



AMERICAN ACADEMY *of* ACTUARIES

Objective. Independent. Effective.™

Alternative Pension Cost – An Update and Review of Implementation Issues

November 16, 2016



Speakers

- **Ellen Kleinstuber**, MAAA, FSA, FCA, EA, FSPA
Chairperson, Academy Pension Committee
- **Jerry Mingione**, MAAA, FSA, FCA, CERA, EA
Member, Academy Pension Committee
- **Bruce Cadenhead**, MAAA, FSA, FCA, EA
Vice Chairperson, Academy Pension Committee
- **Tim Geddes**, MAAA, FSA, FCA, EA
Vice Chairperson, Academy Pension Practice Council



The Academy

The American Academy of Actuaries is an 18,500+ member professional association whose mission is to serve the public and the U.S. actuarial profession. For more than 50 years, the Academy has assisted public policymakers on all levels by providing leadership, objective expertise, and actuarial advice on risk and financial security issues. The Academy also sets qualification, practice, and professionalism standards for actuaries in the United States.



Traditional “aggregated” approach

- Pension accounting calls for a PBO value to be determined based on yields for high quality corporate bonds at appropriate maturities, (typically done through application of a yield curve)
- A single-rate equivalent is developed and disclosed as a proxy for the PBO value developed from the yield curve spot rates
- This same single rate is used to develop values for service cost and interest cost as needed for determining pension cost



Rationale for current approach

The aggregated approach implies some trade-offs that might not be obvious

- The service cost can be viewed as overstated because the demographics associated with new accruals are younger (farther from payment) than the existing base of prior year accruals
- The interest cost can be viewed as being understated because it does not recognize the aging of payments related to already accrued benefits from BOY to EOY
- The overstatement and understatement would exactly balance out (i.e., no gains/losses at year end) if two conditions are met:
 - the addition of new accruals (service cost) suffices to keep the overall plan demographics (liability duration) unchanged
 - the yield curve at EOY is unchanged from BOY

Note: actuarial balance is achieved if the EOY discount rate equates to the BOY discount rate regardless of what causes that outcome



Alternative “more granular” approach(es)

There are a number of alternatives that fall under the general header of “more granular.” Each involves re-determining service cost “more exactly” based on service cost-specific demographics.

There are three variations on how interest cost would be calculated:

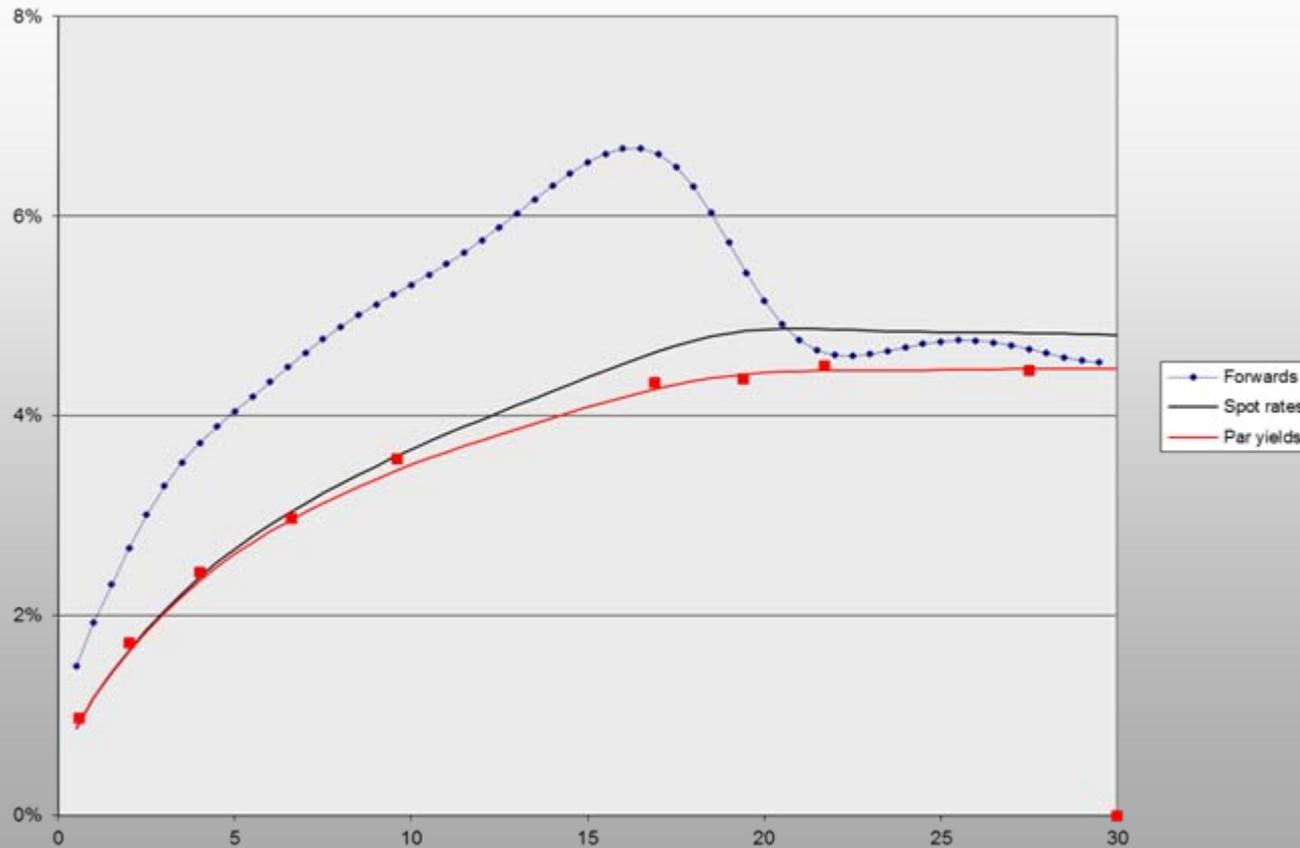
- Apply **individual forward rates** applicable to each future time period to each year’s projected cash flow
- Apply **individual spot rates** applicable to each future time period to each year’s projected cash flow
- Apply the **first year spot/forward rate** to each year’s projected cash flow

Note: there are also options to segment the plan population into separate demographic groups, e.g., active, terminated vested, retired, applying the discount rate model separately to each. This achieves a portion of the cost reduction represented by the individual spot rate approach, which can be viewed as the most extreme version of segmentation, i.e., segmenting year-by-year payment amounts.



Rate relationships

From a sample yield curve:



Rationale for spot rate approach

- Use of a single weighted-average rate is necessary only for disclosure purposes, and not required for calculation of obligation amounts
- Applying multiple (per year) discount rates may be characterized as a “more precise” technique for the development of the benefit obligation
- The determination of interest cost is linked to the determination of benefit obligation – so the rates used to discount the benefit obligation should also be used to determine interest cost
- Thus, accruing interest at the spot rates is acceptable – at least when the obligation is determined from an array of spot rates derived from a yield curve

Note: application of this same logic has proved problematic for bond model applications



What's affected?

- Service cost goes down when re-measured based on interest rates that reflect (younger) service cost-specific demographics
- Interest cost also almost always goes down:
 - This may not be intuitive, since the rates applied for each year are the same rates applied to benefit payments to generate the present values for PBO purposes. The difference is in the fact that for PBO the rates are applied to undiscounted benefit payment amounts.
 - In the case of interest cost they are applied to discounted present values, so the weighting applied to the spot rates is different – much more front-loaded. This results in a lower effective average rate



Affected by how much?

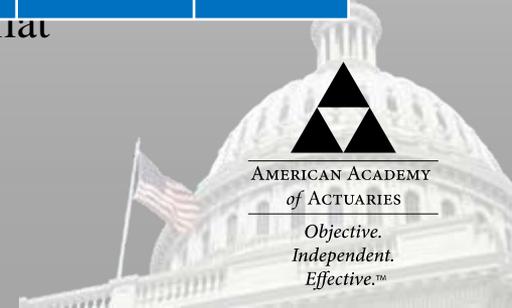
Costs determined using the granular/spot rate approach were compared to those under the traditional/aggregated approach, based on a range of capital market conditions and yield curves:

- The service cost impact averages about -6%
- The interest cost impact averages about -14%

The impact varies based on yield curve slope (steeper = more cost change) and demographics (more mature = more cost change)

% effect on:	Flatter Curve (12-07)			Median Curve (10-16)			Steeper Curve (12-13)		
	Older	Median	Young	Older	Median	Young	Older	Median	Young
SC	-7.3	-4.2	-2.6	-9.2	-5.0	-2.6	-12.1	-6.5	-3.2
IC	-8.4	-7.2	-5.4	-19.2	-14.2	-9.9	-25.9	-19.3	-13.2
Sum	-8.1	-5.9	-3.9	-14.6	-8.4	-4.9	-20.9	-12.4	-7.0

Note that it is difficult – almost impossible -- to find a past curve so flat (or inverted) that there is no cost reduction



How much in aggregate?

The potential reduction in recognized pension cost adds up to significant \$ amounts

\$ billions amounts for all Fortune 1000 companies	SC	IC	SC + IC
Total	\$35	\$95	\$130
Estimated reduction*	-2.6	-16.3	-19
% of Net Pension Cost			32%
% of Pretax Income			1.3%

* Based on average of cost effects for mature and stable plans, calculated at EOY-15

Issue: will analysts adjust to offset for the change in cost recognition or might stock prices increase with the 1%+ increase in earnings?



Pros and cons

Benefits of changing:

- Service cost calculation considered to be more precise
- Reduced or no reliance on stable plan demographics
- Cost components are the same whether liabilities are contained in one plan or valuation group or split into several sub-groupings

Negative implications:

- Calculation of pension cost components is more complex; projections are less straight-forward
- Cost calculation is less transparent, since it relies on multiple rates rather than just one rate; thus disclosure will probably involve presenting 3 or 4 rates
- Recognized costs are expected to be more variable (since both the single yield curve equivalent rate *and* the yield curve slope have an impact)
- An increase in the year-end discount rate is typically necessary to offset the impact of reduced cost recognition during the year (in order to avoid an experience loss)



To summarize

	Aggregated	Granular	
Calculation methodology	simple	complex	-
Technical precision	less	more	+ (?)
Understandability/ transparency	more	less	-
Requirement to achieve actuarial balance	no change in discount rate	discount rate needs to change	-
Reliance on stable plan demographics	some	none	+
Impact if liabilities are segmented	results vary	results don't vary	+



Comments from David Zion/Credit Suisse analyst

(as reported in Barron's 1-23-16)

Pension Accounting Magic

"As fourth-quarter earnings reports come out, investors should look for pension accounting changes that will artificially flatter earnings by tens of millions of dollars or more in 2016 at some firms. ...

It's not free money. The magic of increasing earnings now will be paid for in the future. As an actuarial change, lowering costs now **could mean higher costs down the road,*** Zion notes. If both service and interest costs shrink, something else has to grow on the balance sheet, and that's usually an item called unrecognized actuarial losses. That cost should, over time, find its way back into the income statement through amortization of actuarial losses. ...

Pension service and interest costs were about 10.7% of aggregate pre-tax income for the S&P 500 index from 2010 to 2014, he says, and the spot rate approach would have **boosted the S&P 500 index's pre-tax income by 1.7%.** If that seems low, the S&P 500 index EPS will likely be down 1% to 2% in 2015 and down 5% for the fourth quarter. This year's numbers are coming down as well. ...

At many firms, Zion notes, the spot rate method could cut service and interest costs 5% and 20%, respectively, and raise pre-tax income by 5%. Not bad when earnings growth is hard to find. **However, you might not want to put much of a price/earnings multiple on that profit 'increase,'** he says. We agree."

* Note: in limited testing an Academy working group found it unlikely that costs will ultimately increase, except perhaps under a scenario where future yield curve slopes flatten considerably, so that past service/interest cost reductions are much higher than current ones.

Use of granular expensing approaches – survey results

- At YE 2015, almost 30% of Fortune 1000 companies announced a switch to the granular expensing approach
 - About 60% of these companies use yield curves for discount rate setting; about half of those companies switched
 - Only a few companies using bond models announced a change; SEC approval for this combination of methodologies is uncertain

Based on WTW survey from 10-K filing data (9-16)

- Possible reasons entities that use yield curves did not change
 - Management emphasis on balance sheet rather than expense
 - Management focus on cash rather than expense
 - Significance/materiality of cost impact
 - Other factors linked to level of pension cost, e.g., rate reimbursements
 - Deferred decision – wait and see



Implications for gain/loss at year end

- Whenever less \$ cost is recognized for the year, there is a commensurate implication for either/or:
 - (1) the experience loss that should be expected at year end
 - (2) changes in capital market conditions necessary to avoid that implied loss
- Under the individual spot rate approach there is no experience loss if each spot rate remains attached to the same calendar year and projected cash flow figure
 - For example, if discount rate for payment Year 10 is 4% at the beginning of the year, then we want that to be our Year 9 rate at the end of the year
- Implies an expectation of a one-year shift in the yield curve and increase in single equivalent discount rate



Underlying capital market presumption

A no gain/loss outcome is achieved only if certain capital market scenarios apply (at year end):

	Supporting Capital Market Presumption	Implied EOY Discount Rate
Aggregate	not specified (whatever factors result in no change in discount rate)	no change
Individual spot rates	spot rates remain attached to individual years and associated cash flows (i.e., spot rates move down maturity scale one year each year)	generally must go up



Implications for year end

What changes in aggregate PBO discount rate would be necessary to avoid an experience loss outcome?

- The answer of course varies based on which granular approach is used. Obviously the lower the cost recognized the bigger the required discount rate increase.
- Based on current yields for the illustrative plans we modeled in the original issue brief we found:

	Discount Rate Increase Needed	
	Mature Plan	Young Plan
Individual spot rate	+5 bps	+6 bps



Bond matching and granular expensing

- Significant minority of large plans use bond matching to measure obligations
 - derive a portfolio of high quality bonds that reasonably match the plan's cash flows
- PBO = market value of matching portfolio
 - PBO measurement requires neither a discount rate nor a yield curve
 - discount rate measured as the single rate that produces the same liability measure (approximately = yield to maturity on matching portfolio)
 - this rate traditionally used to measure interest cost (and service cost)



Bond matching and granular expensing

- Possible to derive a yield curve that is consistent with the PBO measurement
 - Infinite number of possible curves
 - Narrow range of curves that are consistent with market pricing data.
- Two approaches are discussed in forthcoming issue brief:
 - Infer a yield curve from the yields on bonds of different maturities in the matching portfolio
 - similar to derivation of standard yield curves, but based on smaller bond universe
 - may require additional constraints / reference to external yield information to ensure reasonable outcome
 - Apply a spread to a standard broader market yield curve



Bond matching and granular expensing

- The SEC has indicated that it would object to the use of an underlying yield curve in measuring interest cost
 - Yield curve is not inherent in the measurement of the PBO (of course neither is the equivalent single rate)
 - In effect, bond model plans are forced to use a flat yield curve
- SEC comments indicate switching back to a yield curve would be difficult
 - Skeptical of arguments that may be made about why a yield curve is now preferable when bond model was previously supported as being preferable
 - arguments that might have sufficed a few years ago unlikely to succeed
 - Immateriality of change is not a viable argument
- Audit firms likely to apply similar restrictions for non-SEC registrants



Bond matching and granular expensing

- Forthcoming issue brief discusses additional possibilities for measuring cost:
 - different single yield for each bond
 - different term structure for each bond
 - calculation of implied bond portfolio return (for the successive year)
 - separate application of bond model to service cost (split rate method)
 - separate application of bond model to population subgroups.
- Audit firms unlikely to accept any variation without explicit SEC approval



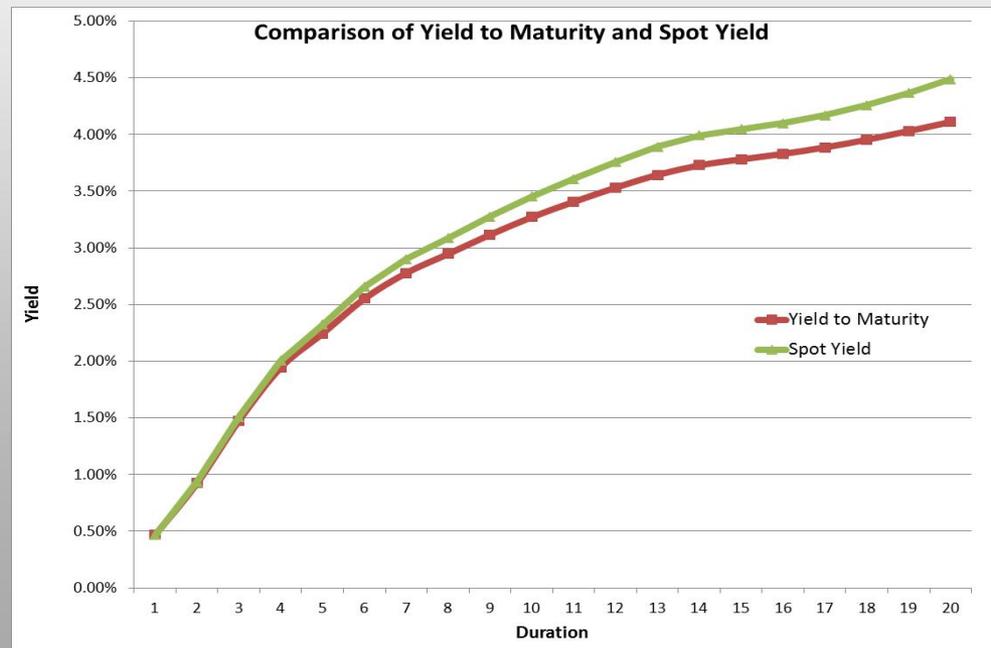
Bond matching and granular expensing – different single yield for each bond

- Traditional approach applied separately with respect to the portion of PBO attributable to each bond
- Interest cost = yield to maturity of a bond multiplied by its market value, summed across all bonds
- The broader the spectrum of maturities incorporated in the matching portfolio, the more significant the effect on interest cost
 - If portfolio consisted entirely of zero-coupon bonds then this approach would be equivalent to using an underlying yield curve, with comparable reduction in interest cost
 - If the portfolio consists primarily of longer bonds, with early year benefit cash flows covered by coupon payments, the closer this gets to the traditional interest cost measurement

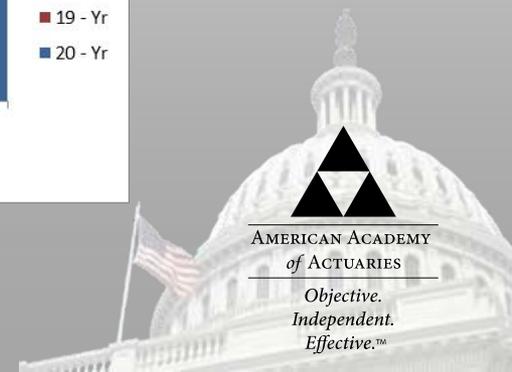
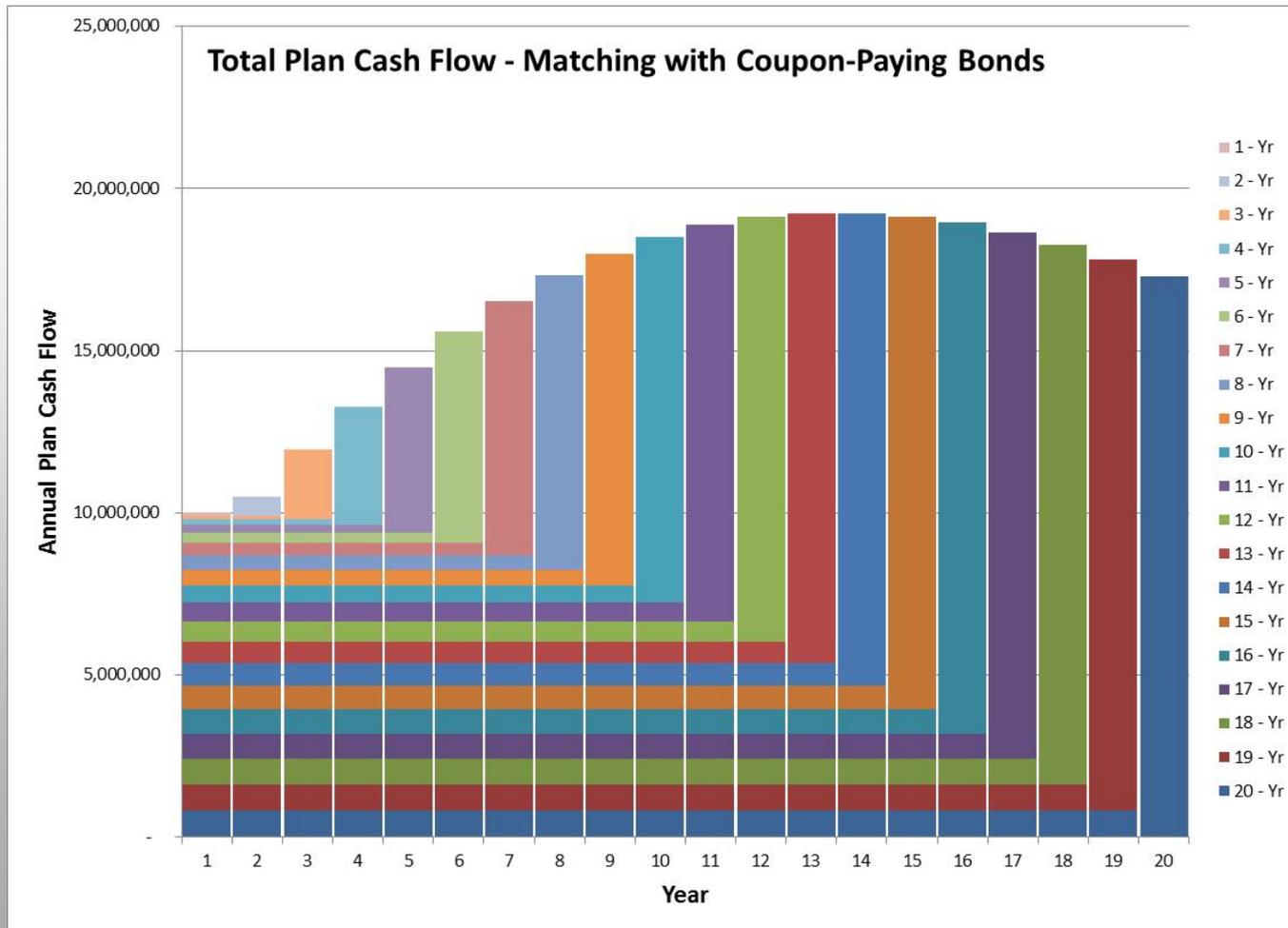


Bond matching – simplified example

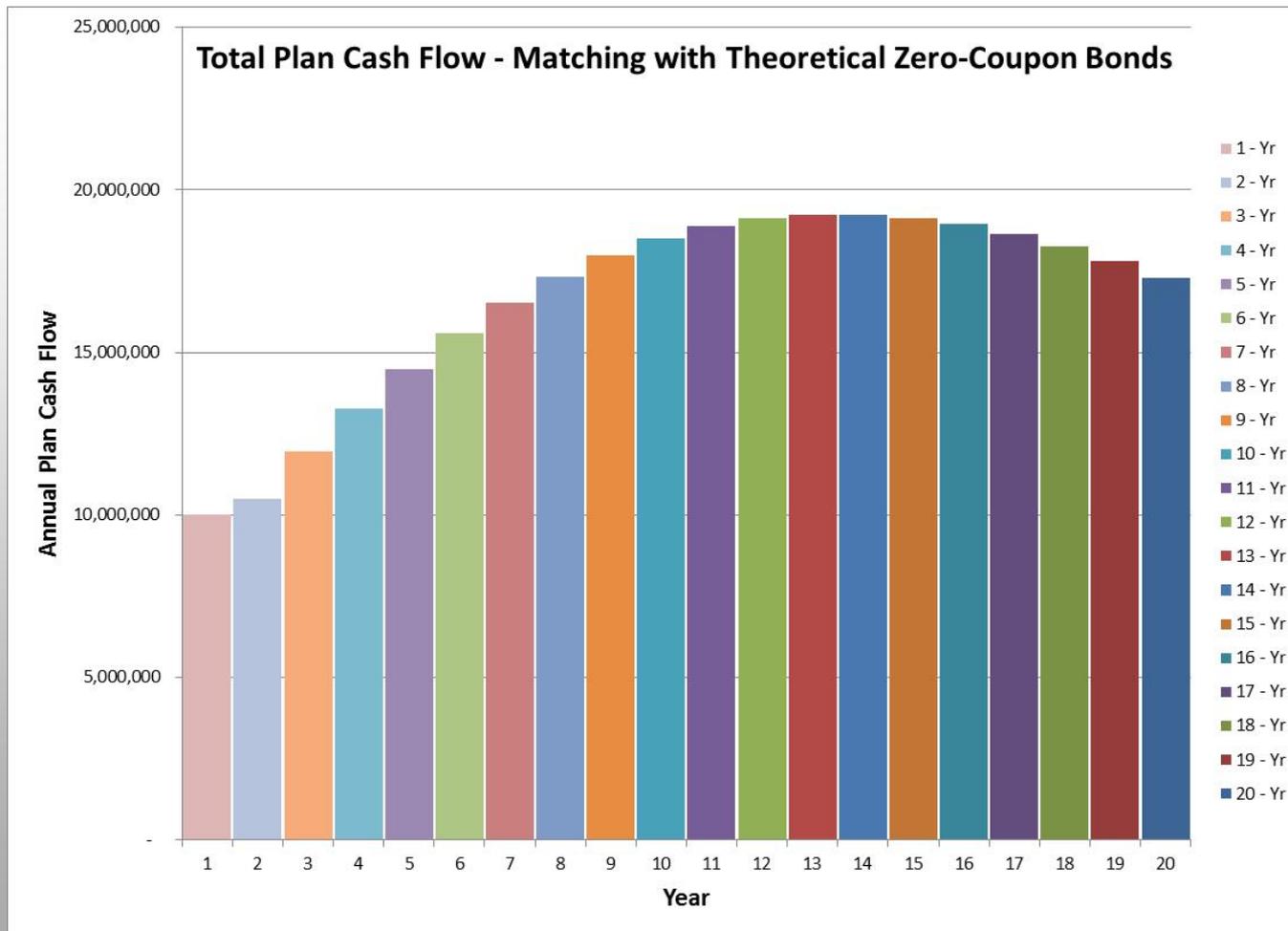
- Assuming a plan with 20 years of cash flows (aligned to first 20 years of payments for “mature” plan modeled in 2014 issue brief)
- Assume bond pricing precisely aligned with 9/30/2014 Citigroup Yield Curve
- Simplifications allow us to disregard complications such as cash flow mismatch and challenges in fitting bonds pricing to underlying curve



Bond matching – simplified example



Bond matching – simplified example



Bond matching – simplified example

Bond Maturity	Matching with Zero-Coupon Bonds (spot rate method)			Matching with 5.0% Coupon-Paying Bonds (different single yield for each bond)		
	MV of Bonds Purchased	Yield to Maturity	Interest Cost	MV of Bonds Purchased	Yield to Maturity	Interest Cost
1	9,953,630	0.47%	46,370	79,673	0.47%	371
2	10,306,679	0.93%	96,212	626,700	0.92%	5,781
3	11,418,016	1.51%	172,169	2,262,171	1.47%	33,337
4	12,265,945	2.00%	245,820	3,897,594	1.94%	75,758
5	12,923,845	2.32%	300,141	5,511,671	2.24%	123,705
6	13,314,405	2.66%	353,511	7,047,996	2.55%	179,812
7	13,528,358	2.90%	392,610	8,511,181	2.78%	236,460
8	13,590,626	3.09%	419,334	9,893,993	2.95%	291,541
9	13,458,806	3.28%	440,922	11,155,404	3.12%	347,659
10	13,176,230	3.45%	455,062	12,297,619	3.27%	402,360
11	12,780,420	3.61%	461,337	13,326,921	3.41%	454,017
12	12,279,871	3.76%	461,446	14,235,968	3.53%	502,830
13	11,708,609	3.89%	455,772	15,039,969	3.64%	548,141
14	11,123,256	3.99%	444,029	15,774,581	3.73%	588,221
15	10,551,433	4.05%	427,269	16,458,123	3.78%	622,478
16	9,952,429	4.10%	408,229	17,058,076	3.83%	653,323
17	9,304,158	4.17%	388,130	17,551,218	3.89%	682,228
18	8,614,576	4.26%	367,135	17,937,458	3.95%	709,420
19	7,901,863	4.37%	345,265	18,228,087	4.03%	734,821
20	7,191,010	4.49%	322,756	18,449,762	4.11%	758,614
Total	225,344,165		7,003,519	225,344,165		7,950,876
Single Equivalent Rate	225,344,165	3.68%	8,296,964	225,344,165	3.68%	8,296,964
Reduction Compared to Single Rate			-15.6%			-4.2%



Bond matching and granular expensing – different term structure for each bond

- Spread to a standard yield curve derived for each bond consistent with the price of the bond
- Interest cost derived for each bond by applying the spot rates to the bond cash flows
- Multiple underlying yield curves unlikely to be acceptable to the SEC



Bond matching – implied bond portfolio return

- Interest cost = expected return on the matching bond portfolio
- Requires a view of how bond yields will change over the course of the year
- Yield to maturity of the entire portfolio assumed to remain constant
 - equivalent to the traditional aggregated approach
- Yield to maturity of each bond assumed to remain constant
 - equivalent to determining interest cost for each bond based on that bond's yield to maturity
- Other views of yield changes possible that give similar results to the other approaches previously described
- Lack of unique measure of return may be troubling to SEC



Split rate method for service cost

- Separate single equivalent discount rate for PBO and Service Cost
 - No change in PBO rate
 - Service cost rate based on service cost cash flows
 - traditional approach completely disregarded service cost cash flows
- Implications:
 - No gain/loss outcome if year-end discount rate is weighted average of PBO and Service Cost discount rates
 - Could be used with bond model by developing a separate matching portfolio for Service Cost cash flows
 - recent SEC position would not appear to be an impediment
 - auditors may disagree or simply be uncomfortable allowing any changes in process for bond model plans



Bond matching – separate application to population subgroups

- For example, separate matching portfolios for actives, term vesteds, retirees
- The greater the variation in duration among the subgroups, the greater the effect on interest cost
- Carried to the extreme, separating benefits by expected year of payment and matching with zero-coupon bonds (assuming availability) would reproduce the spot rate approach
- Smaller population subgroups – particularly groups with low initial year cash flows – likely to increase the cash flow mismatch



Defining service cost

- Obviously, Service Cost is ... the cost of service (duh)
- ASC 715-30-20: “A component of net periodic pension cost recognized in a period determined as the actuarial present value of benefits attributed by the pension benefit formula to services rendered by employees during that period.”
- ASC 715-30-55-24: “...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.”
- Logical that an approach that measures service cost based on its own duration would be interpreted as consistent with the guidance



Defining interest cost

- Clearly, ..., Interest Cost is the cost of interest (right?)
- ASC 715-30-20*: “The amount recognized in a period determined as the increase in the projected benefit obligation due to the passage of time.”
- ASC 715-30-35-8: “Measuring the projected benefit obligation as a present value requires accrual of an interest cost at rates equal to the assumed discount rates.”
- ASC715-30-35-43: “Assumed discount rates are used in measurements of the projected, accumulated, and vested benefit obligations and the service and interest cost components of net periodic pension cost.”

* Note: similar concepts are also expressed in ASC715-60



What rates to use?

- Year-end discount rates are the basis for determining interest cost (ASC 715-30-35-68): “Measurements of net periodic pension cost for both interim and annual financial statements shall be based on the assumptions used for the previous year-end measurements ...”
- 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.”
- Changes in discount rates create gains or losses (ASC 715-30-20 definition of gain or loss): “A change in the value of either the benefit obligation ... or the plan assets resulting from experience different from that assumed or from a change in an actuarial assumption.”



Change from bond model to yield curve?

- Changing from one approach to another for selecting discount rates is not a change in accounting principle (ASC 715-30-55-26)
- Topic of changing from bond matching to a yield curve addressed in SEC speech at 2015 AICPA conference (Dec 9, 2015):
 - Measurement starts with the PBO (ASC 715-30-35-68)
 - Changing is appropriate only when there are changes in facts and circumstances (ASC 715-30-55-28)
 - The objective of selecting a discount rate is to choose the *best* estimate at which the obligation could be settled (ASC 715-30-55-27)
 - Need to consider arguments used when the entity adopted the bond matching approach, which likely included why that approach was preferable
 - A change in the approach to developing discount rates for interest cost would not seem a persuasive argument



Must approach be applied to all employer plans?

- Each assumption is a best estimate (ASC 715-30-35-42)
 - Arguments for using the spot rate approach center on precision inherent in the method
 - Different treatment for different plans would require strong differences in facts and circumstances
- Consideration for plans that don't use yield curves such as jurisdictions without deep bond markets
- Consideration of materiality
 - Difference between the spot rate approach and the weighted-average approach
 - Materiality reassessed each measurement period



Rethink practical expedients

- Actuaries often use practical expedients or shortcuts, which are supported by ASC 715-30-35-1:
 - intended to specify objectives and results rather than specific methods
 - some estimates can reduce costs without compromising objectives
 - approach cannot be expected to produce material differences from a detailed application
- Commonly used practical expedients when using a weighted average approach:
 - rounding discount rates
 - use of a single rate for multiple plans
 - rolling forward calculations from an earlier census date
 - annuity substitution



Calculation considerations

- Rounding rates is not practical
 - single interest rate is not directly used in the calculation
 - spot rate applied individually year-by-year
- Likewise, the use of a plan aggregation approach is also problematic
 - to apply the spot rate approach individual cash flows must be matched with individual spot rates
 - using a plan aggregation would seem to require an additional step (rather than a simplification)



Traditional roll-forward approach

- ASC 715-30-35-64: “...much of the information can be prepared as of an earlier date and projected forward to account for subsequent events.”
- ASC 715-30-55-61: “...produce substantially the same amount as using actual year-end data would.”
- Single discount rate (\bar{i}) often developed using cash flows for years $x+1$ on and the end-of-year yield curve
- Typical roll-forward formula (weighted average rate environment)
$$(PBO_x + SC_x) * (1+\bar{i}) - BP_x * (1+\bar{i})^5 = PBO_{x+1}$$
 - assumes no gains or losses from time x to $x+1$
 - first year expected benefit payments are eliminated
 - all other benefit payments are moved forward one year in time
 - for pension plans, generally, BP_x is taken to be actual payments / for OPEB expected is generally used
- If no change in discount rate $\sim PBO_x + SC_x + IC_x - BP_x$



Simplified interest cost example

- Consider a simplified plan with only five years of expected payments
- At BOY, an interest cost is calculated based on the single discount rate

Year	Ben Pmt	At BOY of Year X			
		Time x Spot Rates	PBOx	1.92% SingRate	Granular IC x
1	1,500	0.95%	1,493	1,486	7.1
2	1,750	1.34%	1,715	1,701	23.0
3	2,000	1.70%	1,917	1,907	32.6
4	1,700	2.01%	1,586	1,591	31.9
5	1,500	2.36%	1,351	1,377	31.9
	8,450		8,062	8,062	126.4

Traditional Interest Cost x	140.1	
Granular Interest Cost x	126.4	1.73%

- In this simplified example, the granular interest cost is \$126 as compared to \$140 under the traditional method



Simplified traditional roll-forward example

- The end-of-year yield curve information is applied to the cash flows expected in year $x+1$ and later to arrive at a new single discount rate
- The plan is valued at time x with that single discount rate to determine a new PBO_x consistent with the EOY yield curve

Traditional at EOY X					
Ben	Pmt	Time $x+1$	1.44%	BOY	
		Spot Rates	PBO_{x+1}	SingRate	PBO_x
1,500					1,489
1,750	0.98%	1,741	1,738		1,713
2,000	1.26%	1,963	1,958		1,930
1,700	1.43%	1,641	1,640		1,617
1,500	1.63%	1,417	1,427		1,407
8,450		6,762	6,762		8,156

- The revised PBO_x is forecast to the end of year with the new discount rate and actual benefit payments

BOY PBO	8,156
Actual Bpay	1,650
Interest	105
EOY PBO	6,611



Traditional roll-forward considerations

- Duration: assumes that actual vs. expected benefit payment differences do not materially distort the duration of the remaining cash flows (and thus the discount rate)
- Release of liability: assumes that the BP_x used in the roll-forward accurately reflects the release of liability

Pension

- Lump sums may release more liability than the amount of payment
- ER annuities with subsidies may release less liability than the payment made (and may signal an unidentified early retirement loss)

OPEB

- Using expected benefit payments assumes that claims paid do not affect the future liability
- Above-expected claims, may indicate a claims-related loss
- Year-of-death claims tend to be higher than earlier years and thus higher payments could signal a release of some amount of liability



Roll-forward under the granular approach

- Applying a traditional roll-forward approach with a granular-type interest determination is not appropriate
 - The granular methods assume that, all else equal, the yield curve shifts during the year
 - The traditional roll-forward approach utilizes KNOWN information about the end-of-year yield curve
 - Determining an interest cost under the granular method and applying it in the $PBO_x + SC_x + IC_x - BP_x$ structure would implicitly assume a different yield curve than that actually observed at time $x+1$
- Entire stream of cash flows for years $x+1$ and beyond are needed to produce estimates of following year's expense
- Some method must be used to adjust the future cash flows for differences between expected and actual BP_x



Determining adjustment for benefit payments

- An adjustment is developed to reflect the difference between the actual and expected payments (assuming those are assumed to release liability)

Adjustment for Actual Payments	
Expected Payment	1,500
Actual Payment	<u>1,650</u>
Difference	150
Single Discount Rate	1.44%
Liability Impact	151
PBO at Spot Rates (before adjustment)	6,762
Adjustment	2.23%

- In this example, the interest adjustment on the difference is applied using the EOY traditional discount rate
- Other possible interest adjustments could include the:
 - beginning of year PBO discount rate
 - first year spot rate
 - effective lump sum rate



Simplified granular roll-forward example

- Each of the projected cash flows in year $x+1$ and later are adjusted by the 2.23% adjustment percentage derived on the prior page

Time $x+1$ Spot Rates	Granular at EOY X				PBO $_{x+1}$	Granular IC $x+1$
	Original Ben Pmt	Adjustment	Adjusted Ben Pmt			
0.98%	1,750	(39)	1,711	1,703	8.3	
1.26%	2,000	(45)	1,955	1,919	24.2	
1.43%	1,700	(38)	1,662	1,604	22.9	
1.63%	1,500	(34)	1,466	1,386	22.6	
		(155)	6,795	6,611	78.0	
Traditional Interest Cost $x+1$					82.5	
Granular Interest Cost $x+1$					78.0	

- The PBO $_{x+1}$ (\$6,611) equals that under the traditional roll-forward approach
- This example assumes pro-rata adjustment of all future payments, other approaches are possible in which case the PBO may not be the same
 - simplify by adjusting the year $x+1$ cash flow (small differences)
 - treat as only differences due to non-retired participants and adjust only the Active / TV cash flow stream
 - other, more-precise estimates suited to the circumstance



Valuing interest-sensitive lump sums

- The value of an interest-sensitive lump sum is aligned with the value of the underlying annuity:
 - The participant has an option to receive the annuity or its market value determined based on a (variable) current market rate
 - A long-duration approach aligns with how an effectively matched portfolio would be constructed
 - Reflecting this dynamic implies using the **annuity substitution** approach (or something akin to that) – aligned with the “settlement” rationale referenced in U.S. accounting rules
- Differences between lump sum conversion and accounting valuation bases imply positive or negative subsidies:
 - Interest rates may be higher or lower (selected cut of AA vs. combined A-AA-AAA)
 - Mortality basis might imply different life expectancy



Valuing interest-sensitive lump sums

Lump sum-based approaches may or may not produce results consistent with the settlement rationale:

- The lump sums could be based on implied forward rates, thus determining yield curve-consistent – but theoretical – lump sum values at projected future payout dates (the amounts that would be invested today to fund those cash flows in the future); label this **implied/theoretical**
- Could be based on an aggregated rate appropriate for the duration associated with the entire plan – label this **implied/aggregated**
- Could be based on some other **long-term expectation** not necessarily consistent with the current capital market



“Expected” basis for valuing lump sums

The expected lump sum basis attaches a value unrelated to the theoretical settlement cost – essentially disregarding the interest sensitivity aspect (and the duration associated with that)

- The projected cash payout at lump sum date will suffice to make lump sum payment only if the assumed lump sum basis is realized
- That projected payout basis should reflect a “normative” rate consistent with the economic parameters incorporated into the inflation, salary increase and return-on-asset assumptions
- There is a some “economic arbitrage” associated with this methodology:
 - The approach implies a reduced value/cost advantage at times when the consensus view is that future interest rates will rise
 - The offsetting disadvantage is that the associated duration is lower, which generally means a reduced discount rate
 - However that also implies that a lower spot rate is attached under the granular expensing approach

Might this approach have appeal due to the (likely temporary) relative cost advantage?



Lump sums – what spot rates to apply

Interest-sensitive lump sums raise new issues with regard to the consistency of interest crediting between otherwise equivalent approaches:

- Annuity substitution results in similar cost recognition as would apply in valuing the underlying annuity
- Under an implied/theoretical lump sum approach the present value should be the same but there are options – and some controversy – about which year’s spot rate would be applied for interest cost purposes
 - Applying the spot rate associated with the lump sum timing results in additional actuarial imbalance, i.e., a greater experience loss or a greater required increase in discount rate to avoid it
 - To mitigate this effect, one could argue for applying a spot rate that is essentially averaged over the annuity period rather than the rate at lump sum payment date – thus reflecting the “nested duration” incorporated in the implied lump sums



Lump sums – what spot rates to apply

- The implied/aggregated approach is not consistent with the granular approach since it doesn't develop a present value from individual spot rates
- The expected lump sum approach essentially means viewing the lump sum as a fixed amount disconnected from current capital markets, i.e., you'd match with short-duration rates/bonds not long-duration rates/bonds. This makes the shorter spot rate the appropriate choice for interest cost purposes.



Questions?

Staff Contact

Bill Rapp

Assistant Director of Public Policy

rapp@actuary.org

202-223-8196

