

RET RPIRM Model Solutions

Spring 2023

1. Learning Objectives:

1. The candidate will understand the issues facing retirement plan sponsors regarding investment of fund assets.

Learning Outcomes:

- (1b) Distinguish the various strategies, approaches and techniques used to manage retirement fund assets.
- (1f) Identify and assess the sources of investment risk applicable to retirement fund assets.

Commentary on Question:

Commentary listed underneath question component.

Solution:

- (a) Describe desirable features for target date fund design.

Commentary on Question:

The list of desirable features below is not exhaustive, other reasonable answers were given credits for. However, the question was not designed to test knowledge of what a target date fund is, therefore responses focusing on basic characteristics of a target date fund were not given credits for.

- (i) Have Multi-Manager/Open Architecture
 - Common across most of the investment management industry but not target date funds
 - Multi-manager funds have historically produced more stable returns with improved median alpha compared to single-manager actively managed funds.
- (ii) Include Non-traditional Asset Classes
 - Includes commodities, real estate, defensive equities, long/short equities, long/short credit, TIPS and unconstrained bonds.
 - REITs and commodities respond positively to increases in inflation.
 - Nontraditional bonds and global bonds can lower interest rate risk.

1. Continued

- (iii) Dynamic Allocation
 - Provides the ability to monitor and adjust the glide path, responding to meaningful changes in market conditions.
 - Can adjust glide path if there's a big increase in market volatility or a sharp change in correlation characteristics of different asset classes.
 - This strategy should focus on reducing risk and not increasing returns.
 - (iv) Mixing Active and Passive investing strategies to enhance risk-adjusted returns and manage costs.
 - (v) Provide a lifetime income option to participants as the default investment for the DC plan
- (b) Describe diversification solutions that address the following risks in target date funds:
- (i) Growth risk
 - (ii) Inflation risk
 - (iii) Market risk

Commentary on Question:

This part of the question was straight forward, and candidates generally did very well.

- (i) Growth risk
 - Long-short equity
 - generates more than half its returns from factors outside the benchmark movements of the equity market
 - Long-short equities is manager skill (alpha diversification)
 - Risk-parity strategies
 - Generate diversification by diversifying across broad asset markets (beta diversification).
 - They don't rely on equity market returns alone They diversify their exposure across interest rates, commodities, credit and other asset classes.
- (ii) Inflation risk
 - Real estate – can pass through rises in inflation by hiking rent prices
 - TIPS – protects a bond portfolio against inflation, since TIPS absorb the upward movement in inflation

1. Continued

- (iii) Market risk
 - Equity risk management
 - Defensive equities
 - Dynamic allocation
 - Fixed income diversifiers are designed to generate stable returns without being sensitive to the interest rate environment.

2. Learning Objectives:

2. The candidate will recognize and appropriately reflect the role of plan investments in managing plan sponsor risk and make recommendations.

Learning Outcomes:

- (2d) Apply and evaluate strategies and techniques for asset/liability management.

Sources:

RPIRM-148-17: Key Rate Durations: Measures of Interest Rates Risk

Commentary on Question:

Commentary listed underneath question component.

Solution:

- (a) Compare and contrast effective duration and key rate durations.

Commentary on Question:

Candidates are expected to list at least 8 of the items below to earn full credit. Candidates need to demonstrate that they fully understand the purposes and differences between effective duration and key rate durations.

- Most commonly used measure of interest rate risk exposure is effective duration.
- Effective duration is the ratio between the change in the security value to the parallel shift of the spot curve.
- Key rate durations are a vector representing the price sensitivity of a security to each key rate change.
- Both measure interest rate risk.
- Both measure duration of a security.
- Effective duration assumes parallel shift of spot curve; key rate durations are based on each segment of the spot curve.
- Effective duration is the total risk exposure and key rate durations are the component parts; effective duration equals sum of the key rate durations.
- Key rate durations are applicable over a broad range of yield curve movements.
- Key rate durations can provide insight into option-embedded bond behavior that effective duration cannot.
- Two portfolios can have the same effective duration but completely different interest rate risk exposure.
- Effective duration grossly understates the interest rate risk exposure of an option.
- Key rate durations are not a single measure as is effective duration.
- Key rate durations can be used to quantify interest rate bets for the manager.

2. Continued

- (b) Calculate the price of Security 1 after a 10-basis point increase in the 30-year key rate.

Commentary on Question:

Most candidates performed very well on this question.

$$P - PI = -PI * D(i) * d(i)$$

where P = price after shift, PI = initial price, D(i) = key rate duration and d(i) = shift in key rate

$$PI = 104, D(30) = 3.0, d(30) = 0.001$$

$$P = 104 - 104 * 3.0 * 0.001 \\ = \mathbf{103.688}$$

- (c) The price for Security 2 is 3.2 after the following shift:

- 15-basis point decrease in the 15-year key rate; and
- 10-basis point decrease in the 30-year key rate.

Calculate the effective duration of Security 2.

Commentary on Question:

Most candidates were able to calculate the 15-year key rate, but some candidates forgot to calculate the effective duration.

$$P - PI = -PI * D(15) * d(15) - PI * D(30) * d(30)$$

P = price after shift, IP = initial price, D(i) = key rate duration, d(i) = shift in key rate

where IP = 3, P = 3.2, D(15) = X, d(15) = -0.0015, D(30) = -40, d(30) = -0.001

$$3.2 - 3 = -3 * X * (-0.0015) - 3 * (-40) * (-0.001)$$

$$0.2 = 0.0045X - 0.120$$

$$X = 0.32/0.0045$$

$$X = 71.1111$$

Effective duration E = sum of key rate durations.

$$D(i): = 0.2 - 0.5 - 0.3 + 71.1111 - 25 - 20 - 40$$

Effective duration E = -14.489

2. Continued

(d) You are given the following steepening shift for Security 3:

- 10-basis point decrease in the 5-year key rate;
- 20-basis point increase in the 15-year key rate; and
- 30-basis point increase in the 25-year key rate.

Calculate the level (parallel) interest rate shift that is equivalent to the steepening shift given above.

Commentary on Question:

Most candidates were able to calculate the effective duration of Security 3.

$$P - PI = -PI * D(i) * d(i)$$

where P = price after shift, IP = initial price, D(i) = key rate duration, d(i) = shift in key rate

$$\text{Level shift change in price} = -IP * \text{Summation } D(i) * d(i)$$

$$\text{Steepening shift change in price} = -IP * D(5) * d(5) - IP * D(15) * d(15) - IP * D(25) * d(25)$$

Set level shift equal to steepening shift

$$D(5) = 0.7, d(5) = -0.001, D(15) = 0.8, d(15) = 0.002, D(25) = 0.4, \\ d(25) = 0.003, \text{Effective duration} = \text{Summation } D(i) = 3.9$$

$$-IP * \text{Summation } D(i) * d(i) = -IP * D(5) * d(5) - IP * D(15) * d(15) - IP * D(25) * d(25)$$

$$\text{Summation } D(i) * d(i) = D(5) * d(5) + D(15) * d(15) + D(25) * d(25)$$

$$\text{Effective duration} * d(i) = D(5) * d(5) + D(15) * d(15) + D(25) * d(25)$$

$$d(i) \text{ level} = [D(5) * d(5) + D(15) * d(15) + D(25) * d(25)] / \text{Effective duration}$$

$$d(i) \text{ level} = [0.7 * (-0.001) + 0.8 * 0.002 + 0.4 * 0.003] / 3.9$$

$$\mathbf{d(i) \text{ level} = 0.00054}$$

3. Learning Objectives:

1. The candidate will understand the issues facing retirement plan sponsors regarding investment of fund assets.

Learning Outcomes:

- (1f) Identify and assess the sources of investment risk applicable to retirement fund assets.

Sources:

Modern Investment Management, Litterman, Ch. 2,

Commentary on Question:

Candidates did either very well or very poorly on this question. If a candidate made a mistake in part a) or b), credit was given for the remaining parts if formulas were correct.

Solution:

- (a) Calculate the marginal contribution to portfolio risk of:

- (i) Long bonds
- (ii) Domestic equities
- (iii) International equities

- (i) Long bonds

$$\begin{aligned}\Delta l &= (l \times \sigma_l^2 + d \times \sigma_l \times \sigma_d \times \rho_{ld} + f \times \sigma_f \times \sigma_l \times \rho_{lf}) / \text{StdDev} \\ &= (0.35 \times 0.062 + 0.3 \times 0.06 \times 0.08 \times -0.2 + 0.3 \times 0.1 \times 0.06 \times -0.3) / 0.04713 \\ &= (0.00126 - 0.000288 - 0.00054) / 0.04713 \\ &= \mathbf{0.00917}\end{aligned}$$

- (ii) Domestic equities

$$\begin{aligned}\Delta d &= (d \times \sigma_d^2 + l \times \sigma_l \times \sigma_d \times \rho_{ld} + f \times \sigma_f \times \sigma_d \times \rho_{df}) / \text{StdDev} \\ &= (0.3 \times 0.082 + 0.35 \times 0.06 \times 0.08 \times -0.2 + 0.3 \times 0.1 \times 0.08 \times 0.6) / 0.04713 \\ &= (0.00192 - 0.000336 + 0.00144) / 0.04713 \\ &= \mathbf{0.06416}\end{aligned}$$

- (iii) International equities

$$\begin{aligned}\Delta f &= (f \times \sigma_f^2 + l \times \sigma_l \times \sigma_f \times \rho_{lf} + d \times \sigma_f \times \sigma_d \times \rho_{df}) / \text{StdDev} \\ &= (0.3 \times 0.12 + 0.35 \times 0.06 \times 0.1 \times -0.3 + 0.3 \times 0.1 \times 0.08 \times 0.6) / 0.04713 \\ &= (0.003 - 0.00063 + 0.00144) / 0.04713 \\ &= \mathbf{0.08083}\end{aligned}$$

3. Continued

- (b) Calculate how many units of long bonds the investor must purchase to retain the same level of risk in the portfolio as before the sale of domestic equity.

Selling 1 unit of domestic equity requires $\Delta d / \Delta l$ units of long bonds to be purchased to maintain equal risk.

$$\begin{aligned}\text{Long bonds} &= \Delta d / \Delta l \\ &= 0.06416 / 0.00917 \\ &= \mathbf{7 \text{ units}}\end{aligned}$$

- (c) Calculate the change in the portfolio expected excess return.

Commentary on Question:

Any reasonable assumptions on the risk-free rate were accepted. Most candidates assumed that the risk-free rate is 0%.

$$\text{Change in return} = (\Delta d / \Delta l) \times e_l - e_d$$

$$\begin{aligned}e_d &= \text{excess return of domestic equity} \\ &= \text{expected return on domestic equity less risk-free rate} \\ &= 0.07 - 0.00 \\ &= 0.07\end{aligned}$$

$$\begin{aligned}e_l &= \text{excess return of long bonds} \\ &= \text{expected return on long bonds less risk-free rate} \\ &= 0.03 - 0.00 \\ &= 0.03\end{aligned}$$

$$\begin{aligned}\text{Change in return} &= (\Delta d / \Delta l) \times e_l - e_d \\ &= 7 \times 0.03 - 0.07 \\ &= \mathbf{0.14}\end{aligned}$$

4. Learning Objectives:

2. The candidate will recognize and appropriately reflect the role of plan investments in managing plan sponsor risk and make recommendations.

Learning Outcomes:

- (2d) Apply and evaluate strategies and techniques for asset/liability management.
- (2e) Provide advice and analysis to plan sponsors regarding the mitigation of investment risks.

Commentary on Question:

*This question was intended to test candidates' understanding of how various de-risking opportunities might affect a DB plan under a significant market shock. The expectation was that candidates would consider **both** the interest rate increase and 25% equity shock together as a single market event. However, many candidates misunderstood the wording of the question and considered the events separately.*

*Because the wording of the question was determined to be slightly ambiguous, it was possible to achieve full credit for the question regardless of whether candidates considered the two events together or separately. What was most important was that candidates understood how each of the de-risking options would affect the plan's response to a change in interest rates **and** a change in equity markets (whether considered together or separately).*

The distribution of scores for this question skewed slightly lower than some other questions, primarily due to a lack of sufficiently detailed responses. Given that this question was worth 9 of the 40 total exam points, candidates would have been expected to provide quite a bit of qualitative and quantitative detail within their response. However, many responses tended to be on the shorter side and lacked appropriately detailed calculations.

Finally, the graders noted that many candidates used a simplified arithmetic methodology for duration adjustment, rather than the more standard geometric adjustment. While full credit was provided for both approaches, it is generally preferred that candidates use the geometric approach for exam questions.

Solution:

Company ABC's CFO is considering the following de-risking options:

- (i) Adopting a glide path that will have an allocation of 100% in liability-hedging assets when the plan is 100% funded on a termination basis.
- (ii) Purchasing an annuity buy-out for retired members and keeping the current asset allocation for the remaining assets.

4. Continued

- (iii) Purchasing an annuity buy-in for retired members and adopting a glide path for the remaining assets that will have an allocation of 100% in liability-hedging assets when the plan is 100% funded on a termination basis.

Compare and contrast how the following economic event would have affected the three de-risking options:

- A 200-basis point increase in interest rates; and
- A 25% drop in equity markets.

Commentary on Question:

Although the question asks candidates to “compare and contrast,” there were a significant number of comparison permutations if candidates misinterpreted the question (and considered the interest rate and equity shocks separately). Credit was therefore provided for appropriate qualitative analysis regardless of whether the answer was presented in a “compare and contrast” format.

- (i) ***Adoption of glide path with 100% liability-hedging allocation at 100% funded status.***

The plan is **not** currently 100% funded before the event, so there is no immediate impact on asset allocation.

From the question data provided:

$$\text{Initial Funded Status} = 180\text{M} / 190\text{M} = 95\%$$

Post-event liability:

Active:	20,833,333
TV:	7,181,844
Retiree:	119,579,082
Total:	147,594,259

Sample liability adjustment (shown for Active):
 $30\text{M} * [(1+(20\text{yrs}/100))^{(-2\% * 100)}]$

Post-event assets:

Fixed Income:	$61,557,402 = 80\text{M} * [(1+(14\text{yrs}/100))^{(-2\% * 100)}]$
Equity Assets:	$75,000,000 = 100\text{M} * 75\%$
Total:	136,557,402

4. Continued

$$\text{New Funded Ratio} = 136,557,402 / 147,594,259 = 92.5\%$$

Plan liability duration post-event =

$$\begin{aligned} & \quad \% \text{ Active liab. x Active duration } ((20.8m/147.6m) * 20) \\ + & \quad \% \text{ TV liab. x TV duration } ((7.2m/147.6m) * 18) \\ + & \quad \% \text{ Retiree liab. x Retiree duration } ((119.6m/147.6m) * 12) \\ = & \quad 13.42 \text{ years} \end{aligned}$$

Plan's Hedge Ratio post-event:

$$[61,557,402 * 14\text{yrs}] / [147,594,259 * 13.42\text{yrs}] = 44\%$$

Contribution required to terminate OR funded status deficit:

$$\text{New Liab.} - \text{New Assets} = 147.6m - 136.6m = \mathbf{11.0m}$$

- Although the 200 bps increase in interest rates has a large decreasing effect on liabilities, the corresponding decrease in fixed income assets combined with the negative equity market shock results in an overall 2.5% funded status decrease and minimal impact on hedge ratio. This means that the plan does not reach the 100% funded threshold needed for the fixed income allocation to move fully to liability-hedging assets
- Should the sponsor wish to contribute additional funds to reach 100% funded status and be fully-funded on a termination basis, the deficit has now increased by 1m from 10m to 11m. Alternatively, the plan could consider re-risking slightly to improve upside outcomes, although the plan is already heavily allocated to equities compared to many plans in a similar funded status position
- Had the 200bps interest rate increase been the only impact, the plan would have experienced a significant improvement in funded status and would have reached the 100% trigger on the glide path. However, the current approach is very risky because, had only the equity shock occurred, the plan would have experienced a very large decrease in funded status that may trigger regulatory required contributions and/or other unwanted events

(ii) *Retiree buy-out prior to market event*

The buy-out will completely remove all 150m of Retiree liability from the plan. Because the liabilities are stated on a termination basis, we can assume that 150m in assets will also be removed from the plan

Post buy-out liability (before market event):

Active:	30,000,000
TV:	10,000,000
Retiree:	0
Total:	40,000,000

4. Continued

Liability duration post buy-out (before market event):

$$\begin{aligned} & \quad \% \text{ Active liab. x Active duration } ((30m/40m) * 20) \\ + & \quad \% \text{ TV liab. x TV duration } ((10m/40m) * 18) \\ + & \quad \% \text{ Retiree liab. x Retiree duration } (0) \\ = & \quad \mathbf{19.5 \text{ years}} \end{aligned}$$

Post buy-out assets (before market event):

180m total assets – 150m buy-out assets = 30m in assets remaining in the plan. Assuming assets are taken pro-rata, this leaves 30m/180m = 16.7% of each asset type

Fixed Income: 13,333,333
Equity Assets: 16,666,667
Total: 30,000,000

Liability post market event:

$$40m * [(1+(19.5\text{yrs}/100))^{(-2\% * 100)}] = \mathbf{28,015,178}$$

Post market event assets:

Fixed Income: 10,259,567
Equity Assets: 12,500,000
Total: 22,759,567

New Funded Ratio = 22,759,567 / 28,015,178 = 81.2%

Contribution required to terminate OR funded status deficit:

$$\text{New Liab.} - \text{New Assets} = 28.0m - 22.7m = \mathbf{5.3m}$$

- Because the buy-out decreased the dollar value of liability that was sensitive to interest rates during the market event, the contribution required to terminate the plan after the market event is lower than the contribution required in scenario (i)
- Because the plan liability duration after the buy-out is significantly higher than the duration of the original plan (due to the lower duration retirees being settled with the insurance company), the interest rate impact from the market event decreases the liability sufficiently to offset the market event impact on fixed income assets AND equities. Thus the plan funded status improves from 75% post buy-out to 81% post buy-out and market event (unlike scenario 1 where the market event decreased funded status)

4. Continued

- The plan sponsor will now need to consider how to manage funded status going forward given the percentage drop from 95% (before all events) to 81%. The sponsor may wish to make the relatively smaller (5.3m) contribution needed to terminate the plan, or, may need to evaluate whether the equity allocation and risk profile is appropriate to achieve the ongoing goals of the plan and satisfy any regulatory requirements

(iii) *Retiree buy-in prior to market event + glide path*

Unlike a buy-out, the retiree liability will **remain in the plan**, however, any change in the liability value will be fully protected by the annuity contract. The plan will still consider the buy-in annuity “asset value” as part of plan assets, however, the plan will no longer control the investment of those assets.

Post buy-in liability (before market event):

Active:	30,000,000
TV:	10,000,000
Retiree:	150,000,000
Total:	190,000,000

Liability duration post buy-in (before market event):

	% Active liab. x Active duration $((30m/180m) * 20)$
+	% TV liab. x TV duration $((10m/180m) * 18)$
+	% Retiree liab. x Retiree duration $((150m/180m) * 12)$
=	13.6 years

Post buy-in assets (before market event):

Similar to part (ii), the non buy-in assets will be 30m, split between fixed income and equities.

Fixed Income:	13,333,333
Equity Assets:	16,666,667
Buy-in Asset:	150,000,000
Total:	180,000,000

4. Continued

Liability post market event:

None of the liability characteristics have changed relative to part (i) because the retiree liability has remained in the plan, so the calculation is the same

Active:	20,833,333
TV:	7,181,844
Retiree:	119,579,082
Total:	147,594,259

Post market event assets:

*The Fixed Income and Equity assets move the same way they moved in part (ii) as they have the same starting values as part (ii). The buy-in asset will **always** be equal to the retiree liability.*

Fixed Income:	10,259,567
Equity Assets:	12,500,000
Buy-in Asset:	119,579,082 (equal to retiree liability)
Total:	142,338,649

New Funded Ratio = 142,338,649 / 147,594,259 = 96.4%

Contribution required to terminate OR funded status deficit:

New Liab. – New Assets = 147.6m – 142.3m = **5.3m**

- With the retiree liability fully protected by the annuity contract, the dollar value of funded status at-risk from the market impact is significantly decreased. Thus the funded status remains fairly steady after the market event (moving from 95% to 96.4%) and the 100% glide path trigger is not reached
- Due to the buy-in asset having a duration equal to the Retiree liability, the effective asset duration is significantly increased, and the corresponding hedge ratio would also be higher. This explains why the buy-in approach provides the best percentage funded status outcome (which may be helpful from a regulatory perspective). However, it is important to note that the \$ funded status after the market event is the same after the buy-in as it was under the retiree buy-out, and thus the sponsor's decision around ongoing asset & liability management is very similar to the decision in part (ii)
- Unlike a buy-out, liabilities covered through a buy-in are still subject to PBGC premiums, which is why many sponsors prefer a buy-out approach

5. Learning Objectives:

3. The candidate will understand how to evaluate the stakeholders' financial goals and risk management with respect to their plan.

Learning Outcomes:

- (3a) Compare the interests of plan sponsors, employees, shareholders, taxpayers and other stakeholders related to the financial management of a retirement plan.
- (3f) Provide advice and analysis to plan sponsors and other stakeholders regarding the mitigation of pension plan risks.

Sources:

RPIRM-115-13: Pensions in the Public Sector, Ch. 9

RPIRM-123-13: Risk Management and Public Plan Retirement Systems - (appendix background only)

Commentary on Question:

This question was generally answered well by candidates. In many cases, points were given for answers not included in the solutions below. Candidates were given credit for listing a consideration or strategy and subsequent point(s) for elaborating on the consideration. Points were not given where candidates restated or rephrased the same consideration, and candidates were not given points for providing more than four considerations.

Solution:

- (a) Describe four considerations in establishing a risk budget for public sector defined benefit pension plans.
 1. For pooled risks, which of these risks have a systemic element that places a further risk on the parties that fund the system (employees and taxpayers)?
 - Some risks may be pooled cost free (i.e. longevity) which benefits both participants and funders
 - Cohort risk, the risk that the cohort improves, is borne by the system
 2. Are there plan features that participants can use to select against the plan?
 - Early retirement features, or special programs or ways to increase benefits by manipulating other parts of the system (i.e. double dipping with overtime)
 3. What actuarial risks are there that the plan cannot hedge?
 - Primary one is systemic longevity risk
 - Can be significant for public plan systems due to inflation linked benefits

5. Continued

4. What non-actuarial risks are there that the plan cannot hedge?
 - Could be the unwillingness of a legislative body to allocate funding consistently to the plan
 - Such a plan does not have enforceable call on cash
 - Cost is predicated on assuming future continuous access to that cash
 - Hedging may include legal mandates or tighter legislative review
5. What scenarios create extreme tail situations?
 - What happens during negative events
 - Public entity finances are susceptible to economic recessions
 - Local entities must balance their budgets
 - May have limited access to borrowing
 - Risk budgeting should be done in a mindful way that could reduce both tax base and required contributions
6. What is the stability of the benefit level
 - How susceptible is the system to increases in benefits
 - Plan may be able to take on more risk where there has not been increases in benefit levels
 - Plans which have the ability to change the promise may be able to take on more risk
7. What is the ability of the parties that fund the system to support pension contributions?
 - Consider both level of contributions and costs of changing contributions
 - Decrease in contributions can make it appear that the plan can support higher benefit level without increase in contributions therefore putting pressure to increase benefits
 - Employees may not want to increase contributions without future increase in benefits
8. What are the other demands on revenue streams?
 - Conflicting interests (i.e. roads, schools etc) may prevent pension contributions from being made
9. What level of asset liability risk has the plan taken?
 - Combined effect of interest rate, credit, and equity risk
 - View in relation to funding of the plan
10. How mature is the plan?
 - Can gauge maturity by looking at contributions relative to benefit payments
 - Immature plan will have low benefit payments compared to contributions

5. Continued

- Over time, benefit payments will rise but may reach an inflection point
 - A plan with fewer cash needs (from large cash or contribution inflows) can generally take on more risk
 - More immature plans may take more risk as they have a longer investment time horizon
- (b) Describe four strategies that could be implemented to address contribution and funded status risk in a public sector defined pension plan.
1. Better asset/liability matching
 - Designing the assets to move in tandem with the liabilities better serves to limit contribution volatility
 - A higher return seeking portfolio is not always appropriate, and may introduce greater contribution volatility
 - A perfect liability matching asset could in theory remove all funded status and contribution volatility
 - No perfect liability matching asset exists, so a portfolio that best serves to match the liability sensitivity characteristics may be most appropriate
 2. Extend the dollar duration of the fixed income portfolio
 - Liabilities are extremely sensitivity to interest rates
 - Increasing the dollar duration can result in a higher expected return
 - Increasing the dollar duration can reduce riskiness of the funded status gap
 - For an upward sloping yield curve, there is a liquidity premium for longer duration fixed income
 3. Amount of equity exposure
 - A traditional 60/40 split likely does not lie on the efficient frontier
 - Lowest risk portfolio may not always be the most optimal
 - Optimal equity exposure varies plan by plan
 - Adding equity to the portfolio increases expected return, while increasing risk

5. Continued

- Underfunded pension plans may need additional equity exposure to make up the funding deficit
 - Overfunded pension plans may be able to accept additional risk, as funding cushion exists
 - Equity exposure highly dependent on future duration of the pension plan (i.e. may not be appropriate if plan wind-up is imminent)
4. Rebalancing rules
 - Capital markets change continuously which results in deviations from the target investment policy
 - Rebalancing strategy is important to ensure the portfolio adheres to stated purpose
 5. Funding policy including funding methodology and assumptions
 - Surplus assets may not always be accessible by plan participants or plan sponsors
 - Liability value is highly dependent on the assumptions used
 - Once contributions are reduced in a public sector plan, it may be hard to increase again if contribution stability deteriorates
 6. Using a stochastic integrated approach
 - Deterministic analysis is not always appropriate, and could lead to gaming of the system
 - Stochastic analysis is less gameable
 - Stochastic analysis measures risk and return
 - Stochastic analysis assigns a cost to optionality in the benefits
 - Investment policy can be altered at the same time to reduce overall cost risk
 7. Asset liability matching enforces investment discipline to help avoid political raids on assets
 - Public DB plans could view contributions in relation to overall tax revenues
 - Could lead additional international investments

6. Learning Objectives:

3. The candidate will understand how to evaluate the stakeholders' financial goals and risk management with respect to their plan.

Learning Outcomes:

- (3d) Understand and apply the principles of financial economics with respect to pension plan investing.

Sources:

RPIRM-162-21 Use of Financial Economics in Pension Actuarial and Investment Practice

Commentary on Question:

The question tested if candidates understand the areas of the actuarial standards of practice and the accounting standards that are similar and different than the principles of financial economics.

Solution:

- (a) Compare and contrast the principles of financial economics and the actuarial standards of practice applicable to pension plans.

Commentary on Question:

Full mark was awarded to candidates that outlined the similarities and differences between the relevant areas of the ASOPs (US and/or Canadian) and the principles of financial economics. No credit was awarded for providing only the description of the principles of financial economics. Other items not listed below were awarded credits to candidates.

Compare

- ASOP 27 clarified that actuaries may use different economic assumptions (including market-based estimates) depending on the purpose of the measurement. For the purpose of Contribution Budgeting, ASOP 27 still allows actuaries to use “a discount rate that reflects the anticipated investment return”, although for the purpose of Market-Consistent Measurements the selected discount rate should be more in line with FE Measurements.

Contrast

- ASOP 27, selection of economic assumptions for measuring pension obligations prior to 2013, the definition of the best-estimate range seemed to potentially not allow the type of discount rate assumption used in FE measurements.
- ASOP 27 prior to 2013 described the use of compensation increase assumption without limiting its use to projections, which is inconsistent with FE measurements.

6. Continued

- ASOPs 44 covers the selection and use of asset valuation methods that include smoothing while FE measurements are based on market value.
- (b) Compare and contrast the accounting standards for public pension plans and private pension plans using the principles of financial economics.

Commentary on Question:

Credits were awarded for providing a comparison and/or contrast of any part of accounting standards applicable to pension plan, US or Canadian, past or current, with the principles of FE. Candidates did not need to provide the standards' number to get credit. However, candidates needed to mention if they were comparing/contrasting Canadian or US accounting standards (also needed to differentiate public or private pension plans) to get credit for two similar items found in each accounting standards. Other items not listed below were awarded credits to candidates.

Compare

- IAS 19: Discount rate on investment-grade corporate bond yields is used.
- GASB Statements Nos. 67 and 68 issued 2012: Require use of market value of assets.
- CICA 3462: Immediate recognition of gains and losses.
- CICA 3462: Entities may choose measurements consistent with IAS 19 like discount rate and market value.

Contrast

- IAS 19 Measured liabilities and normal cost using projected salaries.
- CICA 3462: Can use a roll-forward of a funding valuation (discount rate is EROA).
- PS3250: Plan assets can use smoothing.
- PS3250: Gains and losses are amortized.