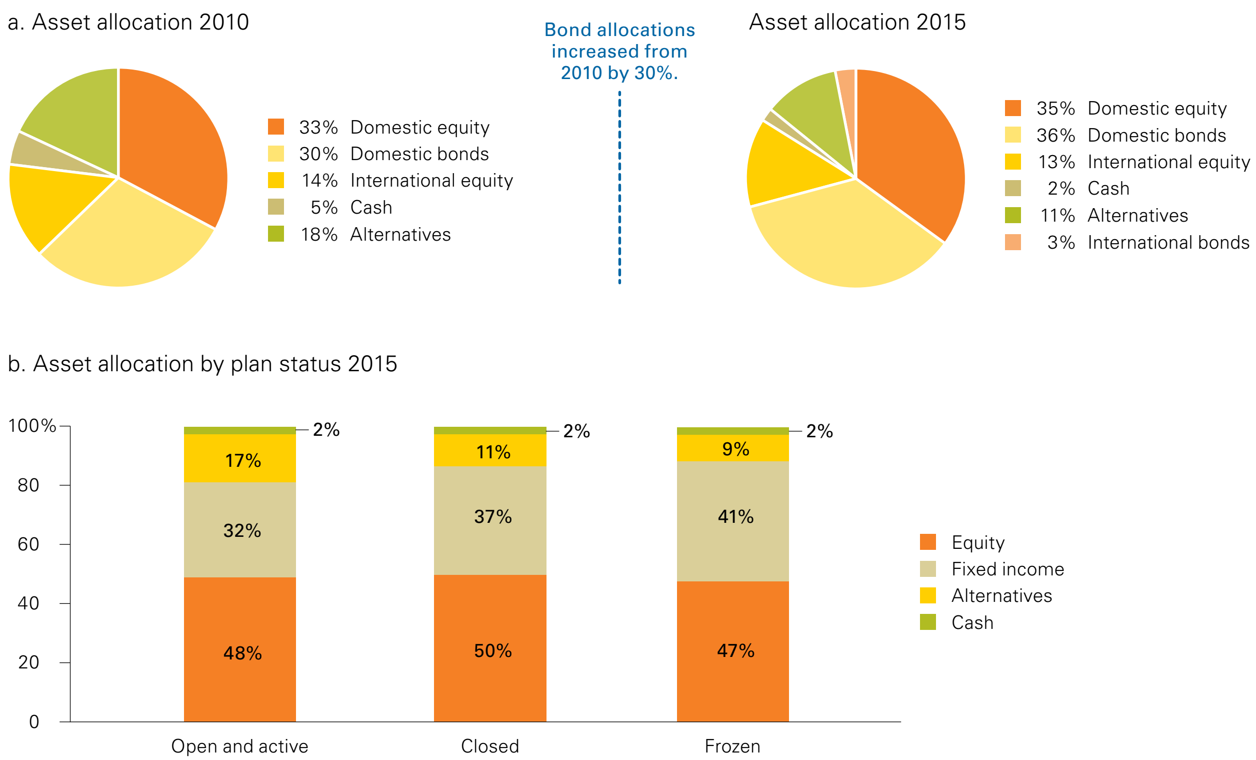
Asset allocation

As described previously, plan sponsors' concerns about their pension plans in 2015 were very similar to their concerns in 2012. These were the cost of their pension plans and funded status risk. In 2015, they reported that their most important risk considerations were interest rates and the equity market. Given that these concerns and risk considerations have persisted, we might have expected somewhat of a shift in their portfolios' asset allocations from 2012. But this was not the case. In fact, the overall average asset allocation reported in 2015 nearly mirrored that reported in Vanguard's 2012 survey: 48% invested in equities, 39% in bonds, 2% in cash, and 11% in alternatives such as hedge funds, private equities, and commodities.[6] Although broad allocations changed little in the past three years, there were some differences from allocations reported in 2010. Most notably, bond allocations increased significantly, with the domestic bond allocation increasing from 30% in 2010 to 36% in 2015, as shown in **Figure 4**. Respondents in 2015 also reported a 3% non-U.S. bond allocation. This trend represents broad longer-term industry trends: As more corporate pension plans implement liability-driven strategies and more approach termination, fixed income allocations have generally been increasing in the past decade.

In addition, when we looked at 2015 asset allocations by plan status, we saw results consistent with plan sponsors' concerns in 2015. For instance, the average asset allocations for frozen plans carried less pension risk than that for plans that were open. Frozen plans had smaller alternative and larger fixed income allocations than open plans, also as shown in Figure 4. Although frozen-plan allocations were lower-risk than those in open plans, the frozen plans' return-seeking allocations—allocations to equity and alternative assets—were still relatively

6 The allocations reported in Vanguard's survey appear to be representative of corporate DB plans broadly. For example, a Market Strategies survey found 2015 reported allocations of 38% fixed income; 60% equities, real estate investment trusts, and alternatives; and 2% cash. See Market Strategies (2016).

Figure 4. Trends in pension plan asset allocation



Notes: International bonds were not included as an option in the asset allocation question in 2010. Data may not add up to 100% because of rounding.
Source: Vanguard.

large at 56%. In general, Vanguard recommends that well-funded frozen plans have 90%–100% of their assets in duration-matched fixed income,[7] representing the liability-hedging allocation. Frozen plans that are underfunded, and without a near-term termination planned, may require a larger return-seeking asset allocation, however. Our 2015 survey respondents with frozen plans reported an average funded status of 84%. Absent contributions to fill this funding gap, this low funded status alone might suggest a larger risk-seeking asset allocation. But 32% of these respondents indicated a planned termination in the next several years. Therefore, some of the frozen-plan respondents may still be assuming too much risk.

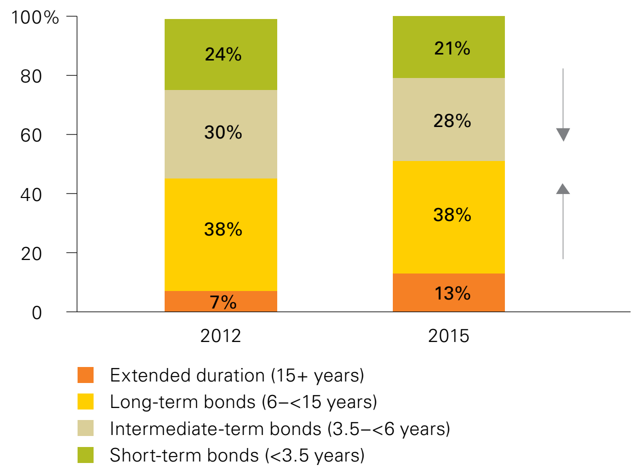
7 Frozen plans with shorter time horizons should have smaller return-seeking/larger hedging allocations because they are at risk of stranded surplus. Once a plan's funded status reaches a certain level, there is little upside to taking investment risk, because surplus assets cannot revert to a plan sponsor.

Bond subasset allocation

Further evidence of a positive trend in plan sponsors' responses to risk is growing bond durations. The suballocations to domestic bonds by term as reported in 2012 and 2015 are shown in **Figure 5**. For plans with large return-seeking allocations, Vanguard believes it is important that the fixed income allocation—the liability-hedging allocation—be at least duration-matched.[8] A typical pension liability has a duration of between 11 and 14 years. While reported durations in 2015 did not appear to be duration-matched, average durations were longer than those reported in 2012. This is due to smaller short-term and much larger extended-duration bond allocations in 2015. The reported extended-duration allocation nearly doubled in 2015 to 13% from 7% in 2012.

Also, with respect to the fixed income suballocation, the corporate to Treasury allocation reported in 2015 was nearly identical to that reported in 2012: 65% to corporate and 35% to Treasury bonds. This is within the range of what Vanguard has determined to be the optimal mix to hedge the pension liability. Vanguard research has found that a long Treasury allocation of 20%–35% combined with a long corporate allocation of 65%–80% had the highest correlation and regression fit to the Citigroup Pension Liability Index (CPLI).[9]

Figure 5. Bond durations increased from 2012



Note: Data may not add up to 100% because of rounding.

Source: Vanguard.

Active versus passive

In a new question this year, we asked about the active and passive asset allocation. The increase in cash flows to passive funds over the past five years has been widely reported.[10] But our results show the portfolio allocations for these institutional DB investors are largely dedicated to active investments, as is typical for institutional investors.[11] On average, 66% and 72% of equity and fixed income assets, respectively, were actively managed. Frozen plans had larger passive allocations than open plans, which Vanguard believes is appropriate given the shorter time horizon of frozen plans.

8 Fixed income durations may need to be even longer than liability duration to obtain the desired liability hedge at the portfolio level. Vanguard assumes return-seeking assets to have a zero duration when estimating liability hedge ratio.

9 See Bosse and Inglis (2012).

10 Passive funds and exchange-traded funds combined experienced inflows of $1.6 trillion compared with active's $269 billion between January 1, 2011, and November 30, 2015. Passive assets grew from $2.1 trillion to $4.6 trillion, while active assets expanded from $7.1 trillion to $9.8 trillion during that period, according to Morningstar data.

11 For example, the 2015 NACUBO Commonfund Study of Endowments found a passive/active mix for domestic equity of 29%/71% in 2015. See NACUBO (2015).

Return assumptions

Again in 2015, we asked plan sponsors what their plan's current expected return on assets (EROA) assumption[12] was in their most recent annual financial statement, and what it was one year ago. The results for 2015 responses are illustrated in **Figure 6a**. The decline in the average current EROA assumption relative to last year's average is notable. With respect to current EROA, most plan sponsors are in the range of 7%–8%, with a few above 9%. Using our asset simulation model, the VCMM,[13] we generated forward-looking return distributions for a portfolio similar to our average respondents', of 59% equity and 41% bonds,[14] over a 30-year period. The range of return results from our forecast is generally consistent with sponsors' average assumptions.[15] Our 50th percentile return results on this portfolio over the 30-year period are 7.2%, as shown in **Figure 6b**. Downside results are much lower, with 5th percentile results of 3.2%.

Figure 6. EROAs consistent with Vanguard expected returns

a. Survey results for sponsors' *assumed* returns

EROA range	Current year's	Last year's
1–5%	10%	10%
6%	18%	14%
7%	41%	34%
8%	26%	30%
9% or more	5%	12%
Average	**7.3%**	**7.7%**

Source: Vanguard.

b. 30-year return forecast on average reported pension allocation: 59% equity/41% fixed income portfolio

Percentile	Return	Percentile	Return
5th	3.2%	60th	7.8%
10th	4.0%	70th	8.5%
20th	5.1%	80th	9.3%
30th	5.9%	90th	10.6%
40th	6.6%	95th	11.5%
50th	7.2%		

Source: Vanguard, from VCMM forecasts. (See Appendixes II and III.)

12 EROA, the return assumption for corporate DB plans, is a component of pension expense for the sponsor company income statement. EROAs are intended to be very long-term, typically 30 years, and based on median (expected) results.

13 Our asset simulation model, the Vanguard Capital Markets Model (VCMM), employs a regression-based Monte Carlo simulation approach to generate forward-looking distributions of expected long-term returns for global equities, fixed income, and other asset classes. More information about the VCMM and our methodology is provided in Appendix II.

14 Here we assume the 11% allocation to alternative assets that our respondents reported is allocated to equity because reliable forecasts for each alternative asset class are not available. See Appendix III for portfolio and forecast assumptions.

15 EROAs are made based on plan-specific portfolios, so they can and should vary. We can make only the general observation that our forecast for 30-year returns on the typical plan asset allocation falls within the expected EROA range reported in our 2015 survey.

Investment strategy

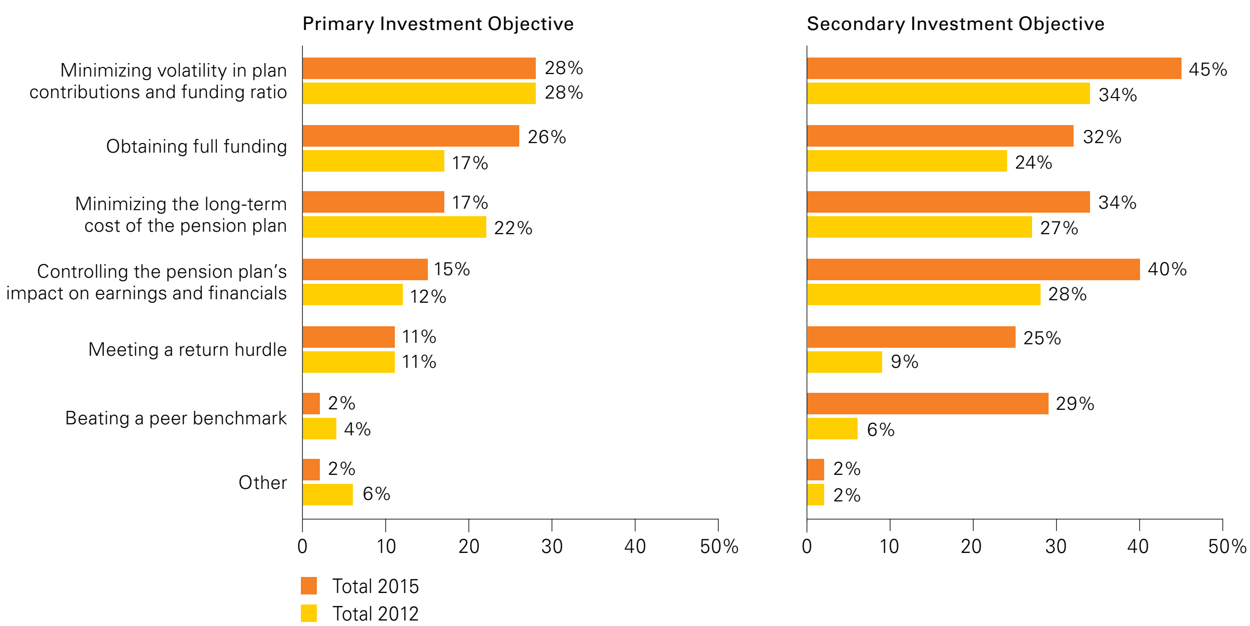
As in 2012, we queried plan sponsors about their plan asset objectives in 2015. As shown in **Figure 7**, survey responses in 2015 linked directly back to sponsor concerns about their plans outlined earlier. Minimizing contribution and funding ratio volatility continued to be the primary and secondary investment objectives of *most*, consistent with our 2012 results. Obtaining full funding was the *second* most common *primary* objective, up from third place in 2012. Given that more corporate plans were frozen in 2015, it is not surprising that obtaining full funding replaced cost minimization in 2015. Although managing cost is still important in this latest survey, obtaining full funding becomes more important as more plans near termination.

Also noteworthy is that, while only 11% of respondents listed meeting a return hurdle as their primary objective, 25% cited it as a *secondary* objective—a significant increase from 2012. This is not something we view as problematic, however. Although Vanguard believes return hurdles should not have a *primary* role in a DB plan's investment strategy, return hurdles as *secondary* objectives can be appropriate for open, underfunded plans, which cannot contribute the full plan deficit and are attempting to earn their way out. Public company sponsors may also consider their EROA for reported pension expense a return hurdle, because plan EROAs must be reasonable given the plan asset allocation.

Finally, again reflecting sponsor concerns is the increase in "controlling the pension plan's impact on earnings and financials" as a secondary objective in 2015. This was the second most common secondary objective; the number of respondents citing this as a secondary objective increased from 28% in 2012 to 40% in 2015. Heightened sensitivity to the impact of the pension plan on company financials is clearly linked to the most common secondary and primary objective of minimizing volatility in plan metrics, for public sponsor companies in particular.

Figure 7. Investment objectives

Respondents ranked their primary and secondary investment objectives for plan assets.



Source: Vanguard.

Again in 2015 we asked what investment strategy changes sponsors planned to make in the next few years. Results for the 2015 survey relative to prior years' surveys are shown in **Figure 8**. Consistent with 2010 and 2012 results, in 2015, many sponsors indicated that they are likely to increase their plan's fixed income allocation, some of which would be allocated to Treasuries, but more to corporate fixed income. The second most common change planned in each survey wave was a decrease in equity allocations. The increasing fixed income and decreasing equity allocations are consistent with increasing use of LDI strategies.

As further evidence of the LDI trend, in 2015, many sponsors planned to increase their portfolio duration in the next few years, 24% without leverage and 15% with leverage. Increasing the average duration match can reduce liability tracking error substantially. However, because of the dynamic nature of plan liabilities, Vanguard does not advise attempts at more "precise" matches with derivative products, which can increase complexity and cost in exchange for only very temporary improvement in the liability match.

Finally, many sponsors (19%) still planned to increase alternative asset allocations but, consistent with 2012 results, most (70%) are simply maintaining their current allocation to alternatives. The 11% average allocation to alternatives reported in 2015 may be too large, however. Vanguard research has found that alternative assets generally have not made positive contributions to an LDI strategy, neither to the return-seeking nor the hedging allocation (Bosse, 2012).

Figure 8. Planned changes to investment strategy

	Total 2015				Total 2012		Total 2010	
	Decrease	No change	Increase	Gap	% Decrease	% Increase	% Decrease	% Increase
Fixed income Treasury allocation	10%	61%	29%	19%	13%	26%	19%	37%
Fixed income corporate allocation	9%	46%	45%	36%	9%	47%	12%	52%
Domestic equity allocation	44%	44%	12%	–31%	48%	9%	54%	21%
International equity allocation	24%	57%	19%	–6%	34%	18%	33%	33%
Alternatives allocation	12%	70%	19%	7%	12%	22%	18%	25%
Duration of portfolio with derivatives/leverage	7%	78%	15%	8%	4%	17%	—	—
Duration of portfolio without derivatives/leverage	8%	68%	24%	16%	9%	21%	—	—

Decrease
No change
Increase

Notes: Gap = increase – decrease.

"**Duration** of portfolio with derivatives/leverage" and "Duration of portfolio without derivatives/leverage" were not included in the 2010 survey question. Data may not add up to 100% because of rounding.

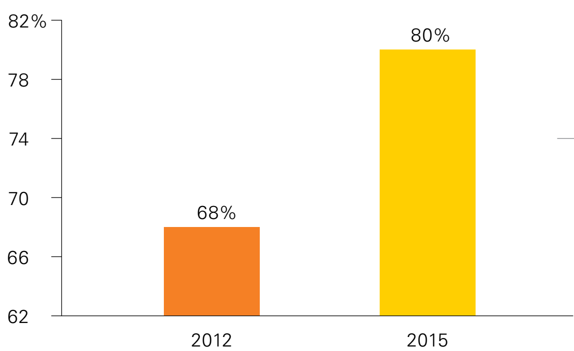
Source: Vanguard.

Liability-driven investing

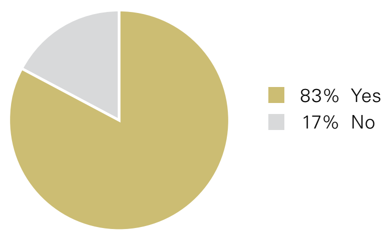
As in the 2012 survey, we asked a number of questions about LDI strategies in 2015. The results are a continuation of trends that emerged in 2012. In 2015, an even larger majority of sponsors are now implementing an LDI strategy and the vast majority are including that strategy in the investment policy statement (IPS), as shown in **Figure 9**. Those respondents using an LDI strategy increased from 68% in 2012 to 80% in 2015. Those reflecting the LDI strategy in their policy statement increased as well to 83% in 2015, from 77% in 2012. Vanguard suggests a dynamic investment policy statement to reflect derisking strategies.[16] We also again asked which type of LDI strategies sponsors were currently using. The percentage of affirmative responses for each strategy in 2012 and 2015 is shown in **Figure 9c**. Glide path derisking, the

Figure 9. Use of LDI strategies continues to rise

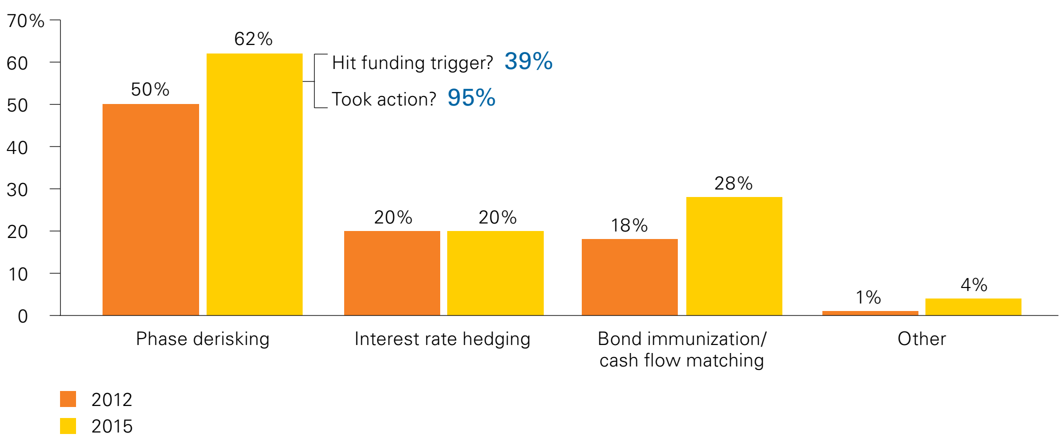
a. **Percentage of respondents using an LDI strategy.**



b. **LDI reflected in investment policy statement 2015.**



c. **Type of LDI strategies respondents said they were employing.** Respondents also said whether their plan had hit a glide path (funded status or other) trigger, and of those that had, whether the plan took action based on the trigger.



Source: Vanguard.

16 See Bosse (2015).

process of transitioning to a lower-risk portfolio as funding ratio improves, continues to be the most frequently used LDI strategy and an approach suggested by Vanguard for defined benefit plans.[17] In a new question for 2015, for those implementing a glide path derisking approach, we asked whether the plan had ever hit a funding ratio trigger and if the plan derisked its asset allocation in response. Thirty-nine percent of sponsors reported hitting a trigger and 95% of those took action in response.

Again in 2015, we asked those respondents who indicated that they did not use an LDI strategy (20%) if they planned to implement one in the future. Seventy-seven percent of those who are not currently using LDI responded that they are not planning to implement it in the next few years. This supports the notion that most sponsors that were planning to derisk with a more liability-sensitive strategy have done so. Of those not planning to implement LDI, most were open and active plans. Open and active plans typically have more uncertain liabilities than frozen or closed plans, so an LDI approach may be more difficult for them to implement. Also, of those not using/planning to use LDI, 14% were cash-balance or nontraditional plan types, which may not benefit from an LDI strategy.[18]

Although Vanguard advocates a liability-driven investment approach for all DB plans, there are sponsors who have very high pension risk tolerance. They therefore still manage their plans entirely from a total-return perspective, using only return-based risk measures and with little consideration for plan asset and liability correlation.[19] Some DB plan types may be more sensitive to pension risk than others. For example, private sponsor companies must worry about the impact of pension volatility on their cash flows, but not on public financial statements, so they could have a higher pension risk tolerance than public sponsor plans.

Finally with respect to LDI, in a new question this year, we asked sponsors what the primary challenges were to implementing LDI. The top three challenges cited were:

- Low interest rates: 76%
- New mortality assumptions: 56%
- Impact on return: 44%

Of the top three challenges, new mortality assumptions, which increased liability value and duration, are in Vanguard's view the one legitimate challenge to LDI implementation. If the sponsor cannot fund the increased liabilities, it may need to have a larger return-seeking allocation than is optimal for an LDI strategy and longer durations may require an adjustment in the plan glide path. Concerns about return impact, however, can be addressed with a glide path approach to LDI. With such an approach, a return-seeking allocation is maintained until the plan is fully funded. At that point, the hedging allocation increases in order to maintain full funding. Higher returns are not necessary at some level above full funding and put the plan at risk for stranded surplus.[20] Rising rates should be much less of an issue for a plan implementing LDI than a total-return approach, because if interest rates rise, liability values will decline proportionately to the hedged fixed income assets in an LDI portfolio.

17 See Stockton and Shtekhman (2012) and Inglis and Sparling (2012).

18 Traditional cash-balance liabilities with interest rate crediting have unhedgeable liabilities.

19 The objective function for all plan assets should incorporate liabilities and funding ratio variation because plan assets are almost exclusively used to fund plan benefits, even for plan sponsors who are unconcerned about the impact to cash flows or company financials from the pension plan.

20 A plan's maximum funding level (MFL) should be 100% *plus* the amount of surplus the plan can expect to use over the expected life of the plan. Funding above the MFL can lead to *stranded surplus* because, except in limited situations, plan assets must be used only to fund plan liabilities or to increase plan benefits. If excess assets do revert to the sponsor at termination, then a 50% excise tax is applied on top of the standard corporate rate.

Funding ratio volatility

An important component of an LDI strategy is managing funding ratio volatility to a level consistent with plan sponsor risk tolerance. We asked sponsors in 2015 what downside variation in their plan funding ratio was acceptable to them. The majority's responses were between 1%–10%, as shown in **Figure 10a**.

Recall that sponsors also listed uncertainty in the plan funding ratio as one of their top concerns about pension risk. Yet average asset allocations are roughly 40% intermediate-/long-term bonds and 60% equity/alternatives, indicating a likely mismatch between asset and liability returns and, consequently, exposure to large downside funding ratio variation. This would suggest that sponsors' assessment of acceptable downside variation was much lower than might actually occur.

To confirm this, we analyzed projected funding status volatility for a typical plan with an asset allocation and duration similar to the average reported in 2015.[21] We found that funding ratio variation was expected to be well beyond the 10% variability ceiling with which sponsors reported being comfortable. As shown in **Figure 10b**, the funded status at risk, as measured by the annual difference between expected (50th percentile) and 5th percentile funding ratio results, is more than 10% in each year of the five-year forecast.[22] As illustrated, sponsors will likely experience more volatility in plan funding ratios than they reported as acceptable.

Figure 10. Sponsors' tolerance of funding ratio volatility

a. Acceptable downside variation in funding ratio

Variation range	Percentage of responses
0–1%	5%
1–5%	47%
6–10%	42%
11–20%	6%
Greater than 20%	1%

Source: Vanguard.

b. Funded status at risk

Year 1	Year 2	Year 3	Year 4	Year 5
14.5%	22.2%	28.4%	35.0%	41.3%

Source: Vanguard, from VCMM forecasts. (See Appendixes II and III.)

Plan status and design

In each of Vanguard's three surveys of DB plan sponsors, we have queried about expected changes to plan status and design. **Figure 11** summarizes the plan status change results for the 2010, 2012, and 2015 surveys. The most notable trend is that by 2015, it appears that the flurry of plan closings and freezes was over. Only 10% planned to close or freeze their plan in 2015, compared with 40% who planned to do so in 2010. Plan sponsors will likely continue to make changes to their plans to address their heightened concerns about plan risks. But these

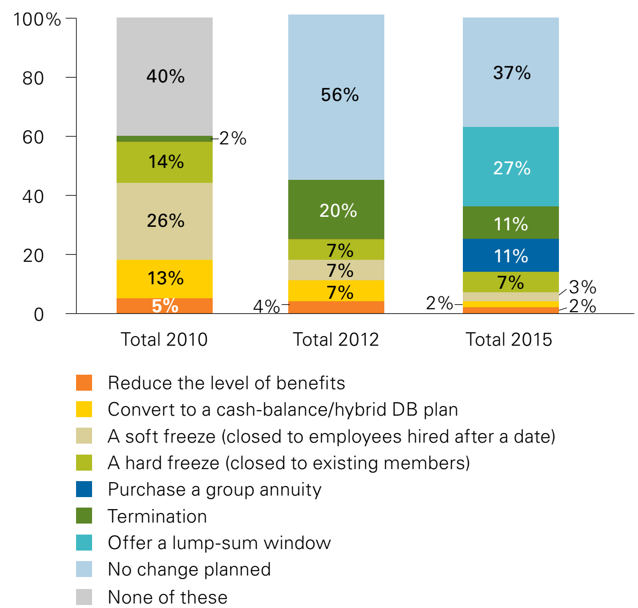
21 More information about the VCMM, our methodology, and the assumptions for this analysis is provided in Appendixes II and III.

22 Here we assumed contributions were made using a proxy for minimum contribution requirements based on the seven-year amortization of funding shortfalls defined by the Pension Protection Act.

changes may entail more derisking strategies than actual plan closures. For example, in 2015, 27% planned to offer a lump-sum window and 11% planned to purchase a group annuity to reduce their plan liability. The process of offering lump-sum windows gained traction as a risk reduction strategy starting in 2012. Plan sponsors typically offer their vested terminated participants the option to give up their future annuity benefits in exchange for a single lump-sum payment and thereby eliminate the liability for those who take the lump-sum offer.[23] Likewise, after General Motors made headlines in 2012 by buying a large group annuity contract for its retirees, this derisking process, which transfers the pension liability to an insurance company, was followed by many others.[24]

It is also noteworthy that the majority of sponsors of *open* plans, 62%, remain committed to maintaining their DB plan. It could be that by 2015, most plan sponsors that intended to terminate their plan had already begun the process and those that had not yet done so planned to maintain their plan, despite the market and regulatory challenges.

Figure 11. Changes that respondents plan to make in plan design or status in the next several years



Notes: Response options “Offer a lump-sum window” and “Purchase a group annuity” were added in 2015. “None of these” was a response option in our 2010 survey; in 2012 and 2015, the option was “no change planned.” Data may not add up to 100% because of rounding.

Source: Vanguard.

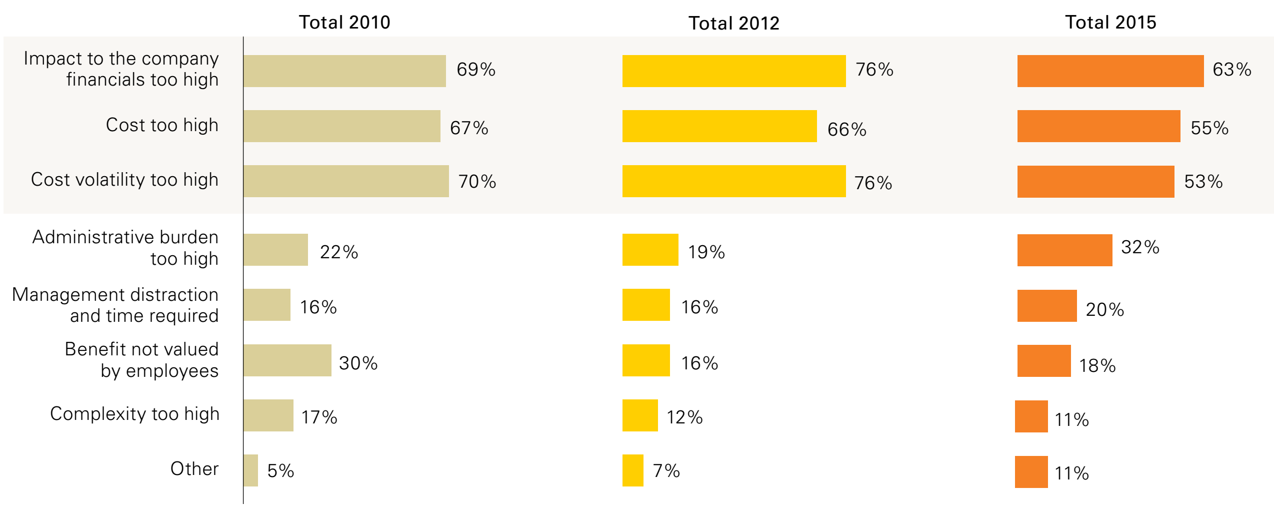
23 Although most plan sponsors had limited the lump-sum offer to terminated vested participants, some made the offer to retirees, and prior to July 2015 there was no clear legal guidance on this. The IRS issued Notice 2015-49 on July 9, 2015, which prohibited qualified defined benefit plans from paying lump sums to in-pay retirees and beneficiaries (apart from those sponsors already far along with their offering). See Internal Revenue Service (2015).

24 Other surveys of DB plan sponsors have had similar findings. For example, Aon Hewitt’s 2015 Hot Topics in Retirement Survey found that 47% would initiate a lump-sum window in 2015 for terminated vested participants, 44% recently offered lump sums to terminated vested participants, and 21% were very or moderately likely to explore purchasing annuities for some participants in 2015. See Aon Hewitt (2015).

For those planning a change to plan status, we asked for the primary reason for making this change. In each survey, the impact on company financials, high plan cost, and high cost volatility were the top three considerations for making changes to plan design or status, as shown in **Figure 12**. In 2015, however, impact on company financials was the primary reason, by a large margin, followed by high cost and cost volatility. This concern about the impact of the plan on company financials also surfaced in the investment objective questions, as discussed earlier. A comparison of 2010, 2012, and 2015 results for top reasons for making a change are in Figure 12.

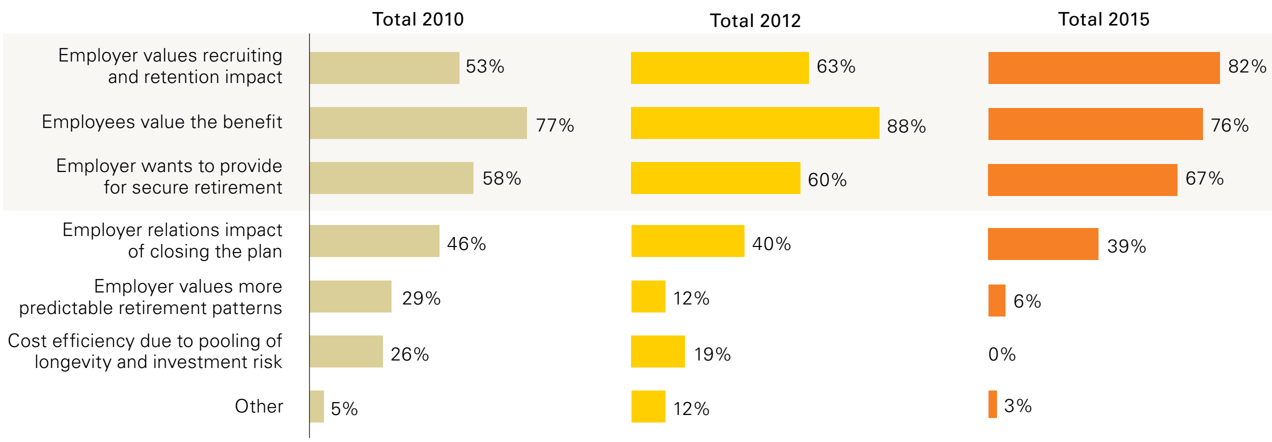
Sponsors continue to attempt to manage what they view as increased risk and costs for their plans. Many have already terminated or have started down that path, but some view the plans as a benefit their employees value and they intend to keep their plans open indefinitely. In our final question, we again asked those sponsors who had open plans and did not intend to make any changes to plan status or design why they were intending to maintain their plan. In each survey, the top three reasons cited were: employees value the benefit, employer values recruiting and retention impact, and employer wants to provide for secure retirement. "Employees value the benefit" slipped from most cited reason in 2010 and 2012 to the second most common in 2015 as shown in **Figure 13**. This may reflect sponsors' assessment of an increasingly mobile workforce and employees' desire for a more portable benefit. Yet, somewhat paradoxically, respondents still see their plan as a valuable recruiting and retention tool; this was the most cited reason for maintaining the plan in 2015.

Figure 12. Top reasons for making changes to defined benefit plan



Source: Vanguard.

Figure 13. Top reasons for maintaining a DB plan



Note: In 2010, this question was asked of those who said their current plan status is open and active; in 2012 and 2015, this question was asked of those who said their current plan status is open and active *and* planned no change in the next several years.
Source: Vanguard.

Conclusion

Since 2010, a number of market and regulatory factors have driven DB funding ratios lower and costs for maintaining the plans higher. Interest rates remain stubbornly low. New mortality assumptions reflecting longer life spans have increased liability value and duration for most plans. At the same time, PBGC premiums have been rising since 2013 and are scheduled to increase each year through 2019. Our 2015 results reflect this environment. A much larger percentage of plans are closed or frozen in 2015 relative to our first survey in 2010. And many sponsors of these plans, not surprisingly, are looking for exit strategies. At the same time, most of those with open plans remain committed to maintaining their plan, but continue to focus on managing risks and controlling costs. Finally, our results show an increased focus on funding to minimize variable PBGC premiums, manage impact to sponsor company financials, and facilitate eventual plan termination.

References

Aon Hewitt, 2015. *2015 Hot Topics in Retirement.* Lincolnshire, Ill. Aon Hewitt.

Bosse, Paul M., 2015. *Dynamic Investment Policy Statement: A Plan for Action.* Valley Forge, Pa.: The Vanguard Group.

Bosse, Paul M., 2012. *Pension Derisking: Diversify or Hedge?* Valley Forge, Pa.: The Vanguard Group.

Bosse, Paul M., R. Evan Inglis, 2012. *For Better Pension Liability Matching, Consider Adding Treasuries*. Valley Forge, Pa.: The Vanguard Group.

Davis, Joseph, Roger Aliaga-Díaz, Peter Westaway, Qian Wang, Andrew J. Patterson, Harshdeep Ahluwalia, 2015. *Vanguard's Economic and Investment Outlook.* Valley Forge, Pa.: The Vanguard Group.

Inglis, R. Evan, and Jeffrey Sparling, 2012. *Pension Derisking: Start With the End in Mind.* Valley Forge, Pa.: The Vanguard Group.

Internal Revenue Service, 2015. IRS Notice 2015-49. Available at irs.gov at this address: https://www.irs.gov/pub/irs-drop/n-15-49.pdf.

Market Strategies, 2016. *Cogent Reports, US Institutional Investor Brandscape*, *January 2016.* Livonia, Mich.: Market Strategies.

NACUBO, 2015. 2015 Commonfund Study of Endowments. Washington, D.C.: National Association of College and University Business Officers.

Society of Actuaries, 2014. Mortality tables available at soa.org at this address: https://www.soa.org/Research/Experience-Study/pension/research-2014-rp.aspx.

Stockton, Kimberly A., 2012. *Survey of Defined Benefit Plan Sponsors, 2012.* Valley Forge, Pa.: The Vanguard Group.

Stockton, Kimberly A., 2015. *Fundamentals of Liability-Driven Investing.* Valley Forge, Pa.: The Vanguard Group.

Stockton, Kimberly A., and Anatoly Shtekhman, 2012. *Glide Path ALM: A Dynamic Allocation Approach to Derisking*. Valley Forge, Pa.: The Vanguard Group.

Works, Richard, 2016. Trends in Employer Costs for Defined Benefit Plans. *Volume 5/Number 2 Pay and Benefits.* U.S. Bureau of Labor Statistics.

Zahm, Nathan, *Longevity and DB Plans—The Good and the Bad. Vanguard Investment Perspectives,* Fall/Winter 2014. Valley Forge, Pa.: The Vanguard Group.

Appendix I. Respondent demographics

Number of respondents		178
Plan asset size	\$20 million–\$50 million	20
	\$50 million–\$100 million	19
	\$100 million–\$250 million	51
	\$250 million–\$500 million	23
	\$500 million–\$750 million	8
	\$750 million–\$1 billion	10
	\$1 billion–\$2 billion	19
	\$2 billion–\$5 billion	14
	\$5 billion or more	14
Sponsor company	Publicly traded	71
	Private	107
Company market cap	Less than \$50 million	2
	\$50 million to less than \$250 million	2
	\$250 million to less than \$500 million	2
	\$500 million to less than \$1 billion	15
	\$1 billion to less than \$2 billion	23
	\$2 billion to less than \$5 billion	38
	\$5 billion to less than \$200 billion	89
	\$200 billion or more	7
Plan type	Traditional	141
	Cash balance	28
	Other	9
Use consultant for plan management		150

Appendix II. About the Vanguard Capital Markets Model

IMPORTANT: The projections and other information generated by the Vanguard Capital Markets Model regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results, and are not guarantees of future results. VCMM results will vary with each use and over time.

The VCMM projections are based on a statistical analysis of historical data. Future returns may behave differently from the historical patterns captured in the VCMM. More important, the VCMM may be underestimating extreme negative scenarios unobserved in the historical period on which the model estimation is based.

The Vanguard Capital Markets Model is a proprietary financial simulation tool developed and maintained by Vanguard's primary investment research and advice teams. The model forecasts distributions of future returns for a wide array of broad asset classes. Those asset classes include U.S. and international equity markets, several maturities of the U.S. Treasury and corporate fixed income markets, international fixed income markets, U.S. money markets, commodities, and certain alternative investment strategies. The theoretical and empirical foundation for the Vanguard Capital Markets Model is that the returns of various asset classes reflect the compensation investors require for bearing different types of systematic risk (beta).

At the core of the model are estimates of the dynamic statistical relationship between risk factors and asset returns, obtained from statistical analysis based on available monthly financial and economic data from as early as 1960. Using a system of estimated equations, the model then applies a Monte Carlo simulation method to project the estimated interrelationships among risk factors and asset classes as well as uncertainty and randomness over time. The model generates a large set of simulated outcomes for each asset class over several time horizons. Forecasts are obtained by computing measures of central tendency in these simulations. Results produced by the tool will vary with each use and over time.

Appendix III. Assumptions and portfolio: Funding ratio variation and expected return simulations

Return and funding ratio forecast assumptions

VCMM forecast	As of 12/31/2015
Asset Allocation	
Domestic equity	43.0%
International equity	16.0%
U.S. aggregate bonds	8.0%
Short credit bonds	4.0%
Long credit bonds	21.0%
Extended-duration bonds	5.0%
Non-U.S. bonds, hedged	3.0%
Portfolio duration	9.7 years
Credit/total bond allocation	66%
Funding ratio variation forecast	
Time horizon	5 years
Initial funding ratio	100%
Plan status	closed
Liability duration	13 years

Funding ratio variation results are shown in Figure 10.
Return forecast is shown in Figure 6.

Vanguard®

Vanguard Research

P.O. Box 2600
Valley Forge, PA 19482-2600

Connect with Vanguard® > vanguard.com

For more information about Vanguard funds, visit vanguard.com or call 800-662-2739 to obtain a prospectus or, if available, a summary prospectus. Investment objectives, risks, charges, expenses, and other important information about a fund are contained in the prospectus; read and consider it carefully before investing.

ISGDBP 102016