CSP-RU & CSP-RC
Complete Illustrative Solutions
Spring 2009

All solutions apply to both the United States and Canada unless otherwise specified

1.

Learning Objectives:

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

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

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.

The objective of this question was to demonstrate the differences between private and public plans in the context of financial economics. A strong candidate recognized that typical FE arguments do not apply to public plans in the same fashion. As can be seen below, surplus and risk management were key, as well as recognizing different stakeholders.

Solution:

Pros

- **Stocks are justified when cash flows contain economic risk**
  - Salary related benefits can be (partially) hedged with equities
  - COLA increases can be (partially) hedged with equities
  - Investing 100% of the portfolio in bonds can actually increase risk
  - Fund allocation should be determined considering underlying liability and cash flows

- **Allow for use of ALM strategy (as opposed to strictly cashflow matching)**
  - Higher expected returns may allow for lower taxes (contributions)
  - Minimize contributions and surplus volatility
  - Use ALM to determine optimal (risk/return) portfolio mix

- **Higher Employee Benefits**
  - Surplus funding often leads to benefit improvements for employees

1. continued

- **FE arguments apply differently to Public Plans than Private Plans**
  - Government has no shareholders
  - Government pays no taxes
  - GASB not rushing toward a transparent economic accounting model
  - Taxpayers can move to avoid troubled pension fund
  - Indefinite lifetime of government plans

- **Political Reasons**
  - Short term nature of elected officials versus long term nature of pension plans

Cons

- **Market Risk**
  - Equities may have higher returns, but are subject to higher volatility

- **Intergenerational Taxpayer Conflicts**
  - Current taxpayer may fund less, but future taxpayer may be responsible for shortfall
  - Current taxpayer benefits from risk premium but transfers the risk to a future tax generation
  - Important to design structure that can fend off raids on large pool of assets

- **Asymmetric Nature of Public Pension Plans**
  - Asymmetric nature of plans prevent taxpayers from benefitting from any equity surplus
  - Surplus often goes to employee benefit improvements, but taxpayers pay the shortfall
  - Ownership of surplus if not known
  - Employee contributions complicate ownership issue
  - Ownership of surplus is not necessarily based on who bears the investment risk

- **Higher governmental borrowing costs**
  - Entity has taken on more risk so lower demand for their bonds and a higher yield

- **Risks perceived by participant**
  - Benefit Security

2.

Learning Objectives:

1 – Analyze risks faced by participants in a defined contribution 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.

The objective of this question was to analyze the retirement risks associated with different asset allocations. As shown below, given the topic of Target Funds, the employee age and risk tolerance and accompanying discussion were key to receiving full points on this question.

Solution:

Well diversified, professional managed portfolio designed to meet the investor's objectives through a single, convenient investment vehicle.

Target date funds (TDF) can address problems in traditional designs

- Members have little or no understanding of finance/investment
- No interest in obtaining knowledge
- Long term thinking/planning is foreign to most
- With no deadlines, members tend to not make changes when necessary
- More choices not better than fewer

Many members tend to choose money market funds
For younger members, this will most likely lead to inadequate retirement assets
However, this exposes the member to inflation risk and longevity risk
Most participants make the mistake of not taking on enough risk
Most participants' portfolios are significantly under diversified
In some cases, managers may also make shifts between asset classes based on their outlook, and this can further enhance the participant's returns.
TDFs can form a core part of portfolio and offer other employee-managed investments to supplement

Provide significant benefits for the plan sponsors as well

- Offer a certain level of investment advice in a pre-packaged vehicle
- A way to simplify the investment process for participants and reduce (but not eliminate) education needs
- Better retirement planning promotes orderly succession and workforce planning
- Help meet fiduciary obligations
- Members may appreciate the additional guidance and simplicity of the option

2. continued

The interest rate risk is minimized because the appropriate fund has a pre-designed diversified portfolio with an appropriate age-related weighting to cash and fixed income, including investments in long-term bonds.
Stock market risk is addressed by providing a fund with diversified investments, with the equity component reducing as retirement gets nearer.

Automatically reallocate the investments over time to be more conservative.

- Increase in fixed income and decrease in equity is consistent with this goal.

Changing balances represents trade-off between risk and reward

- Addresses common problem of individuals not rebalancing to meet changing needs

Addresses other investment behavioral problems

- E.g., chasing winners, inertia, equal weighting to all choices, etc.

Care should be taken to communicate that if such a fund is used in addition to other funds, then the overall asset allocation may not fit the investor profile
TDFs assume that all investors become more risk averse at the same rates as reflected into the allocation shifts.

In fact, individual risk may vary, depending on:

- Other retirement income sources, family money, health, lifestyle, etc.

Conservative portfolio for 2010 retirements, does not consider that the participant has many years to live in retirement.

- May not address inflation risk adequately.
- Should maintain some equity content for inflation hedge
- But to correct for this, individual can choose a "target maturity" that is later in their retirement years

Geographic diversification of equities and bonds may be inadequate

- Foreign stock/bonds may be a substantial pool for potential investments relative to domestic stocks/bonds
- But introduces currency risk for individuals

Small allocation to long-short equities strategy can produce additional returns
That may be uncorrelated to market, offering diversification
More opportunities with shorts because:

- Fewer investors on the short side
- Greater universe of stocks from which to choose
- No constraint on active short position (can only reduce long position to zero)
- Can take advantage of management fraud/overconfidence
- Can take advantage of sell-side "buy" recommendations
- But introduce leverage and exposure to margin calls
- Exposure to unlimited losses on short positions

2. continued

Number of available funds is too low

- Significant differences in risks between employees to have only three choices

Inclusion of company stock is questionable

- Especially for 2040 fund with 30% allocation
- Undiversified investment
- Could cause employee relations problems if stock falls
- Creates agency issues between management and employees
- Danger of loss of job and loss or retirement income assets at same time
- May not be permitted by legislation
- But strengthen link between employee and corporate interests

Other issues that could be addressed but details not provided

- Active vs. passive management
- Level of fees
- Diversification of equity position by cap size and/or style (value/growth)
- Distribution of fixed income portfolio by quality and/or duration

3.

Learning Objectives:

1 – Analyze risks faced by participants in a retiree health plan

3 – Evaluate risks faced by sponsors of a retiree health plan by virtue of the plan's design

4 – Evaluate a retiree health plan design

This is a synthesis question requiring candidates to assess the risks faced by plan participants and the plan sponsor of a change to the design of the retiree health plan. Successful candidates discussed risk to the plan sponsor and to the plan member; in addition to comparing/contrasting plan features.

Solution:

Maintain current retiree medical program

NOC's Perspective

- Rising claim costs
- Medical costs are rising higher than inflation
- Balance sheet/income statement impact
- No cost containment built into plan design
- Employer pays 100% of the cost; no copayments, deductibles, dollar caps, eligibility requirements related to service, retiree contributions, lesser benefit on early retirement, capping employer costs in aggregate
- Operational and administrative costs of the plan
- May not fit recruiting/retention strategy
- Perceived value by employees may be low

Employee Perspective

- Only covers limited medical expenses
- Need to retire from the company in order to be eligible for post-retirement medical benefits
- NOC may terminate or modify current program or implement cost sharing
- Risk of plan sponsor going insolvent and benefits not being paid

3. continued

Increase base pay by $4,000 per year

NOC's Perspective

- May be paying employees who do not stay with company until retirement
- May delay retirement of older employees
- Workforce morale/motivation issue
- Recruiting/attraction/retention issue
- Higher payroll taxes
- Higher cashflow needs for current active members
- Increased pension liability

Employee Perspective

- Risk of inability to afford adequate medical care
- Risk of not saving the money for use for medical savings in retirement
- Risk of inadequate coverage for spouse/dependant medical care
- Risk of outliving assets set aside for medical expenses and long term care
- Risk of inflation of medical expenses
- Additional salary is taxable
- Risk of illness requiring higher than expected medical costs
- Stock market and investment related risks

4.

Learning Objectives:

12 – The candidate will be able to apply the standards of practice and guides to professional conduct.

The candidate was expected to analyze the appropriateness of various assumptions in light of the Actuarial Standards of Practice. Points were given for explaining how different assumptions should be derived and for tying the assumptions to the NOC plan provisions. Points were also given for mentioning items that were not included in the question text but that should be included in this type of report.

Solution:

Assumptions should be:

- Reasonable, reflect plan provisions
- Independently reasonable & reasonable in aggregate
- Internally consistent
- Best estimates or within best estimate range
- Set in compliance with generally accepted actuarial practice
- And in accordance with ASOPs

ASOP 23 – may not have reviewed data for reasonableness
ASOP 27 – various violations in setting economic assumptions

Possible violations in setting economic assumptions:

- Discount rate should be set based on high quality fixed income assets whose timing match cashflows
- Replicating portfolio
- 5.5% seems reasonable compared to other assumptions
- Should disclose how assumption was set
- Expected return on assets should reflect allocation of assets. Need to know asset allocation to judge 7% assumption. This assumption may be high unless assets allocated to equity securities

Salary increase assumption:

- Should include a merit & productivity component separate from inflation component
- Should reflect past experience & sponsors objectives for future experience
- May be better to use an age related assumption rather than a single rate as this may match experience better
- 4% seems reasonable based on relationship to discount rate & EROA

4. continued

Demographic assumptions:

- Unreduced at 60, 100% retirement at 55 probably does not reflect best estimate or plan experience. Surely some employees cannot be able to retire at 55
- Members are expected to exercise plan options to their advantage so central retirement age of 60 is probably most reasonable
- Should have a table of rates to reflect probability of retirement at different ages.
- Should base retirement rates on plan experience
- Mortality table is outdated - better to use a more recent table like RP-2000
- Should include future mortality improvements projected past the valuation date – possibly using a generational table

- Turnover rates based on old experience (1990 – 95)
- Experience study should be updated
- Use own company experience if large enough to be credible or else look at large company experience in similar industry or published studies
- May be appropriate to use longer period than 5 years to study experiences
- What are sample rates?

- Percent married assumption does not reflect normal form = 60% J & S for marrieds (w/o reduction)
- 0% married is not reasonable, should be based on actual plan experience & best estimate for future
- This will result in losses
- Should also include a spousal age difference assumption
- The sponsor is responsible for selection of accounting assumptions, ASOPs apply to advice given by actuaries

- Actuary is responsible for checking sufficiency appropriateness of data
- Should include a summary of data statistics in report so other actuary could reproduce results. Like, counts, average age, average service, etc.
- Should disclose liability cost method (ie., Projected Unit Credit)
- Should disclose asset valuation method

5.

Learning Objectives:

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

This is a pension accounting question with a curtailment at the end of the year. The curtailment results from the freeze of the plan, but there is no reduction in the obligation as a result of the curtailment; however, there are unrecognized past service costs that must be recognized on curtailment. Further, there is a replacement plan for future service which affects future pension expense.

Some of the difficulties in this question:

- *The candidates must include the cost of the DC plan.*
- *The 2009 employer contribution to the DB plan (frozen) should just cover special payments since there is no further DB normal cost.*

Note that any reasonable estimate of the 2009 employer contribution and the 2009 amortization period would have received full credit. The solution below shows several acceptable approaches.

Solution:

NTD: "PBO" means "pension benefit obligation" as defined under FAS87; Canadian candidates would instead use "ABO" meaning "accrued benefit obligation" in their solutions.

2008 Expense

The 2008 expense is expense before curtailment plus effect of curtailment (numbers in 000s)

Expense before curtailment = 44,620

Curtailment – Since reduction in 100% of future service must recognize unrecognized past service cost (PSC), transition obligation and any change in PBO due to curtailment at 12/31/2008

Unrecognized PSC at 12/31/2008 = 44,775 – 7,214 = 37,561
Unrecognized transition obligation = 0
Change in PBO due to curtailment = 0; no changes in respect of past service benefits – only future benefits

Total 2008 expense = 44,620 + 37,561 = 82,181

5. continued

2009 Expense

DB expense (numbers in 000s)

Employer contribution in 2009 will be only for special payments. No need to contribute the current service cost as no employees accrue benefits under the DB plan (however, there will be a service cost in respect of the new DC ERP)

Subtract the service cost from the 2008 employer contribution to estimate the 2009 contribution; and

Use the funding current service cost, not the accounting service cost

DB Expense = Service Cost (SC) + Interest Cost (IC) – Expected Return on Assets (EROA) + Amortization of PSC + Amortization of Gains / Losses

Service Cost: Service cost is zero since no future service accruals (plan frozen)
Interest Cost: Interest Cost needs to reflect the fact that the PBO had a gain in 2008.

Rollforward of PBO to January 1, 2009

= PBO + service cost + interest cost – benefit payments + PBO gain at 12/31/08
= 704,050 + 30,274 + 43,579 – 16,000 – 10,000
= 751,903

IC = interest on PBO and SC – half a year's interest on benefit payments
IC = (751,903 + 0) × (0.06) – 16,000 × 0.5 × 0.06
= 44,634

EROA: Assets need to be rolled forward and should adjust 2009 contribution to reflect curtailment

Rollforward of Assets to January 1, 2009

= BOY assets + Contributions – Benefit Payments + Actual Return

Actual Return

= [BOY assets + (0.5 × (Contributions – Benefit Payments))] × - 0.2
= [597,964 + (0.5 × (35,000 – 16,000))] × -0.2
= - 121,493

Assets as of 1/1/2009

= 597,964 +35,000 – 16,000 – 121,493
= 495,471

5. continued

2009 Expected Contribution
= 2008 Contribution – Funding Service Cost
= 35,000 – 28,295 (or = 35,000 – (28,925 × 1.0625))
= 6,075 (or = 4,267)

EROA
= - [1/1/09 Assets + (0.5 × (Contributions – Benefit Payments))] × 0.065
= - [495,471 + (0.5 × (6,075 – 16,000))] × 0.065
= - 31, 883

Or EROA
= - [495,471 + (0.5 × (4,267 – 16,000))] × 0.065
= -31,824

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

Amort G/L: Need to roll forward gain/loss and relect the fact that the PBO had a gain in 2008 as well as any asset gain/loss.

Rollforward of Unrec Gain/Loss to January 1, 2009
= BOY G/L – G/L Amort + PBO loss + Asset G/L

Asset G/L
= Expected Return – Actual Return
= 36,448 + 121,493
= 157,941

Rollfoward of Unrec gain/Loss to January 1, 2009
= 30,683 – 0 (amort in 2008) – 10,000 (2008 PBO gain) + 157,941 (2008 asset loss)
= 178,624

(Candidate will also receive full credit if they calculate Unrecognized Gain/Loss from accrued/prepaid – funded status 1/1/2009 – Unamortized prior service cost – Unamortized transition obligation)

Amort G/L
= (Unrec G/L – 10% of max(PBO, Assets)) ÷ Average Future Working Lifetime
= (178,624 – 0.1 × max(751,903; 495,471)) ÷ 10.2 (or ÷ 9.2(i.e. 10.2-1) as in the question EARSL has not been provided for 2009)
= 10,141 or = 11,243

5. continued

2009 DB Expense

= 0 + 44,634 – 31,883 (or 31,824) + 0+ 10,141 (or $11,243)

= 22,892 or = 22,951 or = 23,994 or = 24,053

DC Expense

DC Expense = 6% × Total Employee Compensation

Total Employee Compensation in 2009

= Average earnings in 2007 × (1 + salary scale)^2 × Number of Employees

= 41,000 × 1.04^2 × 6,363

= 282,171,053

2009 DC Expense

= 0.06 × 282,171,053

= 16,930,263

Total 2009 Expense

= DB Expense + DC Expense

= 22,892 (or 22,951) + 16,930

2009 Expense = 39,822 or = 39,881 or = 40,924 or = 40,988

6.

Learning Objectives:

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

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.

The candidate was required to apply his/her knowledge of plan design, company specific, demographic, financial, and economic variables to an asset allocation analysis for a pension plan. Points were given for recommending a modeling technique with appropriate justification and identifying the assumptions to use for an asset/liability study for the plan under consideration.

Solution:

(a)

Plan Design considerations
- Behavior of liabilities can impact optimal asset allocation
- Lump sums & ERF require liquidity
- Shorter duration = lower risk tolerance
- Assets correlated with inflation hedge salary growth impact on benefit

Company specific considerations
- Invest in assets uncorrelated with oil to reduce risk
- Financial condition of NOC is key
- Asset allocation can impact contributions, expense, and funded status ... need to identify which are most important to NOC
- Risk tolerance and objectives

Demographics
- Lots of actives = higher risk tolerance
- Workforce getting older = lower risk tolerance

NOC vs BIG
- Demographics may be different
- Regulatory ruler may be different

Plan specific considerations
- Size of plan versus NOC
- Plan well funded
  - = higher risk tolerance
  - Could reduce risk to protect surplus

6. continued

(b)

Stochastic projection is recommended

- Can model contributions, funded status, and expense
- Use Monte Carlo simulation
- Range of outcomes produced
- Confidence intervals
- Can identify & test tail scenarios

Assumptions

- Expected return on asset classes
- Volatility of returns
- Correlation of returns
- Inflation
- Discount rate
- Salary scale
- Risk tolerance & objectives

7.

Learning Objectives:

2 – Evaluate sponsor's goals for the retirement plan

7 – Evaluate the sponsors financial goals and risk management with respect to their plan

8 – Recommend and advise on the financial effects of funding policy and accounting in line with the sponsors goals, given constraints

9 – The candidate will be able to synthesize plan design and funding/accounting/economic value

The primary focus of this question is on the conflict of interest that can exist between the various stakeholders of a corporate sponsored pension plan. Candidates were expected to explain, from a financial economics perspective, what moral hazards exist and what agency conflicts may arise if the CFO proceeds with his recommendations. This question drew on information from several sections of the syllabus and was meant to elicit responses that touched on general principles of financial economics and general criticisms of traditional pension accounting from a financial economics perspective, as well as specific implications (positive or negative) to the various stakeholders of the CFO's recommendations.

Solution:

Arguments from Financial Economists

- Equities don't add value
- Asset allocation is indifferent in terms of adding value
- Cost of pension is independent of way its funded
- Management's preference for equities results from opaque accounting model
  - If model was more transparent, would prefer bonds
- Second order effects make equities more costly
  - Taxation
  - Surplus ownership
  - Agency costs
  - Signaling costs
- Other adverse equity issues
- Decrease benefit security
  - Management should spend risk budget elsewhere
- Argument for long term investing is moot because individuals bear risk (not institutions)
- Participants bear risk they cannot evaluate or diversify

7. continued

- There exists assets such that liabilities and asset could be matched and immunized
- If accounting more transparent, then bonds would be preferred

Outside corporate preference for equities

- Reduce cost
- Reduce pension expense
- Historical performance hides volatility and risk
- Advisors suggest equities
- Legal issues (prudence rule)
- Signaling
- Accounting biases through an opaque model
- Short term deviations hidden by actuarial process

Inside reasons why equities used

- Role of corporate managers
- Scope of creative accounting

Reasons why financial economics say shift to 100% bonds

- Tax arbitrage from bonds
  - Arbitrage = plan assets × tax spread × bond return × (1 – corporate tax rate)
- Benefits more secure
- Reduces underpricing risk (for plan improvements)
- Reduces asymmetry risk
  - Greater risk of unfunded than surplus
- Reduces agency monitoring costs
- Reduces signaling costs
- Reduces business financial risk
  - Lower cash volatility with bond matched portfolio
  - Lower expense volatility
- Equities don't add value
- Asset allocation doesn't add value

Summary

Plan participants

- Increase in equity would cause more risk for future benefit security
- However, equities provide more opportunity for benefit improvements later through surplus buildup (if any)

7. continued

CFO

- Increase in equity causes lower pension expense (because increases the EROA)
- Increase in discount rate would lower pension expense
- Increase in equity introduces more risks into the plan
- May cause significant volatility for cash and expense

Shareholder

- Equities don't add value
- Bonds have tax arbitrage

Added points

General comments – Assumption Changes

- Because raising the discount rate assumption lowers liabilities, the funded status of the plan will increase

General comments – equity allocation

- Under Financial Economics, the driving force for pension investing is corporate finance, not portfolio selection

Plan participants – equity allocation

- Workers bear some of the risk of poor plan portfolio performance through reduced benefits/wages
- If the sponsor is required to make additional contributions due to poor performance, the workers may receive lower wage increases
- Plan should be operated in the best interest of plan participants so asset mix may not be acceptable/prudent

CFO – assumption change

- Management prefers company growth to growth in shareholder value and may take advantage to further own interests at expense of other stakeholders
- Raising the discount rate / EROA assumptions could be seen as hiding a pension deficit by understating liabilities / overstating asset returns
- CFO might be looking for a large bonus tied to financial results, and lowering pension expense may be one way he is artificially inflating financial results
- Company is faced with moral hazard, where employees are vulnerable to exploitation if management fails to adhere faithfully to implicit contracts

7. continued

CFO – equity allocation

- The CFO might be hoping to have high returns in the pension portfolio in order to help protect his own large benefit, but that could backfire
- Fiduciary responsibilities
- May not be qualified to make decision, requirement to take professional advice and employ advisers in certain capacities
- Investment decisions made by management will be judged against legal precedents in the context of requirements such as prudence

Shareholders – assumption change

- The objective of financial accounting is to report value-relevant information to interested parties – information that would reduce (increase) price that a buyer would be willing to pay for a share of the firm signifies a value-relevant liability (asset)

Shareholders – equity allocation

- In order to reduce risk being transferred to the corporate balance sheet, reduce frictional costs and promote transparency

Pension accounting from FE perspective

- The financial economist would put pension liabilities and pension assets on plan sponsor's balance sheet each measured at fair market value
- Income statement entry for pension expense is then defined as net increase or decrease in funded status during income statement period
- Pension expense is presented as a single number in the corporate income statement whereas different components of pension expense should be characterized as operating income, financing charges or charges to other income
- Changes in liabilities and assets are smoothed

8.

Learning Objectives:

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

1 – f. Evaluate benefit adequacy for members of a particular plan given other sources of retirement income

1 – g. Construct a model for measuring replacement income adequacy under different scenarios

Part (a) of this question required the candidate to address the factors to be considered in developing a target replacement ratio for a retirement program. Credit was given for listing the factors and identifying the implications that each factor has on determining an appropriate replacement ratio.

Part (b) required the candidate to assess the adequacy of a member's retirement income in light of these factors. Credit was given for any answer in which reasonable justification was provided.

Part (c) of this question required the candidate to compare and contrast the risks faced by two individuals participating in different retirement programs. A list of the risks was not sufficient to garner full credit. Significant credit was given for addressing the risks in light of the circumstances of the two sample employees provided.

Solution:

(a)

- Target replacement ratio (Taxes, Savings and Expenditure Changes Model)

$$= \frac{\left(\text{PrRPG} - \text{PrRt} - \text{PrRS} \pm \text{NCCR} + \text{PoRT}\right)}{\text{PrRPG}}$$

PrRPG – Gross pre-retirement income
PrRT – Pre-retirement taxes
PrRS – Pre-retirement savings
NCCR – Change in age and work-related expenditures
PoRT – Post-retirement taxes

- Replacement ratio = ratio of post-retirement earnings to pre-retirement earnings
- Pre-retirement earnings
  - Gross pre-retirement income
  - Less pre-retirement income taxes
  - Less pre-retirement payroll taxes

8. continued

- Usually cease after retirement
- Less lifestyle and work-related expenses
  - Housing, clothing and transportation expenses are usually much higher before retirement
- Less pre-retirement savings
  - The higher the savings rate, the lower the amount of disposable income before retirement. This results in a lower target replacement ratio.

- Post-retirement earnings
  - Retirement income available from Social Security (SS)
    - Replaces larger portion of pre-retirement income at lower wage levels
  - Pension income (DB or DC)
    - More generous benefit provisions replace larger portion of pre-retirement income
  - Other savings
  - Less post-retirement taxes
  - Less post-retirement health care expenses
    - Retiree health care coverage should be factored into the target replacement ratio
  - Less post-retirement lifestyle expenses
    - More expected post-retirement expenses will require a larger target replacement ratio
- Retirement age
  - Earlier retirement age requires lower replacement ratio due to lower pre-retirement earnings
- Savings rate and tenure
  - The earlier the worker begins to save, the higher the post-retirement income at lower rates of personal saving
- Inflation
  - Higher rate of inflation will require a larger replacement ratio
- Investment earnings
  - The higher the real rate of return on personal savings, the higher the post-retirement income at lower rates of personal savings
- Total replacement ratios are highest for the lowest paid workers

(b)

- Net pre-retirement income
  - SS employee contribution $= 50\% \times 8\% \times \$50,000 = \$2,000$
  - PrRT

    Projected earnings = \$180,000
    Less tax-deductible SS contribution = \$(2,000)
    Net taxable earnings = \$178,000
    $\text{PrRT} = 40\% \times \$178,000 = \$71,200$
  - Net pre-retirement income = \$180,000 - \$2,000 - \$71,200 = \$106,800

8. **continued**

- Net post-retirement income
  - SS = 0.005 × $50,000 × 35 = $8,750
  - DB ERP = 0.02 × $170,000 × 35 = $119,000
  - Maximum benefit = $3,000 × 35 = $105,000
  - DB ERP = min ($119,000, $105,000) = $105,000
  - SRP = DB ERP – Maximum benefit = $119,000 - $105,000 = $14,000
  - PoRT

    SS = $8,750
    DB ERP = $105,000
    SRP = $14,000
    PoRT = 40% × $127,750 = $51,100
  - Net post-retirement income = $8,750 + $105,000 + $14,000 - $51,100 = $76,650
- RR = net post-retirement income / net pre-retirement income
  = $76,650 / $106,800 = 72%
  - RR would be considered to be adequate
  - Model does not take other savings in to consideration
  - Can likely maintain same standard of living with less income due to lower expenses

(c)

- Benefit adequacy risk
  - Employee B has a greater overall risk since retirement income is low
  - SS covers greater fraction of pre-retirement income for Employee B
  - ERP and SRP provide benefits on all earnings for Employee A
- Longevity risk
  - Employee A is not exposed because of DB pension
  - Employee B exposed because of DC pension unless he purchases annuity
- Inflation risk
  - Employee A has DB pension based on final average earnings formula which may partially offset pre-retirement inflation risk
  - Both employees affected by post-retirement inflation
- Investment risk
  - Employee B's DC account balance is exposed to investment risk
  - Employee B is exposed to interest rate risk
  - Employee B is exposed to stock market risk
  - Employee A receiving DB pension so investment risk born by NOC
- Unexpected Health Care Costs and Needs
  - Employee B will not receive health benefits from NOC
  - Both employees affected by
    - Health care costs typically increase after retirement
    - Health care costs vary widely by individual

8. **continued**

- Employment risk
  - Employee B is seasonal
- Public Policy risk
  - Both employees are affected

9.

Learning Objectives:

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

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

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

The candidate was expected to analyze the purpose and mechanics of insolvency insurance programs. Points were given for analyzing the types of programs around the world; however, no points were given for identifying country-specific information.

Solution:

(a)

- What's the purpose of the program?
- Private heavily regulated program or public program
- Financing: Pay-as-you-go or require to purchase annuities through insurer
- Mandatory or voluntary
- How premiums will be set (based on risk, past performance, flat-rate and variable rate based on funded status?)
- How assets from premiums will be invested?
- Impose strict eligibility rules? Should all plans be covered? Should all companies be allowed to join?
- What benefits will be guaranteed? Provide limits to benefit guarantees to minimize moral hazard?
- Consider funding regulation – should encourage full funding of plans at all time
- Should the program impose limits on asset allocation (limit on riskier investments like equities)?
- Consider in what situations the program pays benefits

(b)

Members

- Benefits are more secure
- Less dependent on financial well being of the employer
- Participants of non-ERP (SRP, DC, retiree health) plans are not directly affected
- However, may indirectly benefit since sponsor might divert additional funding for these funds as the ERP plans are partially insured

9. continued

NOC

- Additional costs because of the premiums
- May take additional investment risks in the pension fund because downside risk is partially covered by insolvency program
- Additional administration due to reporting requirements
- Failure of other plan sponsors is potentially borne by NOC

DB ERP

- Additional administration to comply with the program

Taxpayers

- They are at risk ("taxpayer bailout") in case the program fails
- Would prefer plans fully funded at all times

10. Canada

Learning Objectives:

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

This is a synthesis question requiring the candidate to assess the funding, accounting, investment, administration, and legal implications of the Monsanto decision. Credit was not given for listing the steps of the wind-up process since the question did not ask for this.

Solution:

Funding

- Need to update the partial wind-up (PWU) surplus position as at a current date
  → Assets at original PWU date must be notionally split and updated to current date
- Need to file a supplementary wind-up report with financial update and surplus distribution proposal to FSCO
- If there is a partial wind-up deficit now, employer must fund it over a 5-year period from the effective date of the partial wind-up
- For ongoing portion of the plan, funding deficiency must be funded over 15 years and solvency deficiency must be funded over 5 years
- The Monsanto ruling will provide plan sponsors with even less incentive to target a surplus cushion in the future

Accounting

- Surplus distribution to employees can be considered as contractual termination benefits under CICA 3461
- For the surplus distribution to employees, ABC Company should recognize it as a liability and in the expense
  → Recognized when it is probably that employees will be entitled to the benefits and the amount can be reasonably estimated
  → The estimated surplus amount to employees will be treated as a one-time recognition in the expense
- For the surplus distribution to employer, ABC should recognize it is a negative contribution when the surplus is paid

10. continued

Investment

- Due to the Monsanto ruling, employer may change its investment strategy for the future for whole plan
- Move the PWU portion of assets into separate account for ease of administration
- Move the PWU portion of assets into short term investment – assuming payment in 1 year horizon
- For residual assets, ABC Company may use liability-focused investment to maximize the surplus at a given level of surplus risk
- For residual assets, ABC Company may have a greater focus on plan liabilities and reduced expectations for returns

Administration

- Statement setting out information and options respecting the distribution of the surplus must be given to partial wind-up members
- Within 30 days after distribution of surplus, ABC Company must give the Superintendent a written notice that all partial wind-up surplus has been distributed

Legal

- Section 70(6) of the Ontario Act requires that on the partial wind-up, affected members shall have the same rights and benefits they would have on a full wind-up of the pension plan
- Monsanto decision requires that proportional share of surplus to be distributed on the effective date of the partial wind-up
- Monsanto decision applies to Ontario members only
  - For partial wind-up members who elected pension option, annuities have to be purchased or "all assets must be distributed from fund before pwu is finalized"
- Need to determine the allocation method for surplus distribution
  → If all surplus is to be distributed to members, the formula for distribution should be included in the supplementary wind-up report
- Surplus must be distributed even if employer is entitled to it (ie., Employer can't choose to retain surplus in the plan)
- Surplus to employer requires 2/3 of member's consent even if the company has legal entitlement
  → If the employer wishes to withdraw surplus, the consent of the regulatory authority is required

11. Canada

Learning Objectives:

1 – Analyze risks faced by retirement plan participants

4 – a. Evaluate and recommend a plan design

4 – c. Evaluate and recommend a plan design – recommending an appropriate plan type and defend recommendations

10 – Analyze the regulatory and tax implications of retirement plan

This was a two part question. The first part required the candidates to outline the features of a Tax Free Savings Account. The second part (which contained relatively more points) required the candidate to understand and apply the differences between TFSAs and RRSPs in comparing and assessing the two vehicles.

Solution:

(a)

TFSAs

- Started January 1, 2009
- Anyone who has attained age 18 is eligible
- $5,000 per year can be contributed to individual account
- $5,000 limit indexed with inflation ($500 increments)
- Contributions can be made to spousal account (Affecting their room, not yours)
- Contribution is not tax deductible
- Investment earnings are tax-sheltered
- Unused contribution room is rolled over indefinitely
- No restrictions or limits on investments
- No required withdrawals – can continue to death
- Withdrawals can be made at any time, for any reason
- Withdrawals are not taxable
- Amounts withdrawn are added to next year's contribution room

11. continued

(b)

Risks

- Risk that TFSA will not deliver adequate retirement income – meant as savings vehicle not retirement savings
  - At many earnings levels, $5,000 per year offers less tax-shelter room when compared to Group RRSP
  - Employees are less likely to make contributions
    - No upfront tax deduction
    - Employer match would not be likely since treated as taxable income and subject to payroll taxes
    - Employees may be tempted to access TFSA savings for pre-retirement needs
      - Contribution room for TFSA is restored on withdrawal, unlike RRSP, which makes it easier to withdraw from a TFSA
  - Risk that improper communication of programs could lead to LESS employee planning/utilization or improper planning/utilization

Benefits

More flexible

- Ability to withdraw funds at any time
- Can be used to secure a loan
- Contribution room for TFSA is restored on withdrawal, unlike RRSP
- Allows individuals to plan for intermediate as well as longer term goals – savings not retirement
- Can contribute to spousal TFSAs without affecting own $5,000 room, whereas contributor's RRSP room is used up by spousal contributions
- Rollover to your spouse upon death

More Universal

- Don't have to have earned income to contribute, unlike RRSP
- Don't have to collapse/transfer TFSA starting at age 71

Better for higher earners

- For those who reach 18% or dollar cap for RRSP contributions, TFSAs represent an additional tax shelter

11. continued

Better for lower earners

- For earnings below about ($39,000 - $45,000), the TFSA offers more tax assistance than RRSP or DCPP contributions
- RRSP withdrawals can reduce means-tested benefits, whereas TFSA withdrawals are not counted in income for these purposes
- TFSAs offer opportunity to maximize tax benefit of RRSP, if both plans are offered (by saving in TFSA first, then transferring to RRSP when maximum tax bracket is reached)

Better for certain types of employees

- TFSAs work better if tax bracket is expected to grow higher through career and into retirement
- RRSP withdrawals can create OAS clawback tax, whereas TFSA withdrawals are not counted in income for these purposes

12. Canada

Learning Objectives:

1 – The candidate will be able to analyze the risks faced by 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.

This question required candidates to assess the risks of two plan designs from both the employee and employer perspective. Significant credit was given if the candidate described and linked the type of plan with the risk that can be mitigated from both the employee and employer perspective.

Solution:

- Plan members can choose the risk they wish to mitigate under flexible pension plans.
- Under a Front-End Flexible Plan the member contributes a pre-determined percentage of pay in exchange for desired ancillary benefits.
- Under a Back-End Flexible Plan, the member chooses the contribution rate and the accumulated flex contribution balance is converted to the desired ancillary benefits at termination or retirement.

The Front-End Flexible Plan can mitigate the following employer risks:

- Cost volatility risk – the employer pays for the cost of basic benefits while the member provides for the additional ancillary benefits that are selected depending on their needs. This employer and member cost sharing arrangement reduces cost volatility for the employer. Members pay for most of the ancillary benefit cost.
- The investment risk is shared between employer & member since the members contribute based on a fixed cost; to the extent that the actual cost differs from the fixed cost either the employer will gain (and the members will have paid more than was necessary) or the employer will have to cover the difference (and the members will gain)
- There is better member retention and attraction through member awareness and appreciation of pension benefits.

12. continued

Member risks and potential mitigation of such risks in a Front-End Flexible Plan

- Financial market or investment risk is lower than under a Back-End Flexible Plan since contributions go toward purchasing ancillary benefits upfront
- Purchase risk – employee contributions could be lost if used to purchase unnecessary improvements
- Interest rate risk – by participating in a Front End Flex Pension Plan, the additional benefits purchased are guaranteed by the company
- Death of a spouse – Death of a caretaker or spouse could cause financial hardship if the survivor is dependent on the pension income. The purchase of survivor benefits or additional pension guarantees will help alleviate the risk.
- Inflation risk – over time inflation will erode the purchasing power of a retiree's fixed pension income and members may be able to purchase pension indexing to alleviate this risk.
- Early retirement risk – can buy enhanced early retirement reductions or bridge benefit to supplement pension on early retirement.,

The Back-End Flexible Plan can mitigate the following employer risks:

- The financial market or investment risk is borne mainly by members in a Back-End Flexible Plan versus a Front-End Flexible Plan
- The cost volatility risk is reduced since the members pay for all of the additional ancillary benefit cost
- The value of the pension can be improved at no additional cost to employer
- There is better member retention and attraction through member awareness and appreciation of pension benefits

Members risks and potential mitigation of such risks in a Back-End Flexible Plan

- Better adequacy/efficiency of benefits obtained versus Front-End Flexible Plan since employee only pays for benefits they need
- Interest rate risk – cost determined at time of purchase
- Financial market / investment risk: If returns are too favorable, the member may end up with higher account balance than needed and may end up forfeiting contributions; if returns are poor, then member may not be able to purchase what they had hoped to purchase
- Death of a spouse – Death of a caretaker or spouse could cause financial hardship if the survivor is dependent on the pension income. The purchase of survivor benefits or additional pension guarantees will help alleviate the risk
- Inflation risk – over time inflation will erode the purchasing power of a retiree's fixed pension income and members may be able to purchase pension indexing to alleviate this risk
- Early retirement risk – can buy enhanced early retirement reductions or bridge benefit to supplement pension on early retirement