Seeing Beyond Risk

Canadian Institute of Actuaries

Institut canadien des actuaires

Voir au-delà du risque

Canadian Institute of Actuaries | *L'Institut canadien des actuaires*

2007 Annual Meeting • Assemblée annuelle 2007

Vancouver

Defined Contribution (DC) Risks
PD-10

Canadian Institute of Actuaries
June 28, 2007
Vancouver

Minaz Lalani
Towers Perrin

Enterprise Risk Management (ERM) and the Current Landscape

- ERM is a holistic framework of managing risks across a corporation
  - 65%* of companies are concerned about how they manage risks
  - 85%* of companies expect risk management to increase over next five years, driven by:
    - Increased shareholder attention
    - Vigilance about their risk profiles
    - Breadth of related lawsuits
- Comprehensive view of risks across a corporation provides a better understanding of exposure and risk correlations
  - Understanding minimizes surprises and mitigates liability
  - Looking across risk silos allows better evaluation of risk/reward
  - Difficult to address all corporate risks at once; ERM must be implemented incrementally

*Source: Towers Perrin – A Survey of Corporate ERM in US (2006)

ERM and Pension Risk

- Key risk domains include strategic/business, market, credit, operational, financial, compliance, pension and human resource
  - For pension plans, coordination and communication between Finance, HR and corporate risk manager is increasing but is still in its early stages
  - Pension risk is moving up the priority scale but is still not well understood; continues to be important but not urgent
- Pension is identified as a priority risk silo*
  - The pension focus is mainly on managing defined benefit (DB) pension expense, funding cost volatility and pension legacy liabilities (recently)
  - DC plans are frequently regarded as “risk free”. HR primarily focuses on day-to- day management. Little or no focus on managing income adequacy, investment, settlement and longevity risks

*Source: Towers Perrin – A Survey of Corporate ERM in US(2006)

Implementing ERM for DC Risks

- Four steps to implement ERM and manage DC risks
  - **Identify**
    - What are my risks?
    - Who is looking after it?
  - **Quantify**
    - How much is the risk?
    - What is the impact?
  - **Solve**
    - What can we do about it?
    - How do we prioritize?
  - **Execute**
    - What action do I take?
    - What value does it create?

Example - Implementing ERM for DC Design Risks

- Design Risk
  - **Identify**
    - Inadequate pensions for employees in retirement
    - Employees responsible for choosing investment options
  - **Quantify**
    - Identify employee groups who will not meet retirement targets
    - Determine the expected retirement shortfall
  - **Solve**
    - List potential solutions – investment education, options, pension formula, etc.
    - Undertake cost/benefit analysis and act on best solution
  - **Execute**
    - Articulate pension objectives more effectively
    - Better communication

Strategic / Business Risk

- Risk of failure to meet specified strategic or business objectives
  - Examples of objectives
    - Attraction, retention and engagement of employees
    - Supporting merger, acquisition and divestiture activities
    - International growth and mobility of employees
    - Pension is not company's "core business"
- From a DC perspective
  - Does the plan support business objectives?
    - Easy to measure on a qualitative basis
    - Not difficult to quantify, for example:
      - Attraction: ratio of offers accepted to total offers (rejection due to nature of DC plan) and feedback from candidates on the level of DC plan coverage
      - Retention: Trend of turnover rates; exit surveys

Design Risk

- Risk of not meeting the sponsor's pension objectives
  - Best practice is to develop a statement of philosophy and objectives; such a statement will articulate:
    - Income replacement levels (income adequacy) based on a given DC formula and at a given target investment rate and retirement age
    - Employer and employee responsibility for income security in retirement
  - Next Two Pages :

    Illustrative level contribution rates (DC formula) and lump sum values for an employee at age 35 retiring at age 65 with pension payable to age 90, assuming a 6% per annum return and 3.5% per annum pay growth throughout the period; no tax limits applied. C/QPP included.

Design Risk

Contribution Rates to Attain Target Replacement Ratios

	Target Replacement Ratio		
2007 Earnings Level	**50%**	**70%**	**90%**
$50,000	**10%**	**17%**	**23%**
$100,000	**13%**	**20%**	**27%**
$150,000	**14%**	**21%**	**28%**

Age 35, retiring at age 65, with pension payable to age 90 assuming a 6% per annum return and 3.5% per annum pay growth throughout the period ; no tax limits applied. C/QPP included.

Design Risk

Lump Sum Required at Retirement to Attain Target Replacement Ratios

	Target Replacement Ratio		
2007 Earnings Level	50%	70%	90%
$50,000	$700,000	$1,200,000	$1,700,000
$100,000	$1,900,000	$2,900,000	$3,800,000
$150,000	$3,100,000	$4,500,000	$6,000,000

Age 35,retiring at age 65, with pension payable to age 90 assuming a 6% per annum return and 3.5% per annum pay growth throughout the period; no tax limits applied. C/QPP included.

Design Risk

- **Risk of being "wrong" on employee expectations**
  - Belief regarding employee behaviour on matching contributions, for example, matching 100% of contribution with a low company matching maximum, or 50% matching with a high company matching maximum
  - Example :
    Up to 5% employee contribution, 100% company match up to 2.5%; or
    Up to 10% employee contribution, 50% company match up to 2.5%
  - **Company cost will be essentially the same, but "design risk" will be materially different**
    - Model expected employee behaviour using historical data
    - Compare expected versus actual
    - Address variance by effective communication and education

Pre/Post Retirement Risks

- Pre-retirement Risks
  - **Market (capital) risk**: Short term, risk averse, or near-retirement member exposed to potential fall in market value
  - **Investment risk** : Return does not exceed target investment return (compounded over the determined time horizon)
  - **Inflation risk** : Return is not in excess of inflation (erosion of purchasing power)
- Post-retirement Risks
  - **Pre-retirement risks**; and
  - **Conversion (settlement) risk**: cost of securing pensions not matched by change in value of member's account
  - **Mortality (longevity) risk**: risk of outliving the account balance; inadequate balances to pay periodic disbursements

Pre/Post-Retirement Risks

Fund	Market / Capital	Investment	Inflation	Conversion
Canadian Equity	✗	✓	✓	✗
Foreign Equity	✗	✓	✓	✗
Bond	✗	✗	-	✓
Money Market	✓	✗	-	✗
Balanced	✗	✓	✓	✗
Life Cycle	✗	✓	✓	✗

Design Risk

Increase in Contribution Rates for Longevity Risk (Age 90 to 100)

	Target Replacement Ratio		
2007 Earnings Level	**50%**	**70%**	**90%**
$50,000	**11%(10%)**	**19%(17%)**	**26%(23%)**
$100,000	**15%(13%)**	**23%(20%)**	**31%(27%)**
$150,000	**16%(14%)**	**24%(21%)**	**32%(28%)**

Age 35,retiring at age 65, with pension payable to age 100 (90) assuming a 6% per annum return and 3.5% per annum pay growth throughout the period; no tax limits applied. C/QPP included.

Design Risk

Illustrative Lump Sums to Provide an Additional $10,000 of Annual Income

	Lump Sum per $10,000 of Annual Income		
Retirement Income Fund, earning	Survival to age 85	Survival to age 95	J&S 60% Annuity
• 5% per annum	**$142,000**	**$181,000**	**$154,000***
• 6% per annum	**$131,000**	**$162,000**	**$154,000***
• 7% per annum	**$122,000**	**$147,000**	**$154,000***

*based on an annuity purchase rate of 4.5% with 1% indexing, J&S60% with 10 year guarantee

Member Education Risk

- Member Education Risk Due to :
  - Lack of communication on the pension promise
  - Too much generic marketing information on investments
  - Too little specific, customized and personalized information
  - Educational material that is not clear and concise
  - Lack of self service tools for interactive education
  - Inadequate level of communication
- Risk Mitigation
  - Communication on plan design
  - Limited yet effective choices of investment options
  - Toolset: risk tolerance assessment , modelling tools
  - Timely delivery of education and choice of media
  - Balance between “push” and “pull” education
  - Release absolving the plan sponsor for non-attendance

Operational Risk

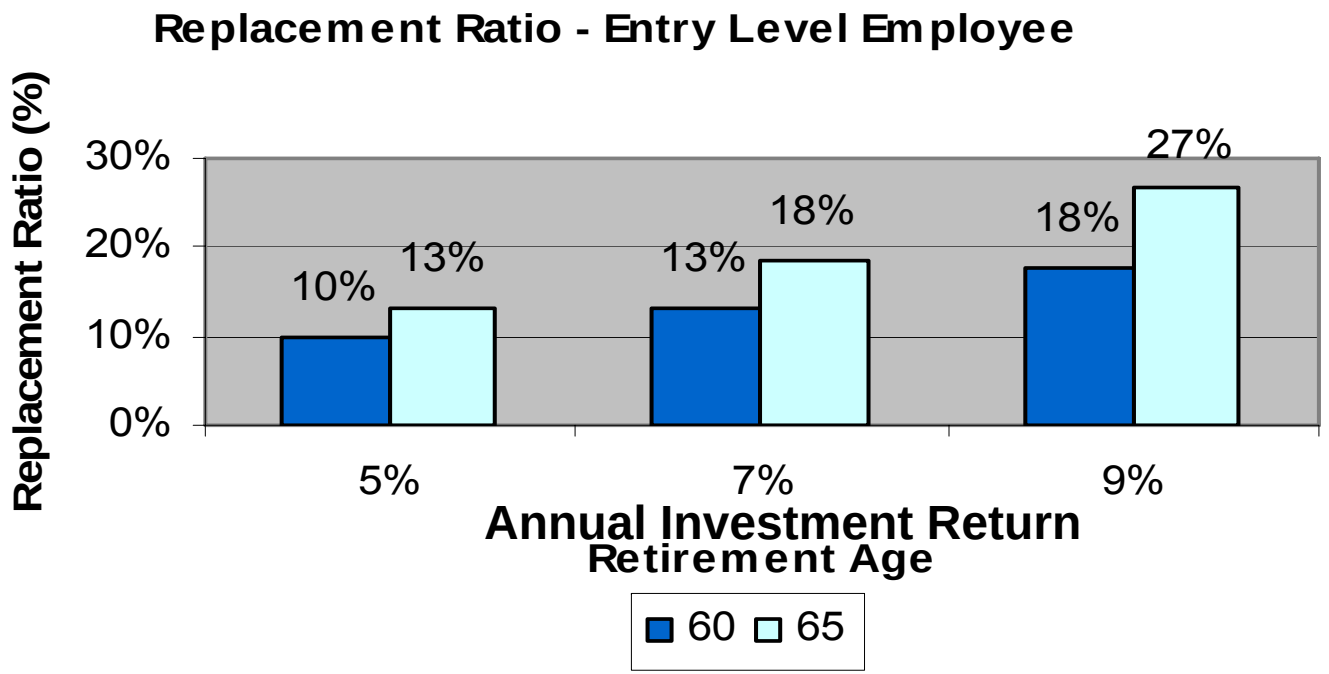
- Basel II and Society of Actuaries Definition – Direct or indirect loss resulting from inadequate or failed internal processes, people and systems, or from external events
  - Examples:
    - Processes: investment allocation, return calculation, statements, untimely delivery
    - People: Incorrect transfers / switching, unclear or misleading information
    - Systems: inadequate checks (investment profile), unavailability
- DC perspective
  - Tasks are mostly delegated to the record keeper and managers
    - Cost of doing business and is included in the “price”
  - Indemnity and liability clauses typically provide protection only if malicious, careless, or deliberate; otherwise best effort basis ➔ Operational risk is minimal but impacts reputation risk

Legal Risk

- Design Risk and Member Educational Risk
  - in combination will likely be the cause for potential legal risk
    - Pension promise not kept – deferred compensation argument
    - Unclear documentation on pension objectives and delivery of the objectives
    - Inadequate or unclear pension education material and/or modeling tools
  - Class action suits are become increasingly common in pensions; significant increase expected in the future
    - Conversion of DB to DC
      - Initial balances were inappropriately calculated (for example, without earnings projections, CRA projections not reasonable, actuarial basis produced minimal values, lack of mortality improvement – 1983 tables used for conversions)
      - Implications of choices offered not adequately explained to employees
  - Quantification not easy; costs will equal potential pension promise “shortfall” and legal costs

Income Adequacy – Deterministic Returns

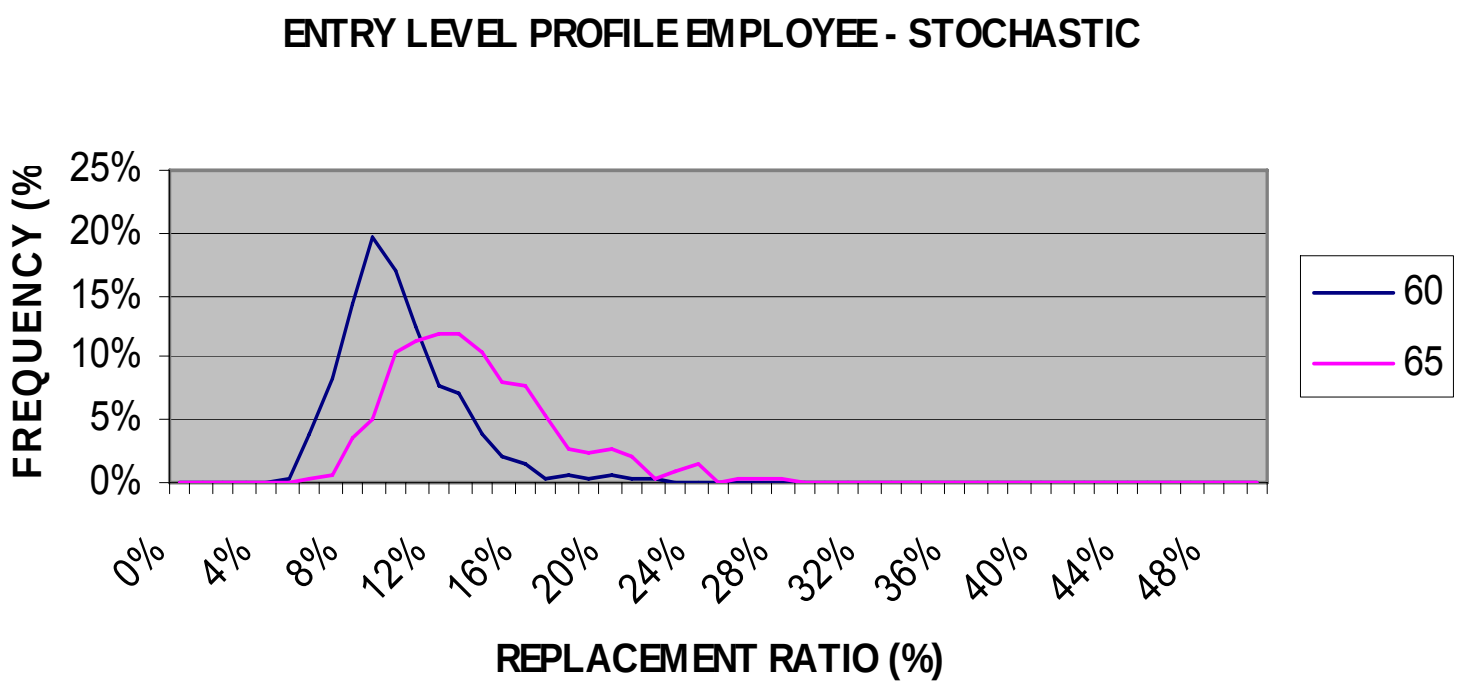
New entrant age 31 and earning $47,000 per year, 5% DC plan, 4% pay growth, conversion to pension at 5.5% with 1% indexing; annuity certain to age 90; C/QPP not included.



Valid information, but little value-added from an actuarial perspective

Income Adequacy – Stochastic Returns

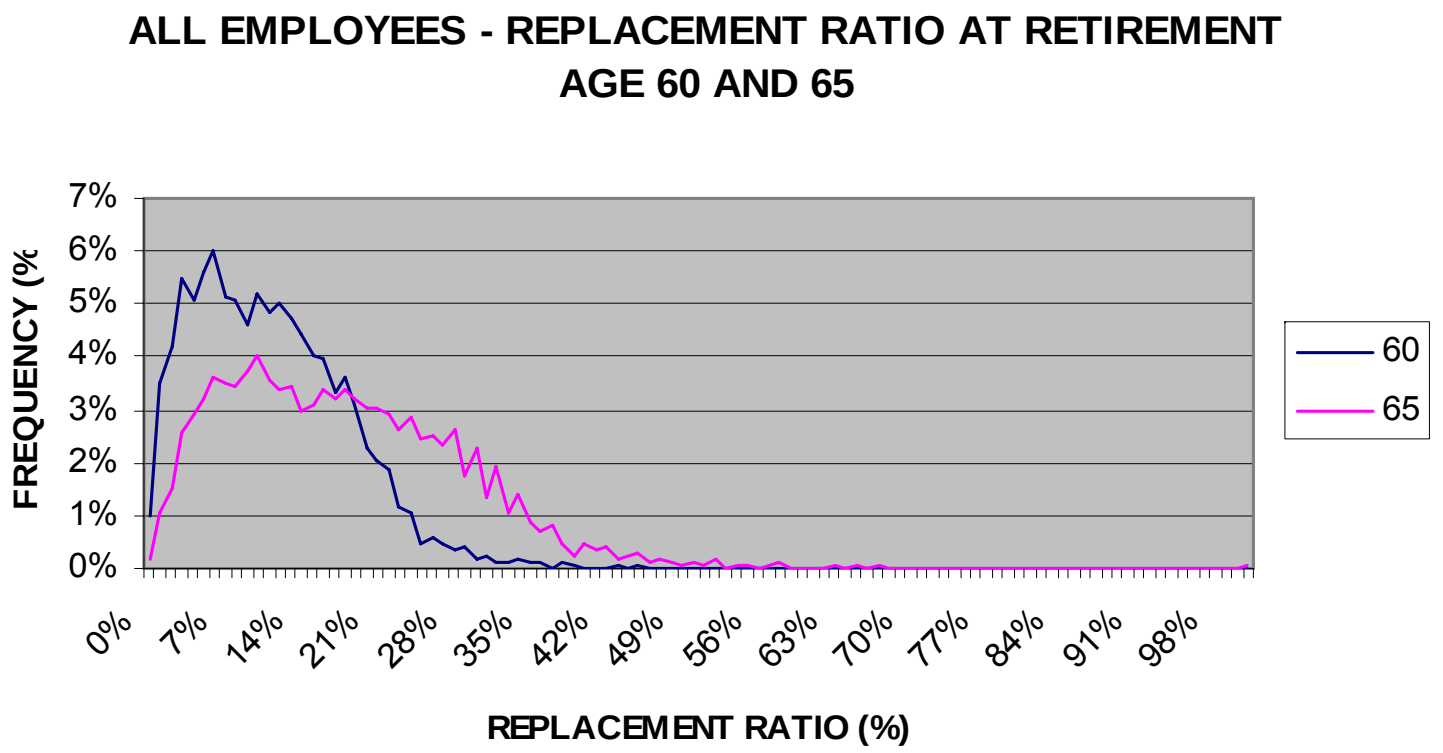
New entrant age 31 and earning $47,000 per year, 5% DC plan, 4% pay growth, conversion to pension at 5.5% with 1% indexing; annuity certain to age 90; C/QPP not included.



Actuarial perspective: 0% (1%) chance of employee retiring at age 60 (65) will attain a replacement ratio of at least 25%

Income Adequacy – Stochastic Returns

Case Study – 4,500 employees, average age 38, 6 years of service, earning $50,000, with an average DC account balance of $16,000; 5% DC plan. C/QPP not included.



Actuarial perspective: 3% (24%) chance of employees retiring at age 60 (65) will attain a replacement ratio of at least 25%. The average replacement ratio of employees retiring at 60 (65) is 11% (18%).

DC Risk Reserving
Concept of "DC Valuation"

- "DC valuation" is analogous to DB valuation
  - DC Deficit is the "unfunded liability" for each individual on a going concern basis, relative to target benefit
    - DB = Assets to date *less* Liabilities (based on projected unit credit)
    - DC = Present value of "average" projected balance based on simulated scenarios *less* deterministic target balance, *multiplied* by Attribution Ratio
  - Attribution Ratio (AR) for DC
    - Preferable approach: ratio of target balance for service to date divided by projected target balance to retirement age (target based on deterministic basis)
    - Simple but not appropriate: Service prorate similar to projected unit credit

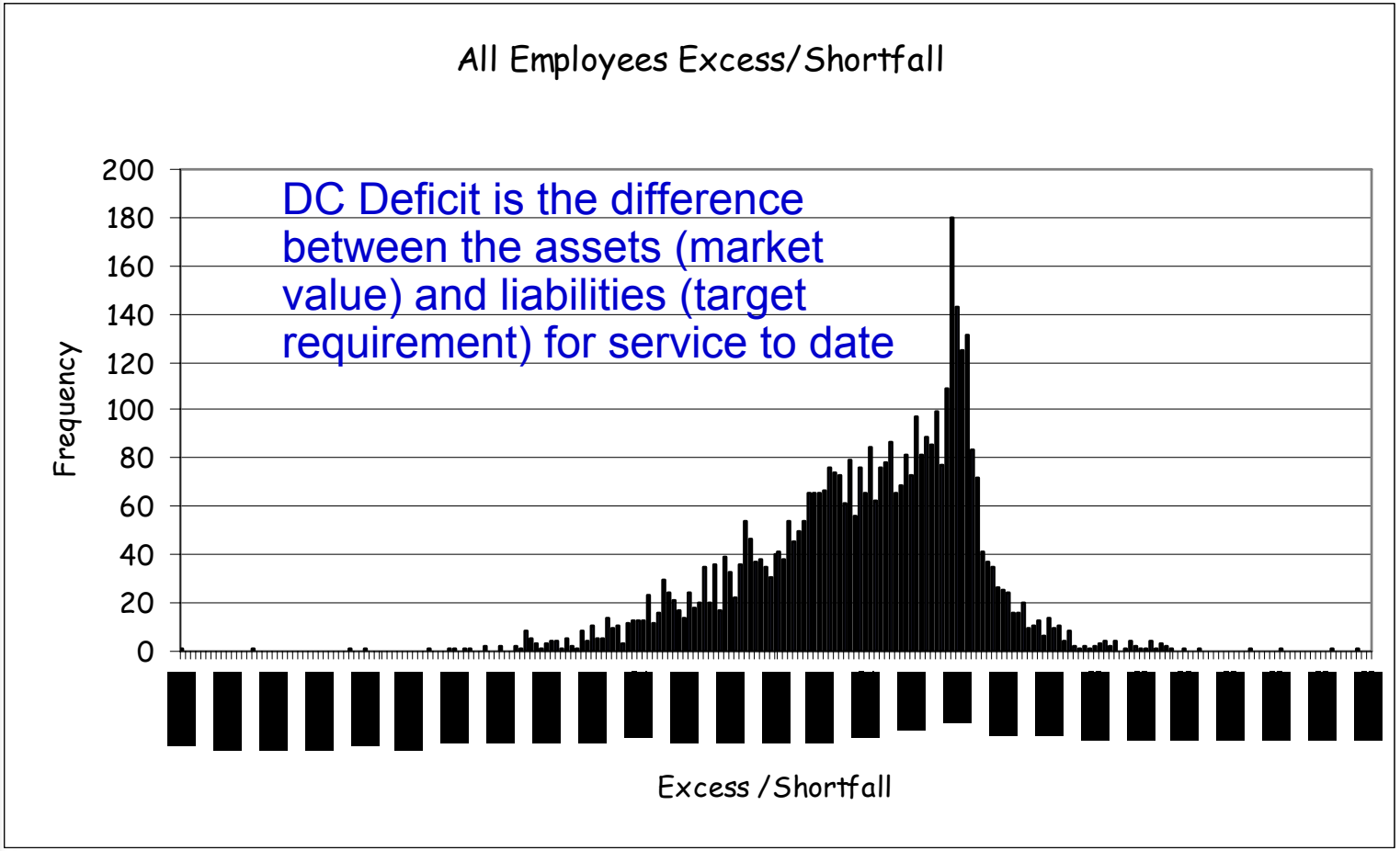


DC Risk Reserving
Concept of "DC Valuation"

- Methodology and actuarial assumptions
  - DC assumptions are similar to DB valuation assumptions
    - Economic (investment return, salary growth, inflation)
    - Demographic (retirement, termination, mortality)
    - DC stochastic assumptions for investment return, inflation – internally consistent
    - Stochastic mortality can be considered (not included in the example)
  - Is there any value added?
    - Plan sponsor gets a better understanding of the aggregate risk.
      - Develop strategies to deal with the "DC Deficit" (e.g., design drivers); unlike DB, the strategies are not primarily based on funding or investment strategies

DC Risk Reserving
Excess/Shortfall – Stochastic Returns

All Employees with Excess/Shortfall Projected Balances to Age 65



DC Risk Reserving
"DC Valuation" Summary

- Summary of the DC Valuation
  - The difference between the assets (market value) and liabilities (target requirement) is the shortfall or "DC Deficit"
  - What does the "DC Deficit" mean in a DC Plan? It could have implications for any one of the following:
    - Design risk due to non-delivery of pension promise
    - Litigation risk in event of a class action suit
    - Investment risk due to current investment options
    - Other risk (based on sophistication of the modelling, for example, mortality risk)

- Case Study (as described in the prior slides)

	Service Prorate	Target Balance*
DC Deficit	$1,790,000	$201,000

*preferred attribution approach

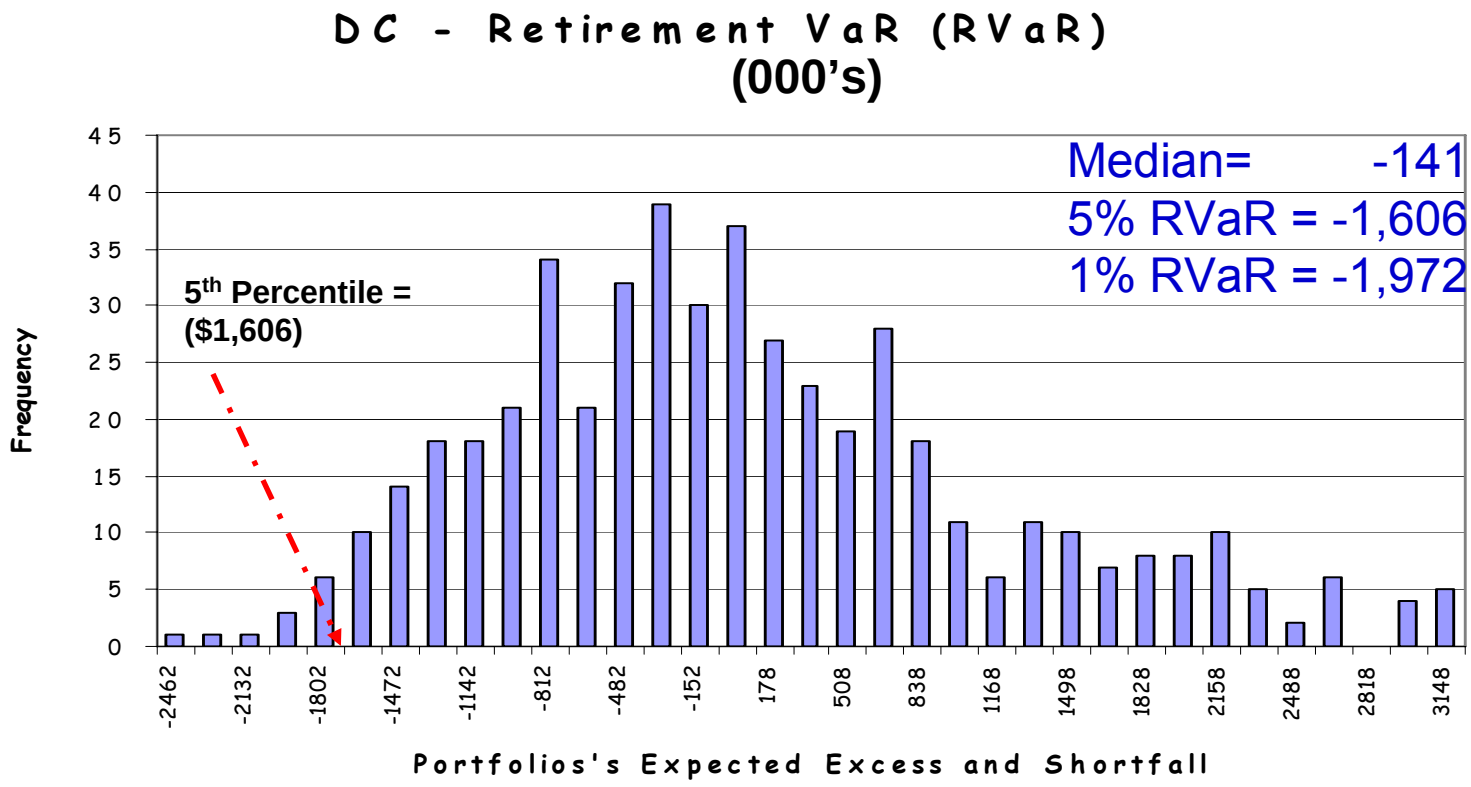
Value at Risk (VaR) Concept for DC Plans

- **Based on statistical distributions, standard deviation and confidence intervals**
  - Also known as “risk dollar concept”
  - Statistical distributions usually determined using simulation methodology
- **“How much can a plan sponsor lose with x% probability over a given time horizon?”**
  - The VaR concept for pension has a much longer horizon than market (days), credit (days to months) or operational VaR (months to years)*
- **DC Context : “The DC Plan (portfolio) has a Retirement VaR (RVaR) of $2m at 5%”**
  - The DC Plan has 5 in 100 chance that it will have a shortfall of at least $2,000,000 over the accumulation period

*Cash flow - CVaR concept could also be used for a long term horizon

DC Retirement VaR Case Study

Each portfolio consists of 4,500 employees



Actuarial Perspective: What is the plan sponsor's downside risk?
5% chance that the "shortfall" (RVaR) will be $1,606

Questions

"We now accept the fact that learning is a lifelong process of keeping abreast of change. And the most pressing task is to teach people how to learn."
Peter Drucker, (Management Guru)