American Academy of Actuaries

Issue Brief

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Alternatives for Pension Cost Recognition—Implementation Approaches Using Bond Models

An issue brief published in August 2015, *Alternatives for Pension Cost Recognition—Issues and Implications,* explored the use of discount rates from a full yield curve instead of a single aggregated discount rate to develop pension costs. This issue brief extends that discussion to the development of a yield curve (and associated spot rates) from a bond model. Five different approaches are explored, each with different attributes to be considered. This information is provided to educate actuaries regarding the issues involved and to inform their practice in this area.

Because it is not an actuarial standard of practice promulgated by the Actuarial Standards Board, this issue brief is not a definitive statement as to what constitutes generally accepted practice in the area under discussion. Actuaries are not bound to adhere to the conclusions that may be identified in American Academy of Actuaries issue briefs or to conform their work to the practices described therein. Because this paper addresses emerging issues, there is likely to be future discussion, professional dialogue, and potential regulatory guidance that could either confirm or negate the appropriateness of proposed methodologies.

KEY POINTS:

- An alternative approach to developing pension cost involving the application of the spot rates for each year—rather than aggregated rates appropriate for the plan as a whole—has become widely accepted in recent years.
- While the application of this methodology is essentially straightforward for plan sponsors using yield curves to develop discount rates, its application is less obvious for those using bond models.
- A number of approaches can be identified to implement more granular expensing approaches within bond model applications. Some reflect information from the more general bond market, as a complement to that from the identified bond portfolio, to develop a full array of spot rates across the range of maturities (similar to yield curve models). Others work more directly from the yield information for the identified bonds and do not consider any external information.
- The approaches can be differentiated based on the extent to which external capital market data is relied on, the compatibility of the derived spot rates with the individual bonds in the bond portfolio, and the means necessary to ensure the consistency of the identified rates with PBO and bond portfolio values.
- A recently articulated SEC staff view may present obstacles to the adoption of some of the approaches described in this issue brief.

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Introduction

Statements from the Financial Accounting Standards Board and comments offered by Securities and Exchange Commission (SEC) staff have provided strong support for cash-flow matching as a means for determining discount rates under Accounting Standards Codification (ASC) No. 715, so that many companies—in particular large companies with complex pension obligations—now use this approach. Using a bond model to develop a pension plan's discount rate entails identifying a specific portfolio of bonds that closely matches the overall cash flow timing and duration of plan benefits. The projected benefit obligation (PBO) is measured as the market value of that bond portfolio; under traditional cost recognition methods, a single aggregated discount rate is developed that reflects the portfolio's internal rate of return.

However, a more granular application of interest rates to determine PBO and components of pension cost under ASC 715 generally requires the availability of a complete series of yield/spot/forward rates across the entire range of fixed-income maturities. While these are readily available or easily developed from any yield curve model, under bond-matching models the selected bond portfolio will generally not include information about yield rates across the entire maturity spectrum.

Identifying rates across the maturity spectrum requires pricing each of a bond's component cash flows (coupons and principal repayment). Because there is no market for the separate component payments that constitute an individual bond, the market price assigned to each item of cash flow must be derived from some other data source. Available pricing information reflects the entire bond cash flow, rather than separate values relating to individual payments, so applying a spot rate approach[1] requires estimating a price for each year's payments. Such an estimate may be based on the overall price of the bond and some assumption about the term structure of interest rates across time. This is not unlike the approach used to construct any yield curve, in that it starts with market pricing for multiple bonds of varying maturities, and uses that information to determine a price for each individual year's cash flow.

This issue brief identifies five possible approaches to implement a spot rate approach for developing components of net periodic pension cost. The approaches are:

1. Theoretically derived yield curve;
2. Yield curve derived from selected portfolio bonds;
3. Different single yield for each bond;
4. Different term structure for each bond; and
5. Calculation of implied bond portfolio return (for the successive year).

When implementing a granular pension accounting approach, some additional information beyond that available from the limited portfolio of selected bonds is almost always needed to generate spot rates across the full range of maturities. The bond-matching alternatives can be differentiated based on the approach for referencing that broader bond market data.

1 While there are other approaches to developing service and interest cost discussed in the August 2015 issue brief, that paper primarily references an approach based on the application of year-by-year spot rates to develop present values and interest costs related to a plan's benefit cash flows.

Members of the Pension Cost Work Group, a joint effort of the Pension Committee and the Pension Accounting Committee, include: James Burke, MAAA, FSA, EA, FCA; Bruce Cadenhead, MAAA, EA, FSA, FCA; David Driscoll, MAAA, EA, FSA, FCA; Timothy Geddes, MAAA, EA, FSA, FCA; Eric Keener, MAAA, FSA, EA, FCA; Gerard Mingione, MAAA, FSA, EA, FCA, CERA; Keith Panetta, MAAA, EA; Todd Peterson, MAAA, EA, FSA, FCA; Francis Ratna, MAAA, FIAA, FSA; Mark Spangrud, MAAA, FSA, EA; and John Stokesbury, MAAA, FSA, EA, FCA.

Each of the alternative approaches for developing spot rates from bond models will be assessed based on three key technical considerations:

- The extent to which the methodology relies on external bond market information for estimating levels of fixed-income yields by maturity/duration;[2]
- The extent to which the actual market pricing of the individual bonds in the portfolio is reproduced; and
- The means for aligning the present value of benefits determined by applying the derived spot rates with the bond model-provided measure of PBO (i.e., the overall price of the matching portfolio).

Background on the common issues that arise in bond model development is provided in Appendix 1 for those who do not have extensive knowledge regarding the construction and application of bond models in selecting a discount rate for measuring pension obligations. Familiarity with bond model concepts will be presumed throughout the remainder of this issue brief.

Relevant Guidance Under U.S. Generally Accepted Accounting Principles (GAAP)

There has been substantial guidance over the years with regard to the use of bond market data in the selection of discount rates. It is broadly accepted that discount rates should be based on high-quality fixed-income investments and reflect the duration associated with a given plan's cash flows. Where zero-coupon bonds are not available at all required durations, determination of the assumed discount rate will incorporate expectations for future reinvestment rates.

While guidance exists around the selection of a discount rate for determining a plan's benefit obligation measures (such as PBO) and service cost, there is much less guidance provided on the determination of interest cost. ASC 715-30-20 defines interest cost as simply, "the amount recognized in a period determined as the increase in the projected benefit obligation due to the passage of time."

The approach to determining interest cost has been the subject of much recent discussion. ASC 715-30-35-8 articulates that "measuring the projected benefit obligation as a present value requires accrual of an interest cost at rates equal to the assumed discount rates." Therefore the same discount rates used to discount to present value must also be used to determine interest cost. However, as discussed further below, there are different approaches for determining the rates used to measure the PBO. Within the context of a bond model (and historically for yield curve models), that objective has generally been accomplished by determining interest cost using the single effective discount rate that equates the present value of plan cash flows to the market value of the bond portfolio.

In considering potential approaches for redefining the calculation of interest cost, it should be noted that there is an important distinction between the application of yield curve and bond model approaches. With yield curves, the projected benefit obligation is developed by applying a series of annual spot rates to the plan's projected cash flows; i.e., individual spot rates are explicitly referenced in determining the PBO value. In a bond model approach the PBO is taken to be the market value of a selected hypothetical portfolio that provides for the plan's cash flow with coupon and principal payments. As such, there is no explicit/direct connection between a term structure of interest rates and the determination of PBO. Recent commentary from SEC staff[3] indicates that this distinction was a significant consideration in the SEC's assessment of alternative approaches for determining interest cost within bond models.

ASC 715 requires consistency among assumptions reflecting expectations of the same future economic conditions, raising the question of whether it is permissible to apply different discount rates to benefit payments assumed to be paid in the same year. This issue will be examined further in this issue brief as the alternative approaches for deriving and applying spot rates in a bond model context are explored.

2 Nearly all bond-matching approaches to developing discount rates already rely on external market information to some extent. Rates from a secondary yield curve are typically invoked by these models to provide reinvestment rates to address the cash flow gaps between bond cash flows and pension plan cash flows. These models may also use rates developed from broad-based yield curves to value benefit payments that extend beyond the 30-year point where corporate bond data generally ends. The broad-based yield curves also incorporate an extrapolation of rate information, beyond the maturity range of statistically credible bond information.

3 Remarks by Ruth Uejio, professional accounting fellow, Office of the Chief Accountant, before 2016 AICPA National Conference on Current SEC and PCAOB Developments.

Making significant changes to bond model methodology—particularly ones that significantly affect the discount rate and the measured obligation—would require justification of the facts and circumstances that have changed to support or necessitate such reconsideration.[4] ASC 715-30-55-28 states, "If the facts and circumstances do not change from year to year, it would be inappropriate to change the basis of selection" of the discount rate. SEC staff commentary further indicates that the predominant rationale for evaluating which method is preferable should be the determination of an appropriate obligation amount rather than the effect on annual accounting cost.

Appendix 2 of this issue brief contains additional background including relevant citations from ASC 715 and other guidance pertinent to the issues discussed in this paper, such as the selection of a discount rate (including the use of bond models as a basis for the selection), determination of separate discount rates for subgroups of plan liabilities, and the relationship between the discount rate and interest cost determination.

Current Approach: Application of Bond Model in Aggregate

Before considering the range of possible alternative approaches for developing interest cost using bond models, it may be helpful to consider how the now-prevalent aggregated approach can be described in this framework.

The remainder of this issue brief will examine a variety of alternatives to the aggregated method and evaluate them using this same framework.

Application of Bond Model to Subgroups

A variation of the traditional aggregate discount rate approach involves splitting the primary plan into subgroups—for example, service cost-related benefits, projected benefits for active participants younger than age 45, active participants age 45 or older, terminated vested participants, and retirees—then identifying bond portfolios and developing aggregated discount rates that align with each group. Accounting guidance specifically supports the use of separate discount rates by benefit obligation groups.[5]

This approach is generally consistent with the traditional aggregated approach but captures some of the cost attributes of the spot rate approach by developing different discount rates for subgroups with varying durations. Note that the more subgroups that are utilized and the more varied their demographics, the greater the impact on net periodic cost.

The spot rate approach discussed in the August 2015 issue brief can be viewed as the most extreme application of segmenting, in which each year's projected cash flow is treated as a separate subgroup. However, in the bond model context, methodology

Application of Bond Model in Aggregate

Key technical consideration	Assessment
Extent to which external capital market data is relied on	Because bond components do not require pricing, there is no need to refer to external capital market information for that purpose. However, the use of external bond market information is generally required for developing the reinvestment assumption for surplus funds attributable to cash flow mismatches.
Compatibility with market pricing of individual bonds	There is no attempt to align rates with values of individual bonds.
Compatibility with PBO and bond portfolio values	The single rate used is fully compatible with PBO and bond portfolio values (by definition, given how the rate is developed).

4 Note that many of the approaches discussed in this issue brief can be applied in a manner that avoids significant change to the discount rate and measured PBO value.
5 See ASC 715-30-55-24.

Application of Bond Model to Subgroups

Key technical consideration	Assessment
Extent to which external capital market data is relied on	Because bond components do not require pricing, there is no need to refer to external bond market information for that purpose. However, the use of external bond market information is generally required for developing the reinvestment assumption for surplus funds attributable to cash flow mismatches.
Compatibility with market pricing of individual bonds	There is no attempt to align rates with values of individual bonds.
Compatibility with PBO and bond portfolio values	The single rates used are fully compatible with PBO and bond portfolio values (by definition, given that the single rates are calculated to equate PBO and bond portfolio values).

issues arise with a subgroup approach that would not arise in a comparable yield curve application. For example, viewing each year's cash flow as a separate subgroup would result in the selection of different bonds than if all plan cash flows were considered in aggregate. A greater overall degree of cash flow mismatch would also be expected because this approach assumes that any excess coupon payments made in a year to cover cash flows for one subgroup would not be available in that (or subsequent) years to cover the cash flows for other subgroups.

Other observations

- The subgroup approach represents a compromise between the traditional aggregated and more granular discount rate and interest cost applications.
- While this approach does not require the development of any new methodology, it represents a more refined and more complex application of the traditional single-group approach. If the PBO is segmented, this approach is likely to result in a change in the overall bond portfolio, because a separate matched portfolio will be developed for each subgroup.
- The change in bond model application could result in a change in the PBO (likely an increase) along with an almost certain increase in the overall level of cash mismatch/implied surplus.
- Some complex controls and assumptions might be required in order to ensure consistent application and outcomes (e.g., to what extent the same bonds can be selected for different subgroups).

It is worth noting that under the predominant approach, service cost-related cash flow is typically not considered in developing the matching portfolio, but rather an aggregated rate derived from the PBO matching portfolio is applied in valuing service cost. Accordingly, the derivation of a separate portfolio solely with respect to service cost cash flows does not affect the degree of cash flow mismatch in the PBO matching portfolio, and arguably represents a more refined estimate of the cost related to current year accruals.

This approach could be viewed as producing multiple discount rates that apply to the same year, because different component plans with cash flows payable in the same year would apply different discount rates to their respective cash flows. The counterargument is that the approach does not require the determination of discount rates on a year-by-year basis, but rather only aggregated rates applicable to each subgroup.

Developing Spot Rates Under Bond Models

Both the traditional aggregated approach and the subgroup approach rely on the determination and application of aggregated rates to selected cash flows (either for the plan in total or as divided into groups). These rates are then applied to the respective obligation amounts to determine the interest cost related to those obligations. The sum of those interest costs is the total interest cost for the plan.

The following alternative approaches involve developing year-by-year spot rates to facilitate the application of a granular interest cost method on a year-by-year basis for plans using a bond model as the basis for developing a discount rate under ASC 715. Approaches 1 and 2 operate similarly in that both determine a single yield curve by combining information from the selected portfolio with additional information on bonds across the range of maturities. In contrast, approaches 3 and 4 develop a varying set of spot rates associated with each individual bond, then combine results at the present value level. Approach 5 represents an entirely new concept for developing interest cost based on estimating a return for the measurement year on the portfolio of matching bonds.

Approach 1: Theoretically derived yield curve

This approach estimates the credit spread resulting from use of the selected bond portfolio and applies it to a baseline/broader-based yield curve. The bond model would be run as usual to identify a bond portfolio and determine an aggregated discount rate. This rate would be compared to the (generally lower) discount rate produced by using a second, broad-based yield curve. The difference between the two discount rates would be designated as credit spread. An increment based on that credit spread would then be applied to rates from the baseline curve (e.g., as a percentage addition or load), and rates from this adjusted curve would be used as part of a granular approach to determining the net periodic cost.

Other observations

- The underlying logic and the use of external curve information are comparable to the approaches used in developing any high-percentile variation of a yield curve[6] (an approach with very similar objectives to a bond model) and approximated curves in markets where corporate yield data is less than robust. (In this case, data from the selected bond portfolio can be viewed as similarly less than robust.)
- The resulting adjusted yield curve rates and yield curve slope are stable and consistent, and presumed to be reasonable in the context of overall high-quality corporate bond information.

Theoretically Derived Yield Curve

Key technical consideration	Assessment
Extent to which external capital market data is relied on	Each derived yield and spot rate is based on a term structure implied by broad-based bond market data, and not directly derived from the selected bond portfolio.
Compatibility with market pricing of individual bonds	The yield curve rates reflect the pricing of the overall bond portfolio but are not intended to replicate the value of individual bonds within the portfolio. (Note, however, that if the adjusted yield curve is applied to the cash flows from the portfolio bonds, the result will, in most cases, match the actual market price of the bonds of varying maturities more closely than would a similar estimate based on the aggregated rate because it includes an adjustment related to plan maturity that a single aggregated rate would not.)
Compatibility with PBO and bond portfolio values	The PBO determined based on the adjusted yield curve reflects the market value of the selected bond portfolio and that determined by the single aggregated rate (by definition, given how the rates are developed).

6 For example, an above-median or top quartile curve that considers only AA-graded bonds with the highest yields among all bonds in the AA bond universe.

- Because this approach is relatively simple and relies on outcomes from two already-standard methodologies, it may not require a significant addition to existing audit procedures.

Approach 2: Yield curve derived from selected portfolio bonds

This approach augments the bond model portfolio with a set of strategically selected bonds so that the portfolio includes bonds across the broad spectrum of maturities. A yield curve is then derived from the expanded set of bonds. The additional bonds will be expected to reduce the degree of cash flow matching and may also reduce portfolio yield, but would presumably be added in nominal amounts so that these impacts are minimized.

It may be appropriate to select bonds at similar percentile levels so as to define a reasonably smooth and homogeneous curve. The derived yield curve would be constrained to ensure that when applied to the cash flows, it produces a value that aligns with the bond portfolio value (which normally defines the PBO value under a bond model approach). The derived yield curve would also be reviewed to ensure that the level and slope are reasonably consistent with more broad-based yield curve models.

Other observations

- The selected portfolio of bonds is used to define a yield curve that provides the spot rates for each year.
- Expanding the selection of bonds included in the portfolio could be viewed as a methodology change. However, including bonds from a broad array of maturities in nominal amounts should not significantly affect the market value of the matching portfolio or the level of cash flow mismatch. Thus, even with the added bonds, the methodology remains generally consistent with the bond-matching concept in attempting to determine a balance between optimizing portfolio yield and providing a good fit to plan cash flows.
- The small number of bonds implies less statistical validity than a broad market yield curve. The derived curve would not be expected to fit the data as well as a broader market yield curve; thus, the outcome will rely more heavily on the curve-fitting/smoothing methodology employed. It may be appropriate to institute constraints on the relative yield levels for the added bonds to ensure a reasonable progression of rates and rate patterns generally aligned with the overall bond market.

Yield Curve Derived From Selected Portfolio Bonds

Key technical consideration	Assessment
Extent to which external capital market data is relied on	Additional bond market data is referenced in the selection of additional bonds and as a secondary check on the yield curve level and slope.
Compatibility with market pricing of individual bonds	The yield curve rates reflect the pricing of the overall bond portfolio but are not intended to replicate the value of individual bonds within the portfolio. (Note, however, that if the derived yield curve is applied to the cash flows from the portfolio bonds, the result will, in most cases, match the actual market price of the bonds of varying maturities more closely than would a similar estimate based on the aggregated rate because it includes an adjustment related to plan maturity that a single aggregated rate would not.)
Compatibility with PBO and bond portfolio values	The derived yield curve rates must be calibrated to ensure alignment of the PBO value with the market value of the selected bond portfolio. (A curve fitted without this adjustment would not be expected to produce this alignment.)

- Due to an unequal weighting of bonds (for curve-building vs. PBO measurement), the curve-fitting methodology requires a secondary constraint to ensure that the fitted curve results in a PBO that aligns with the outcome from the bond model (including the added bonds).

Approach 3: Different single yield for each bond

This approach applies a highly simplified assumption that spot rates in each year equate to the bond's overall yield. Under this approach, the bond yield (i.e., the single rate that equates the present value of these cash flows with the bond's market value) is applied to discount the benefit payments at varying maturities that the bond is selected to settle. The present value of each benefit payment is calculated as the sum of the present values of the bond cash flows used to settle it, each measured at its own respective bond yield. The overall plan/portfolio spot rate for each maturity is derived from the (combined) present values for the bond components addressing the benefit payments at that maturity.

Other observations

- Given that a full term structure of rates is not developed, the presumption of a single rate across time provides a less refined estimate, and reduces the impact of applying the spot rate approach.
- The progression of overall plan/portfolio spot rates across the array of maturities will likely be uneven and discontinuous. (The underlying rates would presumably be somewhat upward sloping, but not to the same extent as a typical market-based yield curve.)
- Because each year's benefit payment may be settled by a combination of bonds, this could be viewed as using different discount rates for payments made in the same year. However, because present values for all bond cash flows related to a given year's benefit payments are combined, this methodology could also be viewed as applying a single average rate to all cash flows for a given year.
- It is noteworthy that this approach allows the calculation of interest cost to potentially be reduced to a simpler form—interest cost can be determined as the sum for each bond held by the selected portfolio of (1) the market value of the bond multiplied by (2) the yield of that bond.

Approach 4: Different term structure for each bond

This approach builds on two of the concepts that were applied in previously defined approaches:

- Each bond is recognized based on its market yield (as in Approach 3); and
- A broad-based term structure is calibrated (as in Approach 1) to align with each individual bond's yield.

In this case, a credit spread applicable to each bond is derived. This differs from the application in Approach 1 where the theoretically derived yield curve approach reflects a credit spread associated with the entire bond portfolio. In both cases, an increment based on that credit spread is then applied to the baseline curve rates (e.g., as a percentage addition).

Different Single Yield for Each Bond

Key technical consideration	Assessment
Extent to which external capital market data is relied on	Because flat rates are presumed across the maturity spectrum, additional bond market data is not necessary.
Compatibility with market pricing of individual bonds	The yield associated with each bond is consistent with the price of that bond.
Compatibility with PBO and bond portfolio values	The PBO value that results from the application of the derived year-by-year rates will generally not equate to the market value of the selected bond portfolio due to the impact of cash flow mismatches. Rates need to be calibrated to ensure this outcome.

Different Term Structure for Each Bond

Key technical consideration	Assessment
Extent to which external capital market data is relied on	The implied term structure for each bond is based on broad-based bond market data; the individual bond's price is used to calibrate that term structure.
Compatibility with market pricing of individual bonds	The spot rates associated with each bond are consistent with the price of that bond.
Compatibility with PBO and bond portfolio values	The PBO value that results from the application of the derived year-by-year rates will generally not equate to the market value of the selected bond portfolio due to the impact of cash flow mismatches. Rates need to be calibrated to ensure this outcome.

Once each bond's term structure has been developed, a present value is determined for each component of bond cash flow. The present value of each benefit payment is calculated as the sum of the present values of the bond cash flows used to settle it, each measured at its respective yield. The overall plan/portfolio spot rate for each maturity is derived from the (combined) present values for the bond components addressing the benefit payments at that maturity.

Other observations

- The progression of overall plan/portfolio spot rates across the array of maturities will likely be uneven and discontinuous.
- Because each year's benefit payment may be settled by a combination of bonds, this could be viewed as using different discount rates for payments made in the same year. However, because present values for all bond cash flows related to a given year's benefit payments are combined, this methodology could also be viewed as applying a single average rate to all cash flows for a given year.

While the bond-by-bond type applications identified as approaches 3 and 4 are more complex in execution, these approaches allow additional recognition of the specific yield characteristics—including the idiosyncrasies and inconsistencies—of the selected portfolio, whereas approaches 1 and 2 aggregate the overall bond model outcome to a single set of (presumably market-consistent) rates across the full range of maturities. The recognition of individual bonds' characteristics is unlikely to result in a smooth/regular pattern of rates across maturities, and thus will not present a single coherent view of fixed-income market rates.

Approaches 3 and 4 also differ in that Approach 3 ignores the term hierarchy of fixed-income rates to a great extent, while Approach 4 makes a more refined estimate based on reference to an external portfolio and curve.

Approach 5: Calculation of implied bond portfolio return (for the successive year)

This approach represents an entirely new way of developing interest cost by estimating a return for the measurement period on the selected bond portfolio. The expected return determined for the bond model portfolio is treated as interest cost. Because the progression of yields during the year is a primary driver of bond return, this approach requires developing an expectation for the term structure of rates at the end of the year.

This rate development could be done in one of the following ways:[7]

- Assume that spot rates remain constant; i.e., the year-five spot rate expected at the end of the year equals the year-five spot rate at the start of the year.
- Assume that spot rates shift down in maturity; i.e., the year-five spot rate expected at the end of the year equals the year-six spot rate at the start of the year.
- Assume that spot rates evolve according to a pure expectations hypothesis; i.e., the year-five spot rate expected at the end of the year equals the forward rate of interest applicable to years one through six (the five-year period starting at the end of year one) at the start of the year.

7 As discussed in the August 2015 issue brief, the various granular approaches can be expressed in terms of the expectation regarding the expected discount rate at the end of the year that leads to a no gain/loss outcome.

Calculation of Implied Bond Portfolio Return (for the Successive Year)

Key technical consideration	Assessment
Extent to which external capital market data is relied on	Capital market data would generally not be referenced, except perhaps as input for a decision about presumed year-end rate conditions.
Compatibility with market pricing of individual bonds	The characteristics of individual bonds would be reflected in determining the presumed portfolio return and interest cost.
Compatibility with PBO and bond portfolio values	The PBO calculation would not be affected; it would continue to align with the total market value of the selected bond portfolio.

- Develop an expected end-of-year term structure based on a presumed ultimate term structure, with an assumed movement from initial year conditions toward that normative state over the course of the year.

Other observations

- The approach equates the concepts of discount rate and expected return (for the hypothetical/matching bond portfolio). While this would represent a change in approach for most pension plans, it may be supported by accounting guidance.
- The treatment of cash flow mismatches and the resulting surplus may require additional consideration.[8]
- The approach requires the plan sponsor to affirm a capital market view about the evolution of interest rates. This interest rate view could be considered either an assumption (which can change from year to year) or methodology (which generally cannot). Careful consideration would need to be given to the longer-term implications given each type of treatment.
- There should be consistency between the presumed level of expected yields used in estimating the fixed-income returns and interest cost and the capital market outlook incorporated in other economic assumptions. The difference in timeframe between the one-year assumption used for this purpose and the longer time horizon reflected in the development and application of other assumptions may make demonstrating such consistency challenging.
- Certain views about the progression of interest rates (e.g., the presumption of a significant rate increase) could have a major impact on the level of recognized interest cost.

Because this approach seems generally consistent with concepts expressed in accounting standards, it may be found acceptable. However it brings a new emphasis and reliance on a projection of year-end capital market conditions and requires that an assertion about the long-term structure of the yield curve (implicit in the derivation of the assumed yield curve rates at year-end) that has historically not been a criterion considered in setting economic assumptions under ASC 715.

Calculating Service Cost

A more granular application of interest rates may also be applied to develop a revised calculation of service cost. Because service cost-related benefits generally have a longer duration than already-accrued benefits, this approach will almost always result in a higher effective discount rate and thus lower service cost. A more granular approach to developing service cost in a bond model context could be applied in one of three ways:

- Running a separate bond model based solely on service cost cash flows;
- Running the bond model based on the sum of PBO and service cost-related cash flows; or
- Using a set of spot rates defined based on PBO cash flows and applying those rates to the service cost-related cash flows.

8 For example, a portion of funds required to pay benefits in a given year may be attributable to a bond principal payment paid in an earlier year yield, and presumed to earn return at a lower rate than amounts attributable to portfolio bonds. This type of return/yield discrepancy introduces "noise" into the model that should be addressed.

Some of the alternatives for developing spot rates seem better aligned with certain service cost applications. When yield curve rates are derived from the total bond portfolio (as in approaches 1 and 2), it may be viewed as consistent and appropriate to apply the spot rates derived from that curve to the service cost cash flows (the third method described above). This same service cost calculation approach might also be considered desirable from a simplicity perspective. Because the impact of the spot-rate approach on service cost is typically less significant than the impact on PBO and interest cost (in both dollar and percentage terms), there may be little incentive for implementing an overly complicated approach to calculating it.

Conclusion

While bond model approaches have become fairly common as a means for selecting a discount rate, they present new challenges when implementing a granular expensing approach. This issue brief has outlined a number of alternative approaches for deriving spot rates from bond models, almost all of which reference broader bond market data, albeit in different ways. Given widespread acceptance of the spot rate method for plans utilizing a yield curve and the nearly universal acceptance of the existence of a term-related structure to interest rates, it seems both actuarially sound and rational to facilitate the application of granular expensing approaches in situations where a bond model is used to determine the discount rate.

The recent SEC staff commentary describes a line of reasoning that could present obstacles for approval of some of the alternative approaches. SEC staff opined that (i) the determination of PBO and interest cost are viewed as integrated concepts; (ii) the primary calculation supported by bond matching is the determination of the PBO (for balance sheet purposes) based on the market value of a selected bond portfolio; and (iii) because a full array of spot rates is not a direct and observable outcome derivable from that bond portfolio, such rates should not be invoked in determining interest cost.

The concerns expressed by SEC staff would seem most relevant to approaches 1, 2, and 4, each of which involves reference to a term structure that is not directly observable from the selected portfolio, and not directly connected to the calculation of PBO. However, the concerns appear less relevant to Approach 3 because this approach relies on information available from the selected bond portfolio and does not involve referencing additional rate information. Similarly, the concept underlying Approach 5—an implied bond return—does not require the use of a spot rate curve, and thus it may be possible to develop a version of this approach that avoids the SEC staff concerns.

It should be noted that application of the bond model by subgroups also seems clearly supported by accounting guidance.[9] However, while some similar degree of granularity is achieved in doing this, applying this method is expected to have substantially less impact than a more complete application of the granular/spot-rate approach.[10]

9 Reference ASC 715-30-55-24 and ASC 715-30-35-45; Appendix 2 provides full citations.
10 Preliminary testing by an Academy work group indicated that in a typical application, the reduction to interest cost may be only about one-fourth of the change realized under a typical spot rate approach; testing was done using a market-based yield curve.

APPENDIX 1: Methodology issues that arise with bond models

The development of a bond model requires a number of inputs and assumptions, many of which involve a great degree of subjectivity. Model parameters determine the number and selection of bonds included in the bond model portfolio, the degree of implied cash flow matching, and the assumed reinvestment rates applied to excess cash. These parameters have a significant impact on the bond model outcome and thus the measurement of the obligation and the level of recognized net periodic cost. Accordingly, it is critical to understand the issues involved in setting bond model parameters to fully grasp the context related to the main topic of this paper—the development of a series of spot rates consistent with bond model results.

Bond selection criteria[11]

The specific high-quality corporate bonds included in a bond model must satisfy a set of criteria (such as issue size, non-outlier yields, AA or better ratings, and non-optionality) designed to exclude bonds with features considered inappropriate for purposes of settling (and consequently measuring) the benefit obligation. The two key bond attributes that are primarily referenced are yield to maturity and maturity date. Bonds will be considered for inclusion at maturity points that correspond with the plan's benefit cash flow, and a bond with a higher yield will generally be selected before a bond with a lower yield at the same or similar maturity date, all else being equal.

Number/type of bonds

Accounting guidance implies that an exact match is the theoretical goal of the exercise.[12] However, because there are few zero-coupon corporate bonds, coupon-paying bonds of varying maturities are typically used in bond model portfolios. And because high-quality corporate bonds may not be available at all maturities (and coupon payments on later maturing bonds may not fully align with the cash flow required for earlier years), constructing a bond portfolio that exactly matches the timing and amount of the expected benefit cash flows is not possible. Thus there will be some mismatches between bond proceeds and expected benefit cash flows.

Selection criteria related to the number and maturity of bonds is the primary means for controlling the level of cash flow mismatch.

For example, increasing the number of portfolio bonds may often enable a closer match. However, increasing the bond count will typically cause a reduction in the discount rate. As doing so will entail selecting bonds with lower-percentile yields. Similarly, a selection criterial that only allows bonds with maturities very close to the plan's cash flow requirements to be considered will narrow the pool of available bonds and force the selection of lower-yielding bonds. The handling of these issues illustrates a fundamental tension between achieving an optimal cash flow match and maximizing portfolio yields (and thus discount rates).

Diversification

Another factor that should be considered in the selection of bonds is the degree of portfolio diversification. In general, the smaller the bond count, the less diverse the portfolio. Even if it were possible to identify a single high-quality corporate bond that exactly matches the timing and amount of the expected benefit cash flows, there is little likelihood that a plan sponsor would choose to settle a plan's obligation with a single bond. In a more typical portfolio of 10-20 bonds, the relative size and characteristics of a few dominant bond issues may still lead to a relatively large portion of the benefit obligation being covered by very similar bonds. While the bond portfolio is only hypothetical, the assumed discount rates are meant to reflect the rates at which the pension benefits could be effectively settled. Relying on only a few very similar bonds is unlikely to accomplish this objective.

11 In developing an actual settlement portfolio, there would also be a number of other factors—such as trading frequency, commentary or notations related to possible future rating changes, and the portfolio's concentration within a particular industry or market sector—that a plan sponsor would likely take into consideration in selecting the portfolio of high-quality corporate bonds.

12 "Notionally, that single amount, the projected benefit obligation, would equal the fair value of a portfolio of high-quality zero coupon bonds whose maturity dates and amounts would be the same as the timing and amount of the expected future benefit payments" (ASC 715-30-35-44).

Reinvestment rates

As previously stated, at least some degree of cash flow mismatch is nearly unavoidable. However, accounting guidance implies that the degree of mismatch and its impact on the discount rate should be minimized to the extent practicable. When bonds are (hypothetically) purchased years before the cash flow is needed to pay benefits, the excess funds are assumed to be reinvested and then used as needed to offset cash shortfalls in later years, requiring an assumption regarding the reinvestment rate in future years.

To set the reinvestment assumption, ASC 715-30-35-44 requires that the reinvestment rates "shall be extrapolated from the existing yield curve at the measurement date." But the guidance does not define either "the existing yield curve" or "extrapolation." There are a number of yield curves developed from high-quality corporate bonds or Treasury securities that can be used to derive expected reinvestment rates. The corporate curves differ primarily in the universe of bonds (e.g., full universe, above median, top-third) considered in their development. Reinvestment rates based on corporate bonds would of course be viewed as more consistent with the bond model portfolio than rates based on a Treasury curve (which will generally be lower).

ASC 715-30-35-43 directs plan sponsors to set discount rates based on high-quality fixed-income investments that are "currently available and expected to be available" in the future. But forward rates derived from corporate bond yields are theoretical, because there is no robust corporate market for either zero-coupon bonds or derivatives. Rates based on presumed Treasury bond investments are less theoretical, because markets do exist for derivatives based on Treasury bonds. Therefore, in making assumptions about reinvestment rates in future years, the implied forward rates derived from a yield curve based on Treasury bonds may be viewed as being more consistent with the ASC guidance.

Note, however, that the relevance of assumed reinvestment rates varies based on the characteristics of a given bond model application. The discount rate developed from a bond model will represent a blend of rates of return from the selected bond portfolio and the presumed reinvestment rates. When there is a significant mismatch between the bond portfolio cash flow and the plan's benefit cash flow, the assumed reinvestment rates.

APPENDIX 2: Relevant Guidance Under U.S. GAAP

ASC 715 offers guidance in numerous sections regarding the selection of a discount rate and the development of the interest cost component of net periodic cost. The following citations offer support for the various statements made throughout the section "Relevant Guidance Under U.S. GAAP" and elsewhere in this issue brief, and are provided for reference.

Considerations in the selection of a discount rate

Citation	Relevant statement	Comment
ASC 715-30-35-31	"All assumptions shall be consistent to the extent that each reflects expectations of the same future economic conditions."	This statement pertains to the question of whether it is permissible to apply different discount rates to benefit payments assumed to be paid in the same year.
ASC 715-30-35-43	"Assumed discount rates shall reflect the rates at which the pension benefits could effectively be settled. … [E]mployers may also look to rates of return on high-quality fixed-income investments currently available and expected to be available during the period to maturity of the pension benefits."	The use of a bond model is consistent with guidance requiring the discount rate to reflect a settlement basis for the plan's benefit obligation, and permitting discount rates to be based on the yield on high-quality fixed-income investments.
ASC 715-30-35-44	"In other than a zero coupon portfolio, such as a portfolio of long-term debt instruments that pay semiannual interest payments ... the assumed discount rates (the yield to maturity) need to incorporate expected reinvestment rates available in the future."	Reinvestment rates are required to be estimated if a portfolio is not comprised entirely of zero-coupon bonds.
ASC 715-30-35-45	"Interest rates vary depending on the duration of investments. … Thus the weighted-average discount rate … inherent in the price of annuities (or a dedicated bond portfolio) will vary depending on the length of time remaining until individual benefit payment dates."	It is broadly accepted that discount rates should be sensitive to the duration associated with a given plan's cash flow.

Application of a bond model to subgroups

Citation	Relevant statement	Comment
ASC 715-30-35-45	"The disclosures … regarding components of pension obligation will be more representationally faithful if individual discount rates applicable to various benefit deferral periods are selected."	Provides additional support for an approach that considers subgroups of the overall plan.
ASC 715-30-55-24	"The assumed discount rates used to discount the vested, accumulated, and projected benefit obligations may be different. … For example, different rates should be used to measure the pension obligations for active and retired employees if necessary to reflect differences in the maturity and duration of pension benefit payments."	This provides clear support for methods that divide the plan into subgroups and apply the bond model approach to each of the resulting groups.
ASC 715-30-55-24	"The assumed discount rates for pension benefits that mature in a particular year shall not differ, however, regardless of whether the obligation for those pension benefits is presently classified as a vested, accumulated, or projected benefit obligation."	Whether this prohibition is deemed to apply would seem to relate to whether the method is viewed as referencing year-by-year rates (which may very well differ by component plan) or aggregated overall rates (which even if different do not apply to "a particular year").

Interest cost determination based on fixed-income portfolio expected return

Citation	Relevant statement	Comment
ASC 715-30-35-42	"Each significant assumption used shall reflect the best estimate solely with respect to that individual assumption."	The calculation of an expected return rate for a fixed-income portfolio requires an assumption about the fixed-income yields (or changes in yields) at the end of the measurement period. In developing an expected return assumption, expectations regarding future reinvestment rates must represent a best estimate solely with regard to that assumption, and must be consistent with other economic assumptions used in valuing the plan.
ASC 715-30-35-44	"The determination of the assumed discount rate is separate from the determination of the expected rate of return on plan assets whenever the actual portfolio differs from the hypothetical portfolio."	This language implies that for a fully immunized plan, the expected return and discount rate would be the same.