CSP-RU Complete Illustrative Solutions
Spring 2010

1.

Learning Objectives:

8. The candidate will be able to recommend and advise on the financial effects of funding policy and accounting in line with the sponsors' goals, given constraints.

Learning Outcomes:

(8d) Advise plan sponsors on accounting costs and disclosures for their retirement plans.

Sources:

Employee Future Benefits – Additional Disclosures, Background information and Basis for Conclusion, Includes Section 3461 from the CICA Handbook (omit p. 1-21, 29-34, 111-115).

R-C103-09: Comparison of IAS 19 with FAS87/88/106/132(R)/158, CICA 3461 and FRS 17 – Summary of Provisions Affecting Accounting for Post Retirement Benefits, Towers Perrin

Commentary on Question:

Candidates seemed to do well with this question. This may be because similar questions had been asked in the last year examination.

Some candidates calculated the unrecognized gain and loss correctly based on a reconciliation of accrued asset/liability rather than calculating the difference of expected and actual accrued benefit obligation and assets and reconciling of unrecognized gain and loss.

Most candidates were able to demonstrate that plan freeze would trigger a curtailment under FAS 88 in the salaried plan.

However, only a few good candidates had mentioned that the decrease in the accrued benefit obligation should be reduced by that loss with any excess included in the curtailment gain.

A few candidates did not calculate the curtailment gain properly under the Salaried Plan and a few candidates had provided answers which are contradicting to each other. As a result, they had not been able to receive the full credit.

1. Continued

For the Supplemental Retirement Plan (SRP), the increase in projected benefit obligation in the plan would theoretically trigger a curtailment loss. However due to the lack of syllabus material and enough information in the question, an alternative approach of establishing a new layer of prior service cost is also acceptable.

Solution:

1. Impact on NOC's 2010 accounting expense for the Salaried Plan

Expected Salaried Plan's PBO as of January 1, 2010 (Before Plan Freeze)
Rollforward of APBO to January 1, 2010=APBO + service cost + interest cost – expected benefit payments as of 12/31/09

$$= 1{,}110{,}336 + 52{,}495 + 66{,}058 - 28{,}000$$

$$= 1{,}200{,}889$$

Expected Salaried Plan's Assets as of January 1, 2010 (Before Plan Freeze)
Rollforward of Assets to January 1, 2010 = BOY assets + Contributions + Expected Return on Assets – Expected Benefit Payments
=875,898+40,526+61,751-28,000
=950,175

APBO (G)/L = Actual APBO at 1/1/2010 – Expected APBO at 1/1/2010 before the plan freeze

$$= 1{,}297{,}000 - 1{,}200{,}889$$

$$= 96{,}111$$

Asset (G)/L = Expected Assets at 1/1/2010 – Actual Assets at 1/1/2010 before the plan freeze
=950,175-969,200
= (19,025)

Rollforward of Unrec Gain/Loss to January 1, 2010 = BOY (G)/L – (G)/L Amort + APBO loss + Asset (g)/L
Rollforward of Unrec Gain/Loss to January 1, 2010

$$= 141{,}037 - 2{,}857(\text{amort. in } 2009) + 96{,}111(2009 \text{ ABO loss}) - 19{,}025(2009 \text{ asset gain})$$

$$= 215{,}266$$

1. Continued

Alternative way of calculating unrecognized gain and loss for Salaried Plan as of January 1, 2010:

Accrued benefit asset/ (liability) as of January 1, 2010 = Accrued benefit/asset/ (liability) as of January 1, 2009 – 2009 expense + 2009 contribution

$= 93,400 - 59,659 + 40,526$

$= (112,533)$

Funded status as of January 1, 2010 before plan freeze = Market value of asset – ABO
= 969,200 – 1,297,000
= (327,800)

Unrecognized (gain)/loss = Accrued benefit asset/ (liability) – funded status as of January 1, 2010 – unrecognized prior service cost – unrecognized transition obligation
= (112,533) – (327,800)
= 215,267

The impact effect of plan freeze on Salaried Plan's 2010 pension expense (Numbers in 000s):

Curtailment – Since reduction in 100% of future service must recognize unrecognized psc, transition obligation and change in ABO due to curtailment as 1/1/2010.
As there is a decrease in the accrued benefit obligation and an unrecognized actuarial loss exists, the decrease in the accrued benefit obligation should be reduced by that loss with any excess included in the curtailment gain.

Curtailment gain = Decrease in the accrued benefit obligation – unrecognized actuarial loss

$= (1,297,000 - 907,900) - 215,266$

$= 173,834$

The salaried Plan's 2010 pension expense (numbers in 000s):

DB Expense = Service Cost + Interest Cost – EROA + Amort PSC + Amort (G)/L + curtailment gain
Service Cost: Service cost is zero since no future service accruals (plan frozen)

1. Continued

IC = interest on APBO and SC – half a year's interest on benefit payments
IC = (907,900+0)*0.055-28,000*.5*.055
=49,165

Alternative Compound interest Solution: 49,175
EROA=-[1/1/10 Assets + (.5*(Contributions-Benefit Payments))]*.07
EROA = -[969,200+.5*(0-28,000)]*.07
=66,864

Alternative Compound interest Solution: 66,881

Prior service cost amortization = $0; Amort PSC: No longer an amortization of prior service cost since all recognized in curtailment

Actuarial (Gain)/Loss amortization = $0; Amort of (G)/L: No longer an amortization since all recognized in curtailment

2010 DB Expense/ (Income) = 0 + 49,165 – 66,864 +0 +0-173,834
= (191,533)
Alternative Compound interest Solution: (191,540)

2. **Impact on NOC's 2010 accounting expense for the SRP**

Expected SRP's PBO as of January 1, 2010 (Before Plan Freeeze)
Rollforward of APBO to January 1, 2010 = APBO + service cost + interest cost – expected benefit payments as 12/31/09

$$= 39,270 + 1,272 + 2,322 - 315$$

$$= 42,549$$

APBO (G)/L = Actual APBO at 1/1/2010 – Expected APBO at 1/1/2010 before the plan freeze

$$= 46,000 - 42,549$$

$$= 3,451$$

Rollforward of Unrec Gain/Loss to January 1, 2010 = BOY (G)/L – (G)/L Amort + APBO loss + Asset (G)/L
Rollforward of Unrec Gain/Loss to January 1, 2010 = 2,545 – 0(Amort. in 2009) + 3,451(2009 ABO loss)
=5,996

1. Continued

Alternative way of calculating unrecognized gain and loss for SRP as of January 1, 2010:

Accrued benefit asset/ (liability) as of January 1, 2010 = Accrued benefit asset/ (liability) as of January 1, 2009 – 2009 expense + 2009 contribution

$= -36,725 - 3,594 + 315$

$= (40,004)$

Funded status as of January 1, 2010 before plan freeze = Market value of asset – APBO prior to plan amendment

$= 0 - 46,000$

$= (46,000)$

Unrecognized (gain)/Loss = Accrued benefit asset/(liability) – funded status as of January 1, 2010 prior to plan amendment – unrecognized prior service cost – unrecognized transition obligation
= (40,004)-(46,000)
=5,996

The SRP's 2010 pension expense (numbers in 000s):

DB Expense = Service Cost + Interest Cost – EROA + Amort PSC + Amort (G)/L
Service Cost = 1,374

IC = Interest on APBO and SC – half a year's interest on benefit payments
IC = (56,000+1,374)*.055-300*.5*.055
=3,174

Alternative Compound interest Solution: 3,147
Expected Return on Assets EROA = 0 (unfunded SERP)

For the Supplemental Retirement Plan (SRP), the increase in accrued/projected benefit obligation in the plan would theoretically trigger a curtailment loss.

An alternative method of establishing a new layer of prior service cost is also acceptable.

1. Continued

Alternative Approach:

Establish a new layer of prior service cost

Unrecognized prior service costs as of January 1, 2010 = Projected Benefit Obligation as of January 1, 2010 After Plan Amendment minus Projected Benefit Obligation as of January 1, 2010 Before Plan Amendment

$= \$56,000 - \$46,000$

$= \$10,000$

Prior service cost amortization = Unrecognized prior service costs as of January 1, 2010/ Earsl

$= 10,000 / 5.90$

$= 1,695$

Amort G/L = (Unrec G/L – 10% of max (APBO, Assets)) ÷ Average Future Working Lifetime

$\text{Amort G/L} = (5,996 - .1 * \max(56,000, 0)) \div 5.9$

$= 67$

$2010 \text{ DB Expense/(Income)} = 1,374 + 3,147 - 0 + 1,695 + 67$

$= 6,283$

2. Learning Objectives:

1. The candidate will be able to analyze the risks faced by retirees and participants of a defined benefit or defined contribution retirement plan.

3. The candidate will be able to evaluate risks faced by sponsors of a retirement plan by virtue of the plan's design and be aware of methods to mitigate these risks.

Learning Outcomes:

(1d) Describe the risks faced by participants of single employer sponsored retirement plans.

(3a) Identify how plan features, temporary or permanent, can adversely affect the plan sponsor.

Sources:

Retirement Plan Designs for the 21st Century, Pension Forum, December 2008

Post Retirement Risks Chart, SOA

Key Findings and Issues: Understanding and Managing the Risks of Retirement

Commentary on Question:

Candidates were expected to review two plan designs and describe how each of these designs share investment and longevity risks between the plan sponsor and the plan members. Minimal or no credit was given for providing definitions, discussing hedging or risk-taking strategies, other plan designs or the legality of such plans in the U.S.

Solution:

(i) General

Cash balance (CB) plan is a defined benefit plan
CB settlement generally payable as a lump sum at retirement

Employee Risk - Investment

Investment risk is eliminated if credited rate is guaranteed
If credited rate tied to a passive index, Employees retain some of risk
Plan may provide Employee choice as to index

Employee Risk - Longevity

If CB only provides lump sum, Employee has longevity risk
Employee can purchase annuity with lump sum to avoid this risk
CB plan can provide an equivalent annuity as well

Employer Risk - Investment

If return guaranteed, employer has all investment risk
Can shift some of risk by using passive index for crediting rate
Can provide employees with choice of index

2. Continued

Employer Risk - Longevity
Longevity risk assumed by employer if employee does not select lump sum

(ii) General
Add a feature that guarantees a return up to some point

Employee Risk - Investment
Employee protected from downside
Investment risk only partially mitigated
If employer goes bankrupt, investment guarantees gone
Employee can minimize investment risk by diversification

Employee Risk - Longevity
Benefit provided as lump sum so employee has longevity risk
Employee can purchase annuity with lump sum to avoid this risk

Employer Risk - Investment
Employer takes risk of the rate guarantee
Employer should manage the portfolio to minimize risk
Employer can manage his risk by setting an investment policy that reflects the Employees choice of index
Might be able to buy variable annuities to hedge risk
Differences of return over guarantee allocated to a reserve to be used when actual returns less than guarantee
Cost neutral if guarantee set below expected mean return of plan

Employer Risk - Longevity
If employees can choose lump sums or annuities, can create longevity risk due to anti-selection

3. Learning Objectives:

8. The candidate will be able to recommend and advise on the financial effects of funding policy and accounting in line with the sponsors' goals, given constraints.

11. The candidate will be able to analyze the issues facing retirement plan sponsors regarding investment of fund assets and make recommendations on the actuarial issues.

Learning Objectives:

(8d) Advise plan sponsors on accounting costs and disclosures for their retirement plans.

Sources:

FAS 106 (exclude paragraphs 74, 79-84, 86-89, 108-115, appendix A, appendix C illustrations 3 and 7, appendix D) http://www.fasb.org/pdf/fas106.pdf

Fundamentals of Retiree Group Benefits, Yamamoto, 2006, chapter 7 and Chapter 8 pp. 211-235

Commentary on Question:

This question applies the concepts of settlement reporting and expense calculations to a post-retirement medical benefit plan situation. Candidates were also given credit for the alternate approach of treating the financial effects of the lump sum settlement as a liability remeasurement, prior to calculating settlement effects.

Solution:

- Buyout program will result in settlement reporting in 2009.
- There is no curtailment since the program is only offered to retirement-eligible members whose expected future service is zero.
- Settlement is a transaction that a) is an irrevocable action, b) relieves the employer of primary responsibility of any post-retirement benefit obligation and c) eliminates significant risks related to the obligation and the assets used to effect the settlement.
- Total lump sum payment to opt out retirement-eligible members
  = 300,000 x 600 = 180,000,000.
- Future expected benefit payment reduces to 22,000,000.
- Prorata portion U/R Net Loss* recognized (in 000's)
  = 240,000/1,574,841 X 226,210 = 34,474.

3. Continued

The calculation of the contribution and settlement impact at 1/1/2009 is a follows:

($'000)	Funded Status Before Settlement	Settlement	Funded Status After Settlement
APBO at 1/1/09	(1,574,841)	240,000	(1,334,841)
Fair Value of Assets	500,000	(180,000)	320,000
Funded Status	(1,074,841)	60,000	(1,014,841)
*U/R Net loss	226,210	(34,474)	191,736
U/R PSC	-		-
U/R Transition	-		-
Accrued Postretirement benefit cost	(848,631)	25,526	(823,105)

2009 Expense ($'000)		
(a) Service cost		57,210
(b) Interest cost	(APBO+SC-BP/2) x discount rate (1,334,841+57,210 -22,000/2) x 5.75% =	79,410
(c) Expected return on assets	(MV-BP/2) x EROA (320,000-22,000/2) x 6% =	(18,540)
(d) Amortizations:		
- Prior service cost		-
- Unrecog (Gain)/Loss	U/R Loss-10% max(APBO,MV))/AFS (191,736-10%x1,334,841)/17 =	3,427
(e) Subtotal		**121,507**
(f) Settlement cost /(income)		(25,526)
Total 2009 expense/(income)		**95,981**

Alternate Solution – buyout payment treated as a liability remeasurement

- Gain from remeasurement (in 000's)
  = 240,000 – 180,000 = 60,000
- Revised APBO at 1/1/09
  = 1,574,841 – 60,000 = 1,514,841
- Revised U/R net loss
  = 226,210 – 60,000 = 166,210
- Prorata portion U/R Net Loss* to be recognized
  = 180,000/1,514,841 X 166,210 = 19,750

3. Continued

The calculation of the contribution and settlement impact at 1/1/2009 is a follows:

($'000)	Funded Status Before Settlement	Settlement	Funded Status After Settlement
APBO at 1/1/09	(1,514,841)	180,000	(1,334,841)
Fair Value of Assets	500,000	(180,000)	320,000
Funded Status	(1,014,841)	-	(1,014,841)
*U/R Net loss	166,210	(19,750)	146,460
U/R PSC	-		-
U/R Transition	-		-
Accrued Postretirement benefit cost	(848,631)	(19,750)	(868,381)

2009 Expense ($'000)		
(a) Service cost		57,210
(b) Interest cost	(APBO+SC-BP/2) x discount rate (1,334,841+57,210-22,000/2)x5.75% =	79,410
(c) Expected return on assets	(MV-BP/2) x EROA (320,000-22,000/2)*6% =	(18,540)
(d) Amortizations:		
- Prior service cost		-
- Unrecognized (Gain)/Loss	(U/R Loss-10% max(APBO,MV))/AFS (146,460-10%x1,334,841)/17 =	763
(e) Subtotal		**118,843**
(f) Settlement cost /(income)		19,750
Total 2009 expense/(income)		**138,593**

4. Learning Objectives:

8. The candidate will be able to recommend and advise on the financial effects of funding policy and accounting in line with the sponsors' goals, given constraints.

11. The candidate will be able to analyze the issues facing retirement plan sponsors regarding investment of fund assets and make recommendations on the actuarial issues.

Learning Outcomes:

(8f) Advise plan sponsors on their financial implications.

(8i) Merger and acquisitions.

(11) Able to analyze the issues facing retirement plan sponsors.

Sources:

R-C118-07: Pension Issues in Corporate Sales, Mergers and Acquisitions Acquiring a US Operation

R-C144-10: Mergers and Acquisitions: Due Diligence of Retirement Plans

Handbook of Canadian Pension and Benefit Plans, Morneau Sobeco, Chapters 6 and 8

R-C120-07: Introduction and Overview of Retirement Plan Investments

Commentary on Question:

Many candidates only identified the differences in the assumptions without indicating the implications (e.g. funding interest rates between two plans are different and the selection of interest rate will affect contribution requirements).

We would also like to see candidates identify if the assumptions used to determine the assets transfer are appropriate. However, only a few candidates mentioned that.

Some candidates provided a list from the textbooks regarding the process of purchase and sale (e.g. due diligence, collecting documents) which are not related to the funding/accounting/investment issues.

Solution:

<u>Accounting Issues</u>

- There might be a funding deficit as the assets transferred to the XYZ plan are determined based on NOC's accounting assumptions which are not as conservative as XYZ's funding assumptions.
- The assumptions used for this purpose may not be appropriate in relation to the sale or merger transaction.

4. Continued

- Need to review the assumptions used by vendor to see if they are within buyers practice.
- Discount rate difference between NOC and XYZ. This is critical as asset transfer based on it.
- NOC's assumptions are more aggressive than that of XYZ's which will produce a lower liability (i.e. assets to be transferred to XYZ).
- XYZ's salary assumption is 4.25% vs. NOC's 3.5%. The appropriate salary scale will depend on XYZ's compensation policy.
- NOC's termination assumption outdated. Any recent experience study to see if assumptions are still valid.
- NOC's retirement assumption does not reflect pre 62 subsidy. Any recent experience study to see if assumptions are still valid.
- NOC's mortality assumption outdated. Any recent experience study to see if assumptions are still valid.
- Are the accounting policies of the vender the same as that of the purchaser?
- Is the pension expense of the vendor underestimated or overestimated which may overstate?
- Are the dates used for valuation purposes up-to-date?

Funding Issues

- Selection of discount rate for funding purposes significantly affects contribution requirements.
- Significant differences in discount rate (7% vs. 5%).
- Are there any surplus issues – should review plan text carefully and trust agreement?
- Merge pension funds or keep them separate.

Investment Issues

- Review and update investment policy, if necessary.
- Need to review asset mix due to new demographics and changes in asset mix may impact the level of employer contributions and discount rate selection.
- Review all investment manager agreements and agreements with service providers.

5. Learning Objectives:

7. The candidate will be able to evaluate the sponsors financial goals and risk management with respect to their plan.

10. The candidate will be able to analyze the regulatory environment as it affects retirement plans.

Learning Outcomes:

(7a) Describe ways to work with the sponsor on identifying and prioritizing the goals of management and shareholders related to the financial management of their retirement plans

(10a) Evaluate the effect of regulatory policies and restrictions, for all retirement plans, associated with:

- Plan design
- Plan establishment
- Plan amendment
- Plan termination/windup
- Plan merger or spin-off
- Reporting requirements
- Members' rights
- Plan funding
- Contributions and benefits
- Individual savings plans
- Coordination of individual and employer sponsored retirement plans
- Economic value to shareholders

Sources:

McGill, Chapter 14

Handbook of Canadian Pension and Benefit Plans, Morneau Sobeco, Chapters 5 and 6

Pension Forum, June 1996, Funding Adequacy

R-C116-07: Mercer - Financing the Future: How Fit is Your Funding Policy

Improving Funding and Disclosures: What's in it for Me?

Commentary on Question:

This question requires candidates to assess advantages and disadvantages for plan sponsors, plan members and government/society due to change in minimum contributions requirement. Credit was given for any advantage/disadvantage where appropriate justification was provided; however, no points were given for listing different funding policies without applying the list to this specific case.

5. Continued

Solution:

Plan Sponsors

Because of lower minimum funding contribution requirements, the employer is more likely to be able to keep its pension plan active as well the likelihood of the employer freezing or terminating the plan decreases. The new funding regulations can increase the attractiveness of DB plans and more employers might offer DB plans in the future.

In addition, employers may have more profitable business uses for the cash or more pressing cash flow needs, such as:

- Extra cash for other purposes
- Pay wages
- May not have to lay-off people.

The minimum required contributions will be lower and more affordable. They will be more predictable and as a result it will be easier to budget for future pension cost. This is because amortizing gain/losses over 15 years instead of 5 years will lower cost volatility leading to greater cost control, and at times the sponsor does not want to pay any more contributions than are necessary. The plan sponsor will be able to contribute less when the financial conditions are tough and more when they improve.

Other Implications:

- Sponsors might need to increase future contributions since benefits and expenses are funded by contributions and investment income and delaying contributions reduces investment income.
- Lower contributions will increase pension expense.
- Lower tax deductions on contributions.

Plan Members

Since employers are allowed to contribute a smaller amount into pension plans, benefit security for participants will be at risk as there might not be sufficient assets on hand when employees retire. However, smaller required contributions mean that it is more probable that employer will keep the DB plan active.

- Employer will not need to freeze the pension plan.
- Employer will not terminate the pension plan.
- Employees will continue accruing benefits.
- Employees will still have the security of a defined benefit plan.

Lower funding could affect employee morale if they feel there benefit is at risk. Employees are looking to maximize compensation (earnings and pension income) and because of the new regulations they might be able to do that.

5. Continued

Government / Society

Lower deductible contributions means less employer deductions and thus higher tax revenue. In the current year, for the government the additional revenue could be used to support other government programs. By introducing the new funding regulations, the probability that employers will keep their pension plans active will increase and this reduces dependence on government-funded programs.

The lower required contributions means the employer will be more likely able to pay wages and less people will become unemployed or go on disability decreasing the need for governmental support. The lower contributions encourage employers to keep DB plans versus DC plans, and DB plans are believed to have a greater benefit to society. However, relaxed contribution requirements for employer-sponsored pension plans might result in insufficient assets to cover benefits and more pressure on the Social Security system and other entitlement programs if the new regulations lead to excessive under funding of pension plans.

Lower contributions:

- May result in insufficient assets and society may have to support retired people with inadequate income;
- May lead to pension plans not being adequately funded and may transfer the funding risk from the employer to taxpayer; and
- Might result in more underfunded DB plans thus more pressure on guaranty funds (many countries require pension insurance) as well as premiums to guaranty funds might not be risk related and some companies might not try to better fund their plans to pay lower premiums.

6. Learning Objectives:

11. The candidate will be able to analyze the issues facing retirement plan sponsors regarding investment of fund assets and make recommendations on the actuarial issues.

Learning Outcomes:

(11b) Distinguish the various ways that retirement fund assets are managed.

(11i) Evaluate immunization strategies and other hedging techniques for asset/liability management.

(11h) Identify the sources of investment risk and assess risk facing retirement funds.

Sources:

R-C149-10: Plan Sponsor Guide to Liability –Driven Investing, BNY Mellon, Asset Management

R-C147-10: How Pension Plan's Funding Level Should Influence its Investment Strategy, Vanguard, Both

R-C148-10Jim Moore Discusses Liability Driven Investment Strategies and Concepts, Product Focus, May 2007

"Full Circle, Purchasing Annuities in DB Plans", Ruloff
http://www.soa.org/library/monographs/retirement-systems/managing-retirement-assets-symposium/2004/march/m-rs04-2-05.pdf

R-C114-07: "A Fresh Look at Pension Risks" – MercerHR.com

R-C112-07: Pension Investment and Corporate Risk Management

Commentary on Question:

Part (a) of this question required the candidate to demonstrate that he/she understands the interest risk inherent in the Salaried Pension Plan and the value of reducing such risk. Credits were given for providing the advantages and disadvantages of reducing the interest rate risk as well as evaluating the potential impact of such strategy to the Salaried Pension Plan.

No credits were given to discussing/recommending other investment strategies except when it is utilized to compare and contrast with the Treasurer's proposal. The question specifically deals with interest rate risk; therefore no credits were given by merely identifying other pension risks.

6. Continued

Part (b) of this question required the candidate to list and describe alternative approaches to reducing interest rate risk. Partial credits are given for listing different investment approaches but full credits are given for describing the approach and how it helps reduce interest rate risk.

Solution:

(a) Evaluate the Treasurer's proposal.

- In most pension plans, the duration of plan assets is considerably less than the duration of plan liabilities. The results of this duration mismatch are that asset and liability values may not move in tandem when interest rates change. The duration mismatch is the interest rate risk of the pension plan.
- Investment approach has to take into account the impact of changes in interest rates to both assets and liabilities and ultimately to the funded status of the plan.
- Given that the plan is fully funded, the primary objective is to maintain its full funding status.
- Proposal helps in increasing the likelihood that the plan will remain fully funded and thus reduce funded status volatility.
- The Plan's interest rate risk is considered non-compensable risk (uncompensated risk) since the risk does not offer any incremental expected return. Therefore, reducing this risk allows the company's risk budget to be more productively allocated to compensable risks.
- Consider the relative size of the firm as compared to the Plan. If plan is relatively large, the effect of the interest rate risk to plan funding status is much more relevant to the firm's bottom line.
- Investment approach protects downside risk of plan funded status ratio and therefore makes benefits more secure for employees.
- Limits the upside potential of earning higher returns.
- Minimizes volatility of funding requirements - PPA requirements in US.
- Stabilizes pension expense on income statement.
- Reduces balance sheet volatility.

(b) Describe alternative investment approaches for implementing the Treasurer's goal.

- Dedication strategy or cash flow matching – almost impossible to do especially for ongoing plans that continue to accrue benefits.
- Immunization strategy – create an immunized bond portfolio that matches the duration of assets and liabilities.
- Extend the duration of the asset portfolio through purchase of longer-term bonds.

6. Continued

- Use of derivatives as part of an overlay strategy so that current asset mix does not necessarily have to be changed.
- Interest rate swap strategy:
  - Involves a periodic exchange of cash flows where one is based on a fixed rate and the other based on a market reference rate.
  - Since DB plans typically have a negative duration gap (i.e., asset duration - liability duration is negative), consider entering into a receive-fix interest rate swap that has a positive duration.
- Swaption – option-based strategy involving the right, but not the obligation to enter into an interest rate swap. Pension plan purchases a receiver swaption strategy that protects the plan from drops in the interest rates. However, there is an up-front premium charged for the option.
- Swap collars – involves the purchase of a swaption and selling another swaption at a higher strike rate in order to eliminate or reduce the up-front premium.
- Utilize Treasury futures to increase the asset's duration.
- Divide the assets into two components – a) fully funded portion will use any of the above LDI approach while b) the surplus portion can be used to generate excess returns.
- Construct interest-sensitive stock/equity portfolio – reduces interest rate risk without lowering expected returns relative to a bond portfolio.
- Annuitize the benefits – transfers the risk to insurer but is then exposed to insurer's solvency risk.

7. Learning Objectives:

6. The candidate will be able to understand the general applicability and design of long-term incentive plans.

Learning Outcomes:

(6a) The candidate will be able to describe the design of stock purchase, stock option and phantom stock plans.

Sources:

Handbook of Canadian Pension and Benefit Plans, Morneau Sobeco, Chapter 12

Retirement Plans, Allen, Chapter 15

Commentary on Question:

A well prepared candidate would be able to discuss the key aspects of stock based-compensation as well as other supporting information. They would also address risks associated with these plans.

Solution:

(a) Stock Purchase Plans

- Allows employees to purchase their employer's stock usually at a discount.
- Option price cannot be less than 85% of fair market value at exercise date or option date.
- Employee contributions are deducted from payroll.
- Participation is voluntary.
- Plans are non-discriminatory (no one can participate that owns >5% of company).
- Employee is subject to certain holding periods (two years from grant, one year from option).
- If sold after holding period, capital gains/losses apply for tax purposes.
- If sold prior to end of holding period, employee taxed as ordinary income on difference between fair market value and strike price from exercise date.

Stock Options Plans (aka Incentive Stock Options)

- Available to key employees including highly-compensated and can be discriminatory.
- Give employee the right to purchase stock at a specified price during a time period.
- Typically 2 to 4 years vesting.

7. Continued

- Plan must meet a number of requirements to qualify as ISO.
- Option cannot exceed 10 years.
- Option price must equal or exceed stock price at grant.
- Options are non-transferrable except on death.
- Max value for the first election per calendar year is $100,000.
- Employee must hold stocks for two years from granting of option or one year from exercise.
- Employee taxed at capital gains rate between fair market value when sold and the option price.

Phantom Stock Plans (aka Deferred Share Unit**)**

- Tie a cash bonus to the return of stock over a given period of time.
- Account is established that fluctuates with the value of the stock and the account is paid at some point.
- Can be discriminatory and are usually available for executives or other highly paid employees.
- Paid in cash, there is no actual stock held.

(b)

- The amount in the plan could be overvalued. Since these are stock plans, there is the possibility that value could decrease. If an employee is counting on cashing in their stock at a point in the future, they could be disregarding the possibility of the value lowering.
- It could be difficult for employees to understand the true economic value of the plans and so they may not participate.
- The employee could face a risk of having an excessive concentration in employer stock.
- The employee needs to understand all of the tax treatments of the plans.
- Phantom plans are not funded and employee is exposed to risk that company cannot pay.
- Such plans are indefinite as to the ultimate amount of retirement income that the employees may receive; not designed for retirement savings.
- Stock options are worthless if stock does not reach strike price. Employee may not be allowed to exercise stock options at the right time.
- Employee may not reach vesting criteria in stock option plans and phantom stock plans.
- Phantom shares and options are neither liquid nor portable.

8. Learning Objectives:

5. The candidate will be able to synthesize and evaluate deferred compensation and supplemental retirement plans for the highly paid in a given context.

Learning Outcomes:

(5d) Analyze the options for securing the benefit promise.

(5e) Assess the taxation issues.

Sources:

Retirement Plans – 401(k)s, IRAs and Other Deferred Compensation Approaches, Allen, Chapter 14

R-C801-07: Clary and Hauptman, "Evaluating Financing Options for Non-Qualified Benefit Plans", *Employee Benefit Plan Review*, Jan. 2004

Commentary on Question:

In part (a), candidates were expected to evaluate the pros and cons of funding a benefit plan which has no tax efficiencies. The analysis should include looking at the advantages and disadvantages from the following stakeholders perspectives: the administrator of the plan (NOC) and the beneficiaries of the plan (executives).

In part (b), candidates were expected to describe four funding alternatives. Credit was not given for addressing more than four alternatives.

Solution:

(a) NOC (employer) perspective

Disadvantages:

- Not tax efficient: Money set aside for the benefits are not tax deductible until the benefit is received by the participant which is contrary to other plans where the contributions are immediately tax deductible for the company
- Adding administration complexity: Need more plan documentation explaining the funding method, additional regulatory and disclosure compliance requirements
- Plan design restrictions: Surplus ownership issues, may not be able to change plan design for past accruals
- Minimum funding requirements: Will be required to fund the plan annually
- Fiduciary responsibility: Need to review governance model for the plan, asset allocation review, plan documentation
- May be inappropriate to fund executive benefits as some believe that if the ship goes down the executives should not be compensated (ethical dilemma)
- Requires cash: Will NOC have enough cash to finance these benefits every year

8. Continued

- Financial Statement volatility, impact on balance sheet and income statement: How will the financing option match the plan liabilities, what assumptions to use – depends on funding method
- Assets cannot be used against liabilities on financial statement; assets are put under other assets
- Capital dilemma: NOC may be better off using cash to reinvest in company
- May be funding benefits that are never paid out (because employee terminates) and thus increasing cost of plan

Advantages:

- Executives will value the plan more as it becomes more secure when it is funded, may be easier to retain executives
- May help in attracting executives, Plan is more competitive if funded
- No intergenerational inequity, today's generation is paying for the accrued benefits, more equitable

Executives (employee) perspective

Disadvantages:

- May have adverse tax consequences (if deemed to be constructive receipt)
- Not total security as assets are still subject to creditor risk in the event of bankruptcy

Advantages:

- Benefit is more secure
- Changes to government policy won't affect past SRP benefits if they are funded

(b) Types of Funding Vehicles - Candidate to describe 4 of the following:

1. Pay As You Go (Unfunded) – Finance With Cash
    - Executive is taxed on the payment of the SRP benefit when it is received
    - Methods in which benefits for participants are the most unsecured, if company goes bankrupt there are no assets to pay benefits
    - Benefit payments/cash flow for the company is very volatile (unpredictable)
    - Most common method

8. Continued

2. Corporate Owned Life Insurance (COLI)
   - Company buys life insurance on life of executive
   - The life insurance policy is used as collateral for the SRP (cash value asset offsets the benefit liability)
   - Cash value of the life insurance policy grows tax deferred

3. Secular Trust
   - Trust is irrevocable
   - Employee has constructive receipt of contributions therefore taxable to the employee when employer contributed
   - Benefit is secure if bankruptcy or change of control

4. Rabbi Trust
   - Trust must be subject to general creditor claims; no protection against bankruptcy
   - No tax consequence for employees; does not have constructive receipt of contributions
   - Trust income is taxable to the employer
   - Employer may deduct payments to executives

5. Taxable Securities
   - Company purchases taxable securities such as stocks, bonds and mutual funds to offset the benefit liability
   - Investment income is taxed to the company
   - Could also use Company stock (if paying employee in stock at distribution the company can avoid an income statement expense on the growth of stock)

9. Learning Objectives:

11. The candidate will be able to analyze the issues facing retirement plan sponsors regarding investment of fund assets and make recommendations on the actuarial issues

Learning Outcomes:

(11a) Assess the different types and combinations of investment vehicles for providing retirement benefits given the particulars of the sponsor's financial circumstances, philosophy, industry, workforce and benefit package.

(11b) Distinguish the various ways that retirement fund assets are managed.

(11h) Identify the sources of investment risk and assess risk facing retirement funds.

Sources:

Modern Investment Management, Litterman, Chapter 21 and 24

Handbook of Canadian Pension and Benefit Plans, Morneau Sobeco, Chapter 6

Retirement Plans, Allen, Chapter 24

Commentary on Question:

Candidates' performance varied for this question, which seemed to be useful in separating those candidates with limited knowledge of the material being tested and those with extensive knowledge of the material being tested. Using a part (a) and a part (b) seemed to be effective in focusing candidates on what was being asked. Part (a) was quite straight forward, while part (b) led to far more diverse responses. One difficult aspect of part (b) was that it pulled from several different sources. Many candidates limited their responses to material they remembered from just one or two sources, which caused them to leave points on the table.

Solution:

(a) NOC should consider the following key risks to actively-managed fixed income investing:

- Interest rate risk
  - Risk that yield will change due to changes in the level of interest rates
  - Measured by duration
  - Impact of inflation is an important consideration
- Yield curve risk
  - Risk that yield will change due to the shape of the yield curve
  - Measured by key rate duration

9. Continued

- Sector risk
  - Risk attributable to changes in spread between a sector NOC is exposed to and the baseline yield curve
  - Measured by contribution to duration
- Credit risk
  - Risk that bond issuer will default
  - Credit ratings can be used to assess risk
- Volatility risk
  - Risk that yield will change due to interest rate volatility
  - Measured by convexity and volatility duration
  - Consider gamma and vega exposures
  - Commonly found in assets with asymmetric payouts
- Prepayment risk
  - Risk of overestimating or underestimating prepayments
  - Often tied to mortgage-backed securities
  - Measured by prepayment duration
- Currency risk
  - Risk of exposure to foreign currencies
  - Not an issue for NOC because not invested in foreign fixed income
  - Risk can be hedged away
- Security specific risk
  - Risk of change in the market perception of a particular issuer that NOC is exposed to
  - Measured by contribution to duration

(b) NOC has a fiduciary responsibility to exhibit due diligence in its manager selection process. The first step in the manager selection process involves identifying managers whose style and investment strategy align with NOC's goals. In particular, only those managers with proven expertise actively managing fixed income portfolios should be considered. NOC should establish standardized criteria for ranking the managers in consideration while realizing that historical performance is not necessarily an indicator of future performance. More importantly, NOC should look for a consistent and logical investment process. There are a number of particular things NOC should consider including in its assessment of prospective managers:

- Quantitative analysis of historical performance
  - Was alpha achieved consistently
  - Consider running factor attribution of risk and returns
- Qualitative analysis
- Fee analysis
- Feedback from clients, competitors, and suppliers

9. Continued

- Should NOC utilize a consultant in the search process
  - Consultants are experienced at evaluating managers and can offer unbiased recommendations; however the cost of using a consultant can reduce or eliminate alpha

NOC should consider using a three step-process once it has identified a short list of final candidates:

- Collect information through a detailed questionnaire
- Conduct interviews
- Perform a final evaluation

On-site meetings with prospective managers can be useful for assessing intangible criteria:

- Culture
- Team interaction
- Hierarchy

NOC should also collect information on the experience of the investment team, how long the team has been together, and the depth of resources.

10. **Learning Objectives:**

2. The candidate will be able to evaluate sponsor's goals for the retirement plan

7. The candidate will be able to evaluate the sponsor's financial goals and risk management with respect to their plan

11. The candidate will be able to analyze the issues facing retirement plan sponsors regarding investment of fund assets and make recommendations on the actuarial issues*

*Note: the candidate is not expected to provide advice on investment of plan assets

Learning Outcomes:

(2a) Describe the agency relationship between management of the sponsor and its shareholders or taxpayers.

(2b) Compare the, sometimes conflicting, interests of management, employees, shareholders or taxpayers (in the case of public sector).

(7e) Describe how retirement plan accounting impacts the sponsor's overall financial results.

(11a) Assess the different types and combinations of investment vehicles for providing retirement benefits given the particulars of the sponsor's financial circumstances, philosophy, industry, workforce and benefit package.

Sources:

R-C105-07: Pension Actuary's Guide to Financial Economics

R-C106-07: The Case against Stock in Public Pension Plans (Bader, Gold), Working Paper, 2004

R-C138-09: The Case for Stock in Pension Funds, Contingencies Jan/Feb 08 http://www.contingencies.org/janfeb08/trade.pdf

R-C142-10: Bader and Gold's Rebuttal to The Case for Stock in Pension Funds, Contingencies March/April, 2008

The Good, The Bad and the Ugly, Pension Section News, September 2008, issue 68

Can pensions Be Valued as Marketed Securities, Bader, Pension Section News, June, 2009

R-C146-10: In Support of the Weatherman, Mindlin

R-C136-08: Selection of Valuation Interest Rates for Funding Valuations of Pension Plans – Traditional Pension Plan Approach Vs. Financial Economics Approach

10. Continued

Commentary on Question:
Candidates were asked to apply their understanding of financial economics to answer this question based on several of the readings from the source material. No credit was given for outlining or listing the general concepts of financial economics that did not specifically answer the question. The ideal response was centered around the "Law of One Price" with detailed explanations of supporting and opposing arguments for the law.

Solution:
Supporting Arguments
The CFO supports the financial economics view that pensions are similar to market instruments and therefore have a market value.

- The Law of one price says,
    - Two financial instruments that generate identical cash-flows (in terms of timing, magnitude and likelihood) and tradable in an efficient market must have the same price
        - Otherwise, there's an arbitrage opportunity which can't exist in an efficient market and therefore could be exploited
- Pension liability should be valued at the price at which a reference security trades in liquid and deep market
- The reference security is most likely a bond portfolio that produces cash-flows that match pension plan's liability (projected payments) in:
    - Amount
    - Timing
    - Probability of payment
    - The discount rate should therefore be nearly riskless for well funded plans or strong plan sponsors as the probability of payment is very high in these cases
    - The discount rate should not include an equity risk premium
    - *Note: credit also given if candidate made reference to replicating bond portfolio*
- Asset allocation does not (should not) impact the value of the liability
    - Equity investors realize gains after higher returns have been earned - not just when they are expected
    - Two companies that are identical in every way except for pension asset allocation should not have different liabilities
    - Investing in equities in the pension plan does not create shareholder value because shareholders can invest in equities themselves
- Financial economics would treat ABO as economic pension liability
    - Only accrued benefits are economic liabilities, future pay increases are not a current economic liability
- Current accounting or funding liabilities are moving towards market value measures (result of recent US legislation)
- Financial Economics takes view that pensions are form of corporate debt
    - Plan sponsor is borrower, plan members are lender

10. Continued

Opposing Arguments

The traditional actuarial view opposes the financial economics view in some respects.

- Pensions don't trade in financial markets and should not be valued like traded security
  - Better to call the "market value of liability" the cost of termination - since pensions don't trade on a market
- Since pricing pensions differently doesn't create arbitrage opportunities, law of one price does not apply
- Cash flows for pensions differ from bonds because they are contingent on things that do not affect ordinary bonds:
  - Future pay increases
  - Demographics
  - Mortality

[Note that the financial economics view would critique the traditional actuarial view regarding the uncertainty of projected payments by saying that the traditional view prices pensions as if the projected payments are certain anyway. Also, financial economics would not include pay increases in the liability.]

- It is very difficult to assess the probability of payment (the appropriate discount rate is a function of sponsor strength among many other things)
- Equity risk premium exists according to history, so to ignore it for a long-term vehicle like a pension plan seems wrong
- Debt model for valuing pension liabilities has some limitations:
  - Duration of pension liabilities is greater than bonds available (i.e., refer to maturity of bond market)
  - Debt market may not be sufficient to cover all cash-flows (i.e., can't match cash-flows exactly)
- Current accounting or funding liabilities are not in harmony with financial economics in several respects so it seems there is disagreement about the correct way to value pension liabilities indicating there is no true market value
  - Although, financial economics advocates believing accounting and funding rules would benefit from closer adherence to the principles of financial economics
  - Traditional actuarial view concedes that while there is no true market value, economic value is a useful benchmark for exploring a host of pension issues
  - Examples:
    - Effect of pension plan on financial condition of sponsor
    - Cost of possible plan improvements

10. Continued

- Other arguments against Financial Economics: inability to measure and manage plan's riskiness
  - Use of a bond-like rate only makes sense if the plan is invested in bonds otherwise the measure conceals risk
  - Pension liabilities are a risk measurement, not a known value measurement - so requires assumptions about future
- Liabilities could be valued at annuity purchase price available at high quality insurance company, this would seem to present a different "economic value" than the financial economics view, and since there cannot be two different market values simultaneously it would seem that there isn't a unique single market value for pension liabilities