DP-RU Complete Illustrative Solutions
Fall 2011

1. **Learning Objectives:**

7. The candidate will be able to analyze data for quality and appropriateness.

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

Learning Outcomes:

(7a) Assess data quality.

(7b) Identify data needed.

(7c) Make appropriate assumptions where data cannot be provided.

(11a) Explain and apply the Guides to Professional Conduct.

(11c) Demonstrate knowledge of requirements regarding the actuary's responsibilities to the participants, plan sponsors, etc.

(11e) Recognize situations and actions that violate or compromise Standards or the Guides to Professional Conduct.

(11f) Recommend a course of action to repair a violation of the Standards or the Guides to Professional Conduct.

Sources:

ASOP 23

CIA Rules of Professional Conduct, AAA Code of Professional Conduct, SOA Guides to Professional Conduct

Commentary on Question:

In this question, candidates were asked to demonstrate how they would handle data issues in accordance with the professional standards and code of conduct, which an actuary must consider when assuming work from a prior actuary.

Well-prepared candidates should be able to demonstrate not only their understanding of the professional requirements or guidelines on data review/validation, but also how to apply them in the real-life situation described in the question.

1. Continued

In part (a), we looked for the appropriate actions or steps to review the data provided given that it had already been used in an actuarial valuation and the necessary checks that should be conducted when using the data provided by another actuary.

In part (b), the question stated that data issues have already been uncovered. The candidates were expected to focus on describing how to deal with the data issues in a professional manner in order to complete the valuation, including what needs to be disclosed, documented, and discussed with appropriate parties.

Solution:
Your client has asked you to conduct a valuation of a plan using the same census data that was used in a valuation previously completed by another actuarial firm. The prior valuation and your valuation both have the same calculation date.

(a) Describe the professional guidelines with respect to conducting census data reviews and validations that should be performed prior to using this data.

When reviewing the data, the actuary should (per Code of Professional Conduct)

- Satisfy the applicable standards of practice
- Note: Marks will also be given if candidate mentions that the actuary should:
  - Act honestly, with integrity and competence, and perform professional actuarial services with skill and care
  - Take reasonable steps to ensure professional actuarial services are not used to mislead others

Reliance on Other's Work

- The actuary may rely on data from the other firm, subject to appropriate data review/validation.

Nature and Limitations of Data

- Identify data elements needed for valuation in hand.
- Consider if the data provided require any enhancements (i.e. if any additional data is needed) for the valuation. (Note: Marks will also be granted if the candidate mentions that the actuary should keep in mind that data requirements vary depending on the nature of the valuation.)
- If additional/alternative data are needed, consider the associated cost/time/feasibility/resources.
- Consider if it is necessary to apply any judgmental adjustments, approximations or assumptions to the data.

1. Continued

Data Consistency and Reasonableness

- Consider if the data are sufficient for the valuation.
- Consider if the data are appropriate for the valuation.
- Consider if the data are reasonable and comprehensive for the valuation.
- Consider if there are any known, material limitations in the data provided.

Data Review and Control

- Review consistency between current data and the data used in prior analysis or period. (Note: Marks will also be granted if the candidate suggests performing an experience gain/loss analysis.)
- Check data for internal AND external consistency. (Note: Marks will also be granted if the candidate lists the relevant tests for internal and external consistency.)
- Identify any questionable or unreasonable data values.
- Do some random spot checks (e.g. spot check a few records from each membership category).
- Note: Marks will be given if the candidate lists some real-life tests, such as doing a membership reconciliation, checking benefit payments versus financial statement etc.

(b) Your review has uncovered a number of census data issues. In order to complete your valuation, describe the actions and steps you need to undertake to resolve these issues and the applicable professional standards.

Data Adjustments or Approximations

- To address data issues, consider if necessary to apply judgmental adjustments, approximations or assumptions to data.
- If the data issues could have a material impact on the valuation, consider further actions to improve data quality. (Note: Marks will be granted if the candidate suggests some ways to improve data quality.)
- If the ideal data cannot be obtained at reasonable cost within available time, consider what (if any) alternative data are sufficient and reliable. (Note: Marks will be granted if the candidate mentions that the actuary may decline the assignment or request a new data set in the event that the data are inadequate for purposes of the valuation.)

Data Disclosure Requirements

- The actuary should disclose:
  - Any material limitations in the data and their implications
  - The source of data
  - That the actuary reviewed the data

1. Continued

- The extent of reliance on data supplied by others
- Any material judgmental adjustments or assumptions applied to the data
- Any limitations on the use of the valuation report (or results) due to uncertainties about data quality
- Any unresolved data issues that could have a material effect on the valuation
- Existence of results that are highly uncertain or may have material bias because of the data issues, and quantify the impact (if possible)
- Any conflicts that arose from complying with the applicable legislation or binding authority

Miscellaneous

- Documentation:
  - Document the data evaluation process.
  - Describe any material defects in the data.
  - Describe any judgemental adjustments or modifications made (to address data issues) and the rationale.
- Assess whether data issues could have a material impact on the prior valuation prepared by the other firm and if so, discuss with the other actuary.
- Note: Marks will also be granted if the candidate:
  - Mentions that the prior actuary is required to cooperate, per Code of Conduct
  - Alludes to the Code of Conduct regarding communication with the prior actuary.

2. Learning Objectives:

1. The candidate will be able to analyze different types of registered/qualified defined benefit and defined contribution plans, as well as retiree health plans.

Learning Outcomes:

(1a) Describe the structure of the following plans:

- Fixed dollar and pay-related defined benefit plans
- Hybrid plan designs such as, cash balance, pension equity, and floor offset plans, target benefit plans
- Defined contribution plans including 401(k) plans and capital accumulation plans
- Retiree Health Plans

(1b) Describe the process and apply the principles of conversions from one plan type to another.

(1d) Given a plan type, explain the relevance and range of plan features including the following:

(i) Plan eligibility requirements
(ii) Benefit eligibility requirements, accrual, vest and phased retirement
(iii) Benefit/contribution formula
(iv) Payment options and associated adjustments to the amount of benefit
(v) Ancillary benefits
(vi) Benefit subsidies and their value, vested or non-vested
(vii) Participant investment options
(viii) Required and optional employee contributions
(ix) Phased retirement and DROP plans

Sources:

Allen (Chapters 6, 8, 17, 21)

McGill (Chapters 11, 13)

D101-07: Conversion from DB to DC

Commentary on Question:

In this question, candidates were asked to demonstrate an understanding of the process and implications of an organization shifting a retirement program from a DB plan to a DC plan, including various DC alternatives and transition approaches. Key corporate objectives were provided to help candidates focus their responses accordingly. Candidates should understand how employees at all levels are impacted by changes in retirement programs.

2. Continued

A well prepared candidate would have communicated the impact on the employer and employee, the competitiveness relative to competitors provided, and provided detailed analysis of the design alternatives and transition approaches to enable NOC to make an informed decision in light of their key objectives. They would also be prepared to address other considerations that may impact the decision-making process.

Solution:
In order to become more competitive in the future, NOC is considering freezing the Salaried Full-Time Pension Plan and providing future retirement benefits through a defined contribution plan.

(a) Discuss the implications of the plan freeze for:
- (i) NOC; and
- (ii) the salaried employees.

Implications to NOC
Freezing the DB plan will result in NOC losing the ability to manage their workforce through the use of early retirement windows, and the plan freeze may also impact their ability to retain longer service employees. The plan freeze may result in lower future costs, and NOC should take the opportunity to minimize the ongoing cost volatility since the DB plan is no longer the primary retirement benefit. Implementing a plan freeze and moving to a DC approach is more in line with competitors.

Implications to NOC's salaried employees
All salaried employees will experience a reduction in their projected benefits; however late career employees will be significantly impacted since higher accruals occur the closer employees are to retirement. There will also be a loss of pre-retirement inflation protection. Other considerations include the loss of guaranteed death benefits for future benefit accruals, less protection in case of disability, and no access to DB benefits until termination or retirement.

(b) Compare and contrast the following two design alternatives in light of NOC's objectives:
- (i) Extend the Part-Time DC Pension Plan to the salaried employees.
- (ii) Implement a DC pension plan providing 5% of compensation up to the wage base and 8% above, plus a 401(k) matching program of a 50% match on employee deferrals up to 4% of pay.

Encourages greater cost sharing
Both design alternatives require employees to share in the cost of retirement, Option 1 requiring a 6% employee contribution to achieve the fully company match and Option 2 requiring a 4% employee contribution.

2. Continued

Employees would now also bear the investment risk associated with their retirement benefits, further emphasizing that saving for retirement is a joint responsibility.

Provide Competitive Retirement Benefits
Offering a DC plan is in line with the competitors listed, and matching is a key feature. DC plans tend to be attractive to a younger, more mobile workforce. Both alternatives listed are at or above the median of the competitor benefits. Option 1 provides the same level of benefits to all employees, and provides a maximum employer contribution of 7.5%. This option is above the median of the value provided by the competitors listed (Company 1 -7%, Company 2 - 6%, and Company 3 - varies; up to 8%).

Option 2 utilizes integration with Social Security in its contribution approach, providing higher benefits to those with higher compensation. This may be more difficult to communicate to employees, and does provide different benefit structures for full-time versus part-time employees. Option 2 provides a benefit of 7-8.7% of employer contributions for employees (varies depending on pay above the wage base) and deferring enough to maximize the employer match. This option is in line with the competition and better than the competition for those with higher compensation.

Minimize impact on late career employees
Without a transition approach, late career employees may be negatively impacted; NOC could provide some level of grandfathering. Moving to a DC approach will no longer provide pre-retirement inflation protection on the DB benefits. Option 2 may help offset some of the negative impact of the change for higher paid employees due to the integration feature. However, retention of late career employees may be difficult.

(c) Critique the following two transition approaches:

(i) Allow pay run-up on past service for the next 7 years on the DB plan.

This approach provides pre-retirement inflation protection for up to 7-years and will minimize the impact of the plan change for employees during those 7-years. Employees more than 7-years from retirement will have time to adjust to the new benefit structure under the new DC program. Given that the pay run-up period is temporary, this could result in retention issues at the end of the 7-year period. Also, the cost savings of moving to a DC approach may be offset by the grandfathering costs, and this transition approach is more complex administratively.

2. Continued

(ii) Members age 40 and over at transition receive an additional 1% contribution for up to 7 years.

The DC approach for 7-years could help bridge some of the shortfall for those closest to retirement. The 1% per year for 7-years partially offsets what would have been accrued under the FAP formula, and would likely have lower cost volatility versus the DB transition approach. This approach does give up the flexibility of using the retirement program as a retention tool. There may also be potential discrimination issues, as well as employee issues as some employees may not be happy that they missed the cutoff to receive the additional DC allocation. The transition is also a temporary period; there may be issues with retention at the end of the transition period.

3. Learning Objectives:

6. The candidate will be able to analyze/synthesize factors that go into selection of actuarial assumptions.

10. The candidate will be able to analyze the relationship of plan investments with plan design and valuations.

Learning Outcomes:

(6c) Evaluate appropriateness of current assumptions given the purpose.

(10a) Evaluate the interaction of plan investments and:

- Plan design,
- Plan funding,
- Valuation assumptions, and
- Valuation methods.

(10c) Given a context, describe and compare the structure of appropriate investment vehicles.

Sources:

Allen Chapter 24 (pages 445-446)

R-D131-09: Plan Sponsor – Guide to Liability Driven Investing

R-D124-11: Introduction and Overview of Retirement Plan Investing

R-D114-07: An Introduction to Duration for Pension Actuaries

Commentary on Question:

In this question, candidates were asked to demonstrate their knowledge of LDI strategies and duration to hedge a plan's liabilities. A well prepared candidate was expected to list and describe the different LDI strategies and their characteristics. Candidates were also expected to illustrate how to calculate the optimal duration of the asset portfolio and two other approaches to extend duration of the plan in question.

Candidates did very well on this question reflecting the general comfort and awareness of investment knowledge amongst retirement actuaries. Most candidates were able to describe the three LDI strategies and determine the duration of the pension plan in part (b). However, most candidates did not discuss the different methods to extend a plan's duration in sufficient detail.

Solution:

Your client's CFO is considering liability driven investment (LDI) strategies to minimize the volatility of the pension plan's funded status.

3. Continued

(a) List the characteristics of LDI strategies.

Liability Driven Investing

- Coordinates the liabilities and assets
- Tailored to specific plan needs based on :Interest rate risk, inflation, plan design features, company qualities, and workforce
- Incorporates both alpha producing and risk mitigation of sponsor's objectives
- Measure of the funded status (not the assets and liabilities) – ratio of market value of assets to market value of liabilities
- Market value of liabilities equal to market derived term structure of interest rates
- LDI performance measure is the liability return - percent change in market value of liabilities
- Success of LDI strategy based on extent the that asset return is greater than the liability return
- Increase portfolio duration – increase duration of assets using long bonds, increase number of long bonds or use fixed income derivatives
- Fixed Income derivatives – require liquidity and other types of risk, do not have to sell existing equity or bond positions
- LDI includes three concepts – 1. must hedge or partially hedge assets, 2. asset duration can come from securities or interest rate derivatives, 3. seeking excess return is at the cost of tracking liability risk (tracking error)
- Closer tracking to liabilities, less volatility of contributions

(b) Describe the following LDI strategies:

- Dedication
- Immunization
- Contingent immunization

Dedication

- Cash flow match the liabilities
- Find bonds with similar cash flows as the pension payments
- Principal and coupon payment cover contributions
- Could be very costly to the plan

Immunization

- Portfolio of bonds with market value equal to present value of liabilities
- If interest rates change, ideally the values still match or the assets should be at least as much as the liabilities
- Use duration to determine bond portfolio
- More flexible in constructing the bond portfolio

3. Continued

- Lower cost to sponsor
- Rebalancing required

Contingent Immunization

- Sponsor is willing to accept a minimum rate of return on the bond portfolio 1-2% below current market rate
- Lower market rate provides a safety margin for investment manager to adopt an active management strategy
- If the safety margin is exhausted, the portfolio is still immunized at the minimum rate of return

(c) Calculate the optimal duration of the pension plan assets given the CFO's objective.

Surplus = MV – (Liability active + Liability retiree)

Duration (liability) = (-d (liability)/di)/liability

Duration (MV) = (-d (MV)/di)/MV

Derivation: Duration (MV) = [(liability × dur) of actives + (liability × dur) of retirees)/MV

Calc: Duration = [529(20) + 234(10)]/ (683)

Duration = 18.92 ~ 19

(d) Describe two alternative approaches to extend the duration of the liability hedging portfolio.

1. Purchase long bonds
   - Increase number of long bonds or switch short bonds with long bonds
   - Generates similar cash flow as liability
   - Generally have longer maturity although may be difficult to find many
   - Corporate bonds – mortgage bonds and debenture
   - Government bonds – generally don't want for the portfolio – low yields, taxable income from bond payments

2. Fixed income derivatives
   - Derive their value from another asset
   - Call and put options, futures, convertible bonds, swaps and forwards
   - Call – option to buy an asset at specified price until a specified date
   - Interest rate swaps – one party pays fixed interest and the other pays a floating rate, exchange difference in cash flow

4. Learning Objectives:

1. The candidate will be able to analyze different types of registered/qualified defined benefit and defined contribution plans, as well as retiree health plans.

Learning Outcomes:

(1c) Apply methods of the integration of government-provided benefits with retirement plan designs.

Sources:

Yamamoto – Ch. 4 pgs 61-68

Commentary on Question:

In this question, candidates were asked to demonstrate they understand the three methods to coordinate retiree medical benefits with Medicare and perform a calculation of each method. A well prepared candidate would have described the three methods (not just written down the formulas), showing understanding of the pros and cons, and then applying them to a numerical example.

Solution:

A company would like to add post-65 retiree medical coverage to their existing retiree medical plan and coordinate this new benefit with Medicare.

(a) Describe the 3 basic methods for coordinating post-65 retiree medical coverage with Medicare, including why the company may want to use each method.

Method 1: Standard Coordination of Benefits (COB)
With COB, the plan covers whatever part of the covered expenses Medicare does not cover. However, the coverage is limited to what the plan would have paid if it were the only plan. This method provides the retiree with the largest benefit and most of the time the retiree does not have to pay anything at all. This is also the highest cost to the plan sponsor of the three methods.

Method 2: Exclusion
With exclusion, the plan removes the Medicare payment from the covered expenses and then applies the cost sharing. This method is cheaper than COB but more expensive than carveout. Under this method, the retiree and the plan sponsor share the savings from Medicare.

Method 3: Carveout
With carveout, the plan applies the cost sharing to the total covered expenses and then subtracts the Medicare payment. This method is the cheapest for the plan sponsor of the three methods. Under this method, the plan sponsor keeps the savings from Medicare.

4. Continued

(b) Calculate the company cost under each of the methods described in (a).

COB: Min (C – M, C * %)
Min (1000 – 700, 1000 * 80%)
Min (300, 800)
Company cost = $300

Exclusion: (C – M) * %
(1000 – 700) * 80%
Company cost = $240

Carveout: (C * %) – M
(1000 * 80%) - 700
Company cost = $100

5. Learning Objectives:

1. The candidate will be able to analyze different types of registered/qualified defined benefit and defined contribution plans, as well as retiree health plans.

2. The candidate will be able to understand how the regulatory environment affects plan design and understand how to apply relevant restrictions.

4. The candidate will understand alternative plan types that occur internationally.

Learning Outcomes:

(1a) Describe the structure of the following plans:

- Fixed dollar and pay-related defined benefit plans
- Hybrid plan designs such as, cash balance, pension equity, and floor offset plans, target benefit plans
- Defined contribution plans including 401(k) plans and capital accumulation plans
- Retiree Health Plans

(1d) Given a plan type, explain the relevance and range of plan features including the following:

(i) Plan eligibility requirements
(ii) Benefit eligibility requirements, accrual, vest and phased retirement
(iii) Benefit/contribution formula
(iv) Payment options and associated adjustments to the amount of benefit
(v) Ancillary benefits
(vi) Benefit subsidies and their value, vested or non-vested
(vii) Participant investment options
(viii) Required and optional employee contributions
(ix) Phased retirement and DROP plans

(2a) Explain and apply the regulatory limits placed on types of plans that can be offered.

(4a) Compare different plan types and features.

(4b) Give examples of the structure of different plan types.

(4c) Give examples of plans that could work for multinational companies and their employees including third country nationals and expatriates.

Sources:

Sharing Risk: The Netherlands' New Approach to Pensions

How to Close the Funding Gap in Dutch Pension Plans?

Allen - Ch. 21

5. Continued

Allen - Ch. 17

McGill - Ch.11

Commentary on Question:
This question was trying to test students' ability to understand how employer-sponsored pensions are provided in other countries where the legislation, tax, culture and attitude towards programs allow for alternative plan structures. Further, students were meant to compare inherent risks of these programs with those provided in their own jurisdiction. Finally, students were expected to be able to provide an opinion on the feasibility of implementing alternate plans in their own market.

It was important for students to understand that "describe considerations" meant providing commentary on whether the plan details listed in part (b) could be implemented in their market. Many approached the question as though they would be implementing a similar plan for one sponsor only, which was not relevant in this instance.

Most candidates were able to clearly compare the risk profile of programs offered in their own jurisdiction.

Many candidates did not write enough details about employer-sponsored arrangements in the Netherlands and didn't show understanding of possible implications for setting up such arrangements in their home country.

Solution:

(a) List the key design characteristics of employer supported retirement plans now prevalent in the Netherlands.

Commentary on part (a) of Question:
Part (a) was meant to test recollection of information from the two study notes on the Netherlands current employer-sponsored pension model. Candidates were expected to provide design details of the programs.

Prevalent employer supported pension programs in the Netherlands are hybrid DB/DC plans with a career average benefit formula. Coverage is mandatory and is consistent across industry or occupations. Programs are administered by entities separate from employer and employee.
Final pensions are contingent upon plan investment returns as there is a direct correlation between annual contribution and indexation of benefits rates and the plan's current funded status.

5. Continued

Key design characteristics include:

- Uniform accrual rate for all plan members – typically 2% per annum
- Uniform contribution rate set annually for all members
- Uniform indexation rate set annually for all members
- Uniform Asset Mix applies to whole fund – held in a separate trust

(b) Compare and contrast the following plan characteristics:

(i) investment risk
(ii) benefit portability
(iii) plan governance

Commentary on part (b) of Question:
For part (b), students should have been able to combine information from a variety of sources in order to compare and contrast the aspects of each type of program. This requires recollection and synthesis of the material including some explanation of how the different plans relate.

5. Continued

	Investment Risk	Portability	Plan Governance
The Netherlands	Risk is collectively shared. Risk is more evenly held between active and inactive plan members and employers through impact of funded status on benefits and contributions.	Since 85% are in industry or professional plans, coverage typically extends with change of employer. Standardized design allows for easier portability.	Policy ladder decision is removed from plan. Plans are also more autonomous being separate from employer. Setting of annual indexation rate and contribution levels is done by plan board. More compromise between union and employers required to enable plan governance.
US DB	Risk fully borne by employer. Annual employer costs are unpredictable and are increased with poor performance. Most plans are non-contributory for employees.	Benefits are portable only to other locked in vehicles. Employee risks losing value of future salary increases if FAE.	Mostly conducted by employer. Must negotiate with unions at contract renewal which are often contentious. Must comply with non-discrimination rules.
US Hybrids	A variety of investment risk sharing exists among US hybrid plans. Primarily the risk is borne by the employer. Cash balance and minimum balance plans - risk is with sponsor. Other plans - risk held by individual members.	Cash Balance and Pension Equity have relatively good portability. CB – more accrual takes place in early years so less value lost. PE – transfers lose value of increase in pay.	Typically held by the employer.
US DC	Risk borne by employee as they choose investment risk level. Significant fluctuation of benefit accruals at retirement. Minimal fiduciary requirements for employer.	Relatively little portability issues. Account value moved to other prescribed vehicles. Employer to employer plan transfers not common.	Employer has some fiduciary and governance responsibility. However, employee is more involved than DB plan due to self-directed investment.

5. Continued

(c) Describe the considerations in implementing the design characteristics in part (a) for single employer defined benefit pension plans in the United States.

Commentary on part(c) of Question:
Many students did not assess changes that would need to take place in the current environment for this type of plan to be supported, nor did they provide a commentary on these changes. For example, few students mentioned that the Netherlands plan structure would not be allowed under current legislative and tax framework, requiring legislative changes. This question required the student to think on a macro level rather than on a plan specific level. This type of change would not be for one sponsor/client, but for all employers in the nation.

- Dutch plans would not be allowed under current US regulations. e.g. can't reduce accrued benefits and pensions in payment.
- Nor would it satisfy IRS constraints e.g. employee contributions taxed.
- Sense of social responsibility in the Netherlands is stronger than in US. Plans for the good of society are not easily accepted. A shift in society's mindset would need to occur.
- US employers have other goals for retirement programs than simply providing retirement annuities e.g. workforce management, retention, early retirement incentives.
- Implementing this system would require homogenizing benefits that are currently extremely diverse. Higher paid employees may not appreciate one plan for all.
- US employers are looking for ways to share risks with members as seen in shift to hybrid and DC plans. So they would likely be open to considering this type of arrangement. Currently, US unions and employees feel the responsibility for under-funding should lie with employer. It would require a shift in mindset to get them to consider sharing over and under-funding risks.
- US funds are responsibility of employer. Dutch pension sponsors are separate, so separate fund providers would need to be set up.
- Dutch unions are required to strike a more even balance between active and retired members so a shift would have to take place in the minds of union members in order for the plans to be successful.
- US employees have been looking to take more control over their investments decisions. Implementing the Dutch system would mean that funds are invested in a mixed pool with a small group of employees being involved in investment decisions.

6. Learning Objectives:

6. The candidate will be able to analyze/synthesize factors that go into selection of actuarial assumptions.

Learning Outcomes:

(6a) Evaluating actual experience, including comparisons to assumptions.

(6e) Describe and apply the building of economic assumptions.

(6i) Select demographic and economic assumptions appropriate for a projection valuation designed for a given goal.

Sources:

R-D112 -10: Selection of Actuarial Assumptions

Dynamic Pension Valuations

R-D117 -07: Pension Projections

Commentary on Question:

In this question, the candidate is asked to outline the considerations that should be taken into account when selecting certain actuarial assumptions with respect to point-in-time and projection valuations.

The intent of this question is to compare and contrast the similarities and differences in setting assumptions for the two valuations in light of three specific business events. A well-prepared candidate will not only point out the differences in considerations between setting point-in-time and projection valuation assumptions in each of these situations for the four assumptions in question, but will also outline the similarities in detail. A successful candidate will reflect the impact of the three significant events occurring at the company into their assumption setting considerations.

Many candidates did not preface their discussion on assumptions with the requirements under professional requirements or explain the differences between point-in-time and projection valuations. In addition, many candidates did not provide sufficient written comments on each of the assumptions.

Solution:

Compare and contrast the considerations in setting the following assumptions for the NOC Full-Time Salaried Pension Plan for a point-in-time closed group valuation versus a stochastic 10-year open group projection valuation.

(i) Salary Increases
(ii) Termination Scale
(iii) Retirement Scale
(iv) New Entrant Profile

6. Continued

Valuation Type: General
- Need to follow ASOPs 27 and 35
- Economic Assumptions should be consistent with each other
- Demographic assumptions should be expected to appropriately model contingencies
- Not be expected to produce significant cumulative gains or losses over the period for which the assumption applies
- Should not confuse short-term expectations with long-term trends

Valuation Type: Point-in-time
- Valuation based on population at a fixed date
- Assumptions used to spread cost over future years and are based on long-term expectations

Valuation Type: 10-Year Stochastic Projection
- Need to determine assumptions for bringing population forward
- Projections reflect population changes and investment return of the plan
- Projection assumptions are referred to as "real-world" assumptions and are based on short-term expectations
- Using a single assumption set or average rates could distort results (i.e. Age 62 retirement, Salary scale of 3%)
- Valuation results can be sensitive to minor changes in key assumptions
- A probability distribution is assigned to many of the assumptions

(i) <u>Salary Increases</u>

Valuation Type: General
- Salary increase is a function of:
  - Inflation
  - Real Wage Growth
- Younger employees tend to get larger percentage pay increases
- Single rate assumption can skew results (likely to overstate liabilities)
- Age/merit scale can be constructed using current/historical data
- Merit is independent from inflation and should be a function of age for both valuations and projections

Valuation Type: Point-in-time
- May consider moving to a select/ultimate merit rate to factor in short-term wage freeze
- Valuation assumptions are long-term, so it is not necessary to change if it is expected that the current rate will not produce significant gains or losses over the measurement period
- Should consider revising the single rate assumption as the demographics of the plan will change (no new hires until 2017, ER window until 2015)

6. Continued

- Since using a single rate assumption, may wish to move to age/merit scale to get better results

Valuation Type: 10-Year Stochastic Projection

- Inflation and productivity should reflect economic conditions and vary year-by-year
- Projection salary scale only used to bring population forward from one year to the next
- Salary increase assumption is a key economic assumption in a projection
- Since projection assumptions are "real-world", then salary increase assumption should be 0% through 2015 and based on employer expectations and expected economic conditions afterward
- Since using a single rate assumption, may wish to move to age/merit scale to get better results

(ii) <u>Termination Scale</u>

Valuation Type: General

- Turnover rates usually vary by the following:
  - Age
  - Age and Service
  - Can use select/ultimate table if the plan has a large population
  - Gender
- Unlike other decrements (e.g. mortality & disability), large plans will have enough experience to develop rates
- Can use a published table if there isn't sufficient data
- Rates should reflect future expectations, not just past experience

Valuation Type: Point-in-time

- Valuation turnover assumption should be based on long-term expectations
- May consider moving to a select/ultimate rate to factor in early retirement window
  - Members can retire as early as age 50, so no withdrawal rates for those who qualify
  - Members may voluntarily terminate more frequently due to the pay freeze
- Members unlikely to voluntarily terminate immediately prior to being eligible for ER window
- Valuation assumptions are long-term, so it is not necessary to change if it is expected that the current rate will not produce significant gains or losses over the measurement period
- However, not changing the rates may result in understated liabilities

6. Continued

Valuation Type: 10-Year Stochastic Projection

- Projection assumptions should reflect factors like:
  - Economic conditions (slow economy)
  - Workforce reductions
  - Projection assumption should have select/ultimate rates if reflecting factors above
- Termination scale should be adjusted (select rates introduced) so that there are no withdrawal rates for members who are 50 years old and have 20 years of service through 2015
- Ultimate rate could be same as valuation assumption

(iii) <u>Retirement Scale</u>

Valuation Type: General

- Past experience or estimate of future retirement patterns can be used to develop assumption
- Should consider the following when setting the assumption:
  - Plan design factors that influence retirement patterns
  - Higher rates when a member qualifies for subsidized benefits
  - Lower rates immediately before becoming eligible for subsidies
  - Availability of government benefits (Social Security, Medicare)
  - Eligibility for other post-employment benefits (retiree medical, dental)
- Need to also consider the following:
  - Early retirement windows
  - Economic conditions
  - Financial position of the employer

Valuation Type: Point-in-time

- Valuation assumption may use a single rate assumption however the single point assumption of 62 does not reflect the early retirement subsidies of the ER window
- Should consider introducing a select/ultimate rates to capture members leaving earlier than age 62 (due to ER window and regular provisions)
- Better to use an assumption set as opposed to a single rate
- If age/service based, should consider that members will be less likely to retire if they are near eligibility for ER window
- Valuation assumptions are long-term, so it is not necessary to change if it is expected that the current rate will not produce significant gains or losses over the measurement period

6. Continued

Valuation Type: 10-Year Stochastic Projection

- Projection assumption should be based on expected rates
- Assumption affects projection of liabilities and cash flows
- Events such as early retirement windows should be considered
- Single point assumption of 62 does not reflect the early retirement subsidies of the ER window
- Should consider introducing select/ultimate rates to capture members leaving earlier than age 62 (due to ER window and regular provisions)
- Better to use an assumption set as opposed to a single rate
- If age/service based, should consider that members will be less likely to retire if they are near eligibility for ER window
- Using an assumption set will produce better expected cash flows

(iv) <u>New Entrant Profile</u>

Valuation Type: Point-in-time

- Not needed for point-in-time valuations

Valuation Type: 10-Year Stochastic Projection

- Need to make an assumption for the following new entrant characteristics:
  - Sex
  - Age at plan entry
  - Entry salary rate
  - Number of new entrants
- Plan sponsor is the best source of information
- Reflect current hiring practices, economic conditions, and business environment
- Should adjust new entrant characteristics to reflect hiring freeze until 2017
- Assume no new entrants for that period
- May want to increase new entrants for the period that follows as the employer may begin hiring at a faster pace
- Should discuss with the employer regarding their expectations after the freeze is over

7. Learning Objectives:

4. The candidate will understand alternative plan types that occur internationally.

Learning Outcomes:

(4b) Give examples of the structure of different plan types.

(4c) Give examples of plan types that could work for multi-national companies and their employees including third country nationals and expatriates.

Sources:

R-D136-10: The Trend to a Global TCN Benefits Program for US Companies

R-D104-07: The Globalization of Employee Benefits

Commentary on Question:

In this question, candidates were asked to demonstrate an understanding of international issues in developing a pension plan for Third Country Nationals along with key objectives from both an employer and employee perspective. The candidate should be able to extrapolate the knowledge from the readings and provide a sound recommendation for an international plan design.

A well prepared candidate would have a good understanding of the different types of pension plans and key objectives of a global plan for Third Country Nationals. Candidates should also understand the different options for providing benefits to TCN's as well as the advantages and disadvantages of each.

A good paper discussed both employer and employee issues for TCNs, and had sufficient information for each of parts (a), (b), and (c) and would have connected the company's global retirement program design recommendations in part (c) to parts (a) and (b). Providing a recommendation in part(c) separated the good candidates from other candidates.

Solution:

(a) Describe, from both an employee and employer perspective, the key pension objectives of a global retirement program for Third Country Nationals.

1. Employer
   - Key objectives:
     - Cost effectiveness
     - Consideration of all sources of retirement income
     - flexibility
   - Ease of administration
   - Costs should be controllable and budgetable
   - Retirement program should be structured to recognize "three legged stool" i.e. through social plans, company plan and personal savings

7. Continued

- Consideration should be given to the trend of local government shifting financial responsibility to corporate and employee bases

2. Employee
   - Key
     - Transferable benefits between employers
     - Protection from inflation
     - Easy to understand
   - Provide a suitable source of retirement income
   - Need a retirement program that moves with them and will provide a reasonable retirement income when all pieces are considered

(b) Describe the key practical considerations and constraints in implementing a global retirement program.

How employees in IOT will be transferred from NOC's traditional retirement program to the global program

- Consideration given to whether the Plan should be DB or DC
- Plan design should consider the regulatory environment
  - Consideration of the local tax structure
  - Consideration of financing and funding restrictions
- Plan should be integrated with statutory and government-provided benefits
- Review of statutory benefits would include consideration of retirement and old age benefits
- Competitiveness of the Plan design should be considered based on the local economic and labour environment (but will rarely dictate final plan design)
- Plan design should consider NOC's global benefit objectives
- Consideration given to how the plan should be designed to meet both the employer and employee objectives in part (a)

(c) Propose a global retirement program design for employees in IOT identifying how the program addresses or fails to address the considerations in part (b) and the objectives in part (a).

Design Feature 1 - Plan would be set-up as an international plan for TCN's that provides a plan that moves with employees as they move across geographies to provide a total retirement package.

- International plan must take the regulatory environment into account.

Design Feature 2 - DC plan design rather than DB.
DC Plans meet many of the Employer objectives from part (a) (costs are controllable, flexible and budgetable).

7. Continued

Design Feature 3 -DC contribution formula would be integrated with home country social security. For example, employer contributions of X% of pensionable earnings above the social security wage base.

Design Feature 4 - Employer contribution rate of 10% on pensionable earnings above the social security wage base.

Design Feature 5 - Employee required contribution rate of 3% on pensionable earnings above the social security wage base.
Design considers global benefits objectives from part (b). NOC's mission is to build new offices in Asia and attract top talent. The proposed DC formula would be considered very competitive and the DC structure is consistent with retirement plans in Asia.

Design Feature 6 - Additional matching contributions for **salaried** employees (i.e. NOC matches 50% of employee voluntary contributions up to maximum of 4% if employee contributions 8%).

(Note: Marks were granted if a candidate recommended a plan design and provided reasonable justification with respect to the objectives in part (a) and the considerations in part (b))

8. Learning Objectives:

1. The candidate will be able to analyze different types of registered/qualified defined benefit and defined contribution plans, as well as retiree health plans.

Learning Outcomes:

(1a) Describe the structure of the following plans:

- Fixed dollar and pay-related defined benefit plans
- Hybrid plan designs such as, cash balance, pension equity, and floor offset plans, target benefit plans
- Defined contribution plans including 401(k) plans and capital accumulation plans
- Retiree Health Plans

(1b) Describe the process and apply the principles of conversions from one plan type to another.

Sources:

Yamaoto Chapter 5, Allen Chapter 8, HSA study note

Commentary on Question:

In this question, the candidates were asked to describe the various features and restraints for HSA and compare it to a qualified defined contribution plan as a retirement savings vehicle. The question tests the candidate's familiarity with the HSA as a retirement saving vehicle and understand the similarity and difference with another retirement savings vehicle. A well prepared candidate would be able to not only list the regulatory limits on HSA but be able to consult on the pros and cons of the HSA account in comparison with the defined contribution plan.

Solution:

Your client is considering providing a supplemental retirement benefit to help employees pay for post-retirement expenses, including medical expenses, and better prepare for retirement. Your client would like to know more about Health Savings Accounts ("HSAs") as a possible solution.

(a) Describe HSAs including the related regulatory constraints in their design.

- Contribution is tax-exempt
- Earning accumulate tax free
- Distribution is tax free if used for medical expense
- Contribution could be made to the account only if the employee is enrolled in a high deductible health plan
  - Prescribed Minimum and Maximum deductible amounts to qualified
- Annual contribution limit also prescribed
  - $3,000 for single $5,950 for family in 2009
- Prescribed Catch up contribution if over 55

8. Continued

- Contribution could come from employer or employee
- Account is portable – no "use it or lose it" feature

(b) Compare and contrast using a qualified defined contribution plan (QDCP) and HSA to provide a supplemental retirement benefit, assuming the same level of employer funding.

- HSA is more tax effective
  - Distribution can be tax free (if used for medical)
  - QDCP Distributions are taxed at distribution
- Retiree can accumulate more money in QDCP
  - QDCP has a higher contribution limit (Limit in 2011 was $16,500 vs. $3,050-$6,150)
  - HSA contribution cease when employee enrolls in Medicare
  - Employees likely will tap into H.S.A. for medical expense while active
- QDCP has broader participation
  - Must participate in high deductible health plan to contribute to an H.S.A.
  - May exclude a section of the workforce where high deductible plan is not desirable/practical for health needs
  - QDCP participation is defined by employer and plan terms (have more control on eligible group)
- HSA is less restrictive on early withdrawals
- QDCP has a penalty for early withdrawals

9. Learning Objectives:

3. The candidate will be able to analyze plans designed for executives or the highly paid.

Learning Outcomes:

(3a) Given a specific context, apply principles and features of executive deferred compensation retirement plans.

(3b) Given a specific context, apply principles and features of supplemental retirement plans.

Sources:

Allen, Chapter 14

Commentary on Question:

In this question, candidates were asked to demonstrate their knowledge of US executive pension plans and how such programs could be used for attraction and retention purposes. A well prepared candidate was expected to know general plan features for an executive arrangement, single out key features that are more important than others to executives in establishing a pension plan, and explain the three funding options without getting them mixed up. Many candidates explained the general features and singled out some key features but many mixed up the various funding options in explaining them.

Separate comments made for each part.

Solution:

The CEO of ABC Company is concerned about a recent increase in the number of key executives leaving ABC to take executive positions with other companies, and has decided to implement a new executive retirement arrangement, specifically a defined contribution plan.

(a) Describe the general plan features of an executive retirement benefit program.

Commentary on part (a) of Question:

There was a section of the source material titled "General Plan Features." This part of the question just asked for recall of the items listed in that section.
For part (a), the candidate needed to remember the features of an executive retirement plan. More points were given for more critical pieces of a plan – for example, pointing out that the benefit structure can be DB or DC is more important than knowing that you have to define how service is granted.
There was a section in the source material titled "Objectives of Executive Retirement Arrangements." Most candidates put this list down for part (a), and many put only this list (others put the objectives and some features). Where objectives were described in such a way as to cover the features, credit was given.

9. Continued

Eligibility for Participation

Normally limited to select individuals

Definition of Compensation

Define elements of pay to be included in plan compensation
Define period of time (if any) over which compensation will be averaged
Base salary and short-term incentives typically are included as compensation elements
Providing benefits related to short-term incentive pay is frequently a key plan objective

Service

To facilitate midcareer recruiting, plan might define service to include service with prior employer

Retirement Ages

One reason for specifying retirement ages is to make it clear when the employer expects executives to retire
Normal retirement - many executive plans use the same definition as the broad-based plan, others establish an earlier age than the broad-based plan to encourage executives to retire earlier

Benefit Structure - DB or DC

Vesting

A funded executive plan that is subject to Title I of ERISA must comply with minimum vesting standards similar to those that apply to qualified plans.
No vesting requirements apply to unfunded plans, so the employer's options range from full/immediate to none until retirement.
Even at retirement, the executive benefit can be made forfeitable under certain conditions (for example, if you're going to a competitor).

(b) Describe the key characteristics of the benefit structure for a defined contribution executive retirement plan.

Commentary on part (b) of Question:
Again, this part of the question asked for recall on a section of the source material, on one of the plan features called "Benefit Structure."
More points were awarded for characteristics that are more key than others. For example, the contribution or credit amount is more key than when the accumulated account is paid out.

9. Continued

If candidates recalled the list, they did well. If they did not, the answers took the form of a general discussion and recommendations, when no recommendations were asked for.

Contribution or credit amount

Many executive DC plans are simply excess plans (restoring benefits lost because of IRC limitations), so the contribution or credit simply reflects the provisions of the broad-based plan and the tax law.

Accumulation basis

The contribution or credit is accumulated with actual or imputed investment income.

If the plan is funded, the rate of return will reflect actual investment results.

Whether or not plan is funded

Executive DC plans are typically unfunded.

Participant-directed investments

Accumulated amount paid out at retirement, death, disability, or other term of employment.

(c) Compare and contrast three funding options for a defined contribution executive retirement plan.

Commentary on part(c) of Question:
This part was testing whether or not candidates knew the three main funding options for funding an executive retirement plan, found in a section of the source material called "Benefit Security Arrangements."
Candidates who pointed out the similarities and differences between the options (as asked for) got more points than those who did not.
Most candidates got the high level points (for correctly noting the three options that had been described in the source material). Many got points for additional information, where comparing and/or contrasting between the options was done.

Rabbi trust

This is probably the most common method of funding executive benefits.

It is an irrevocable trust for the benefit of an executive or group of executives.

The trust assets cannot be used by current or future management but remain subject to the claims of creditors in the event of the firm's insolvency.

9. Continued

Corporate-owned life insurance

The employer is the owner and beneficiary of a life insurance contract designed to accumulate sufficient cash values to pay the benefits promised to the executive.

The life insurance policy must be carried as a corporate asset and therefore provides very limited benefit security for the executive since Cash Values/death benefits are within the employer's control.

Secular trust

Employer contributions are made on an irrevocable basis for the benefit of participating executives.

These are funded plans and are subject to Title I of ERISA, with executives being considered in constructive receipt of the value of their benefits when vested.