Pension Risk Management (PRM) in an Enterprise Risk Management (ERM) Context

Minaz H. Lalani

November, 2009

Table of Contents

1. Risk Definition
2. Enterprise Risk Management (ERM) Review
3. ERM models
4. Pension Risk Management
5. PRM in an ERM framework
6. Case Study (Optional)

Defining Risk in General

- Risk is Uncertainty that can be qualitatively or quantitatively measured
  - You can have Uncertainty without Risk
    - — Winner of A or B (Who will win or lose?)
  - You cannot have Risk without Uncertainty
    - — If you bet on A or B, there is *Risk* that you either win or lose
    - — Qualitative : You have bragging rights, or lose face
    - — Quantitative: You have a financial gain or loss
  - Characteristics of Risk
    - — Existence of an uncertain event (E)
    - — Likelihood of an event occurring (L)
    - — Severity or Impact if Event occurs (S)
    - — Definable, or Measurable metric (M)
    - — Time Horizon for expected Event (T)

Risk Management

- Risk Management
  - Business discipline to protect assets and profits by reducing loss potential, mitigate impact or execute recovery after a loss
  - Involves risk identification, measurement, evaluation , reduction or elimination of exposures, risk reporting, risk transfer and/or loss financing
  - All organizations practice risk management
    - — Threat of damage to assets (ex: use of insurance)
    - — Managing volatility of funding contributions (ex: pension plan)
    - — Use of hedging or derivative contracts to mitigate financial exposures (ex: energy futures)
    - — etc

Enterprise Risk Management

- Enterprise Risk Management

  - Broadens the Risk Management scope to all significant business risks of the organization and it deals with risks comprehensively and systematically
    - — Strategic, human capital, operational, financial, hazard, demographic, etc

  - Manages risks and seizes opportunities to reduce uncertainty and achieve organizational objectives
    - — Manages both the downside and upside within pre-determined risk appetite and tolerance
    - — Application is consistent and uniform across business units, financial subsidiaries (pension plan, captives) and related companies
    - — Culture of risk is a core attribute and accountability is easily identifiable

Enterprise (Integrated) Risk Management Framework

AS/NZ2	Generic	COSO
Establish Context	Establish Goals	Objective Setting
Identify	Identify	Event Identification
Analyze	Quantify	Risk Assessment
Evaluate	Solve	Risk Response
Treat	Execute	Control Activities
Communicate	Communicate	Information / Communications
Monitor	Monitor	Monitoring

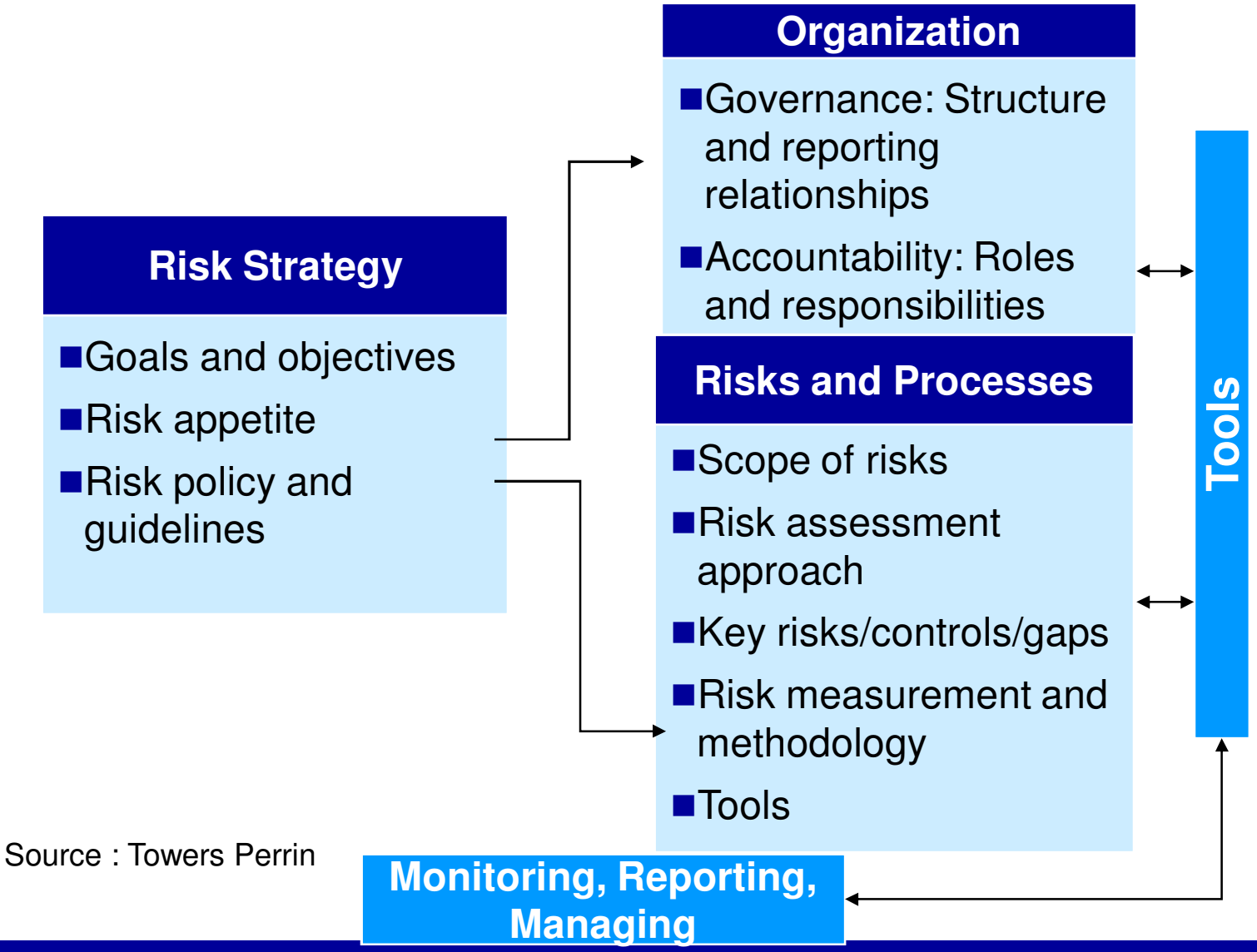
Categorization of Risks – All Companies

- **Strategic Risk**
  - Business planning
  - Resourcing
  - Acquisitions, divestitures and mergers
  - Reputation/brand
  - Competition
  - Customer
  - Vendor (ex: Supply Chain)
- **Financial Risk**
  - Market
  - Credit
  - Liquidity
  - Foreign exchange
  - Interest
  - Commodity

Categorization of Risks – All Companies

- **Operational Risk**
  - People (ex: Workforce planning)
  - Processes
  - Systems
  - Operations
- **Legal Risk**
  - Ethics/ code of conduct
  - Social responsibility
  - Litigation
- **Regulatory Risk**
  - Capital Structure
  - Compliance
  - Governance
  - External relations and reporting
  - Tax
- **Hazard Risk**
  - General insurable risks (not covered above)

ERM Framework – All Companies



Source : Towers Perrin

ERM Framework Applied to Pension Plan



Management of Pension Plan Risks

- Pension plan risks are currently managed on a “silo” basis
  - DB - Pension risk primarily focused on pension expense, funded status, funding cost volatility and pension legacy liabilities
  - DC – “Risk Free” - Pension risk focused on day-to day management ; little or no focus on income adequacy, investment, settlement, or longevity risks
- Pension risk management at an enterprise level is expected to increase:
  - Country-based accounting standards, IFRS and Exchange Commissions are requiring detailed reporting of pension plan financials with company disclosures
  - Recent market turmoil has decreased solvency ratios and increased funding contributions resulting in free cash flow being diverted to the pension plan
  - Increased shareholder attention and vigilance about company’s risk profile
  - Risk management is in vogue – every profession is in the ERM space

ER Management of Pension Risks

- Approaches to managing Pension risks :
  1. Standalone
     a) Pension plan risks are managed on a silo basis *(current practice)*
     b) Pension plan managed as a financial subsidiary / separate entity / enterprise using integrated / ERM framework *(best practice – single plan sponsor)*
  2. Collaborative: Pension risks managed on Standalone basis (b) with coordination of specific risks at the *parent* enterprise level *(emerging practice – single plan sponsor)*
  3. Integrated: Complete pension risk management at the *parent* enterprise level *(best and emerging practice – standalone multi-employer plans, public plans –ex: Caisse)*
- Pension risks cannot be viewed in isolation since companies are exposed to similar risks – investment, inflation, volatility, credit, currency, interest rate, demographic, etc
- Management of Pension plan risks need to be coordinated and communicated at the enterprise level to ensure that risks are managed consistently and efficiently

Standalone - Pension Plan as a Financial Subsidiary

- Pension plans are separate and apart from the company
  - — Established as a trust under trust laws
  - — Pension plan regulation is different than Corporation Acts
  - — Significant stakeholders are the beneficiaries not shareholders
  - — Plan sponsor has overall responsibility for the pension plan
  - — Governance is via:
    - – pension committee / board of trustees (fiduciary)
    - – pension management committee (plan management)
    - – pension investment and audit board committee (oversight)
- Pension Risk Management
  - Risks are *well* managed by a *few*, *adequately* managed by *most* and *poorly* managed by *some* pension plans
  - Decisions at fiduciary level are to ensure secure pension benefits. However, shareholder (enterprise) view usually influences decision to minimize funding

Standalone Approach - Management of Pension Plan Risks

- Four simple steps to manage Pension plan 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 can we take?
    - — What value does it create?

Source: Towers Perrin, Implementing Enterprise Risk Management brochure, 2006

Standalone Approach – Managing DB Plan Funding Cost Volatility Risk *(Illustrative)*

- Funding Cost Volatility Risk
  - **Identify**
    - — Significant volatility in free cash flow when least affordable
    - — Pension committee's responsibility with management input
  - **Quantify**
    - — Evaluate potential economic and demographic scenarios
    - — Determine funding cost level at selected confidence levels
  - **Solve**
    - — Select Liability Driven Investment to minimize funding volatility
    - — Understand cost of implementing short and long term strategy
  - **Execute**
    - — Implement strategy using least cost approach
    - — Determine impact on enterprise financial statements

Standalone Approach – Managing DC Plan Design Risk *(Illustrative)*

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

Collaborative : Pension Plan and Impact on Enterprise

- The pension plan is separate and apart from the company, however, it has a material financial impact on the enterprise.
  - The result is that management / board are increasingly concerned and financial risks are being coordinated
- The impact on the enterprise varies significantly across industries / companies based on :
  - — **Size of pension plan relative to enterprise value**
  - — **Level of funding contributions relative to free cash flow**
  - — **Impact of pension plan on earnings**
  - — **Maturity of pension plan (ratio of active and inactive liabilities)**
- Pension accounting standards require disclosure of pension expense on income statement and funded status on balance sheet
  - 'mark to market' disclosure increases volatility and materially impacts Free Cash Flow and Earnings per Share

Collaborative: Pension Plan relative to Enterprise (*Illustrative)*

Sample Company	MC	PP Assets	PP Liability	PP Funded Status	Ratio of PP Liability to MC
Energy X	40,000	233	263	(30)	0.006
Industrial Y	5,700	6,118	7,068	(950)	1.240
Financial Z	54,000	5,826	6,214	(388)	0.115

Notes:

1. Numbers are in $millions unless indicated
2. Source: Financial disclosure information in the public domain
3. PP : Pension Plan ; MC : Market Capitalization (proxy for Enterprise Value)

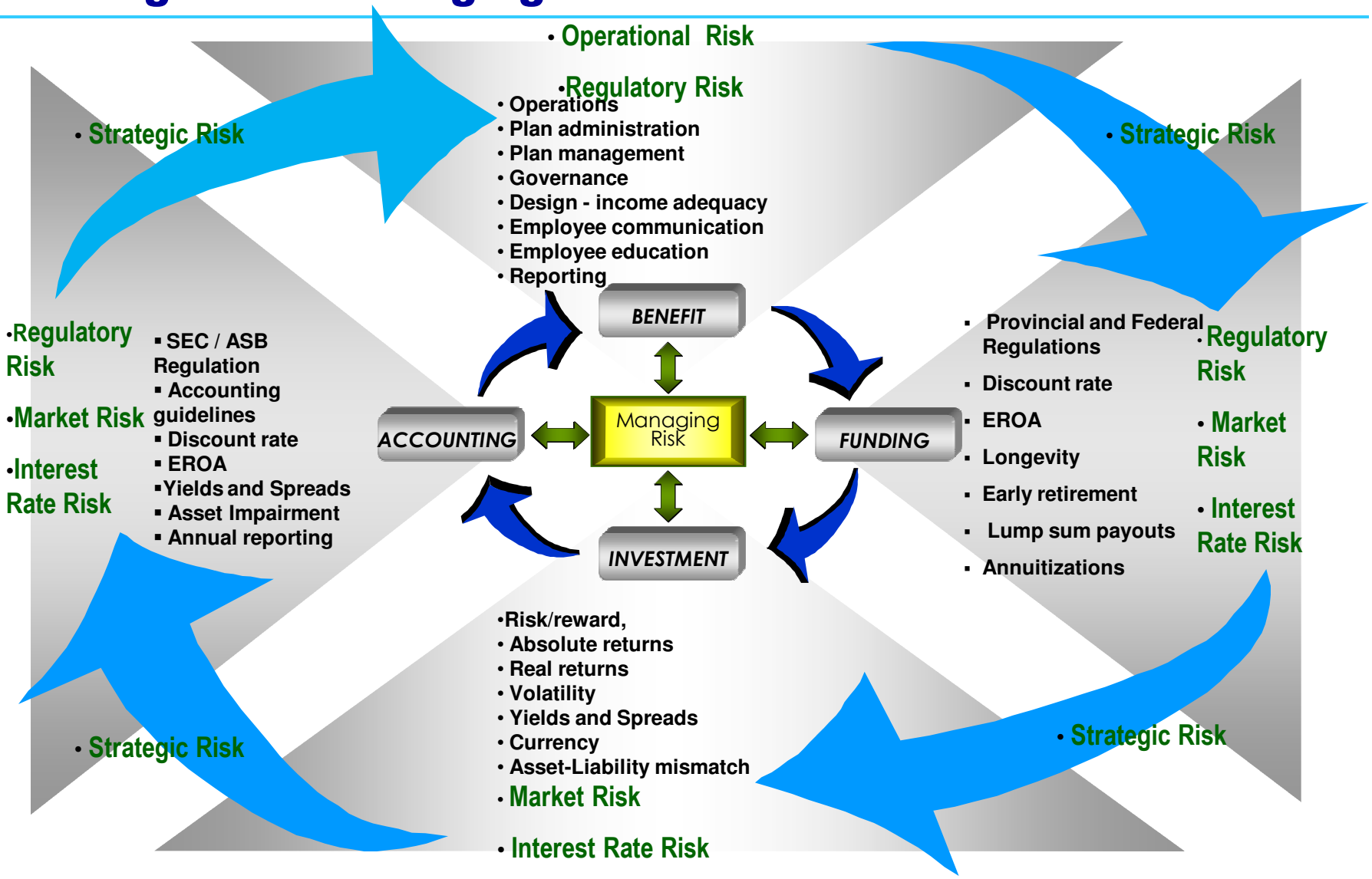
Collaborative: Pension Plan relative to Enterprise (*Illustrative)*

Sample Company	EPS	PP EPS Impact	Free Cash Flow	PP Funding	Ratio of PP Funding to Free Cash Flow
Energy X	7.9	--	383	8	0.02
Industrial Y	4.0	(0.6)	117	96	0.82
Financial Z	3.4	(0.2)	11,086	280	0.02

Notes:

1. Source: Financial disclosure information in the public domain
2. PP: Pension Plan ; EPS : Earnings Per Share

Integrated - Managing Pension Risks



Integrated: Process to integrate PRM with ERM

1. Define and confirm pension and enterprise risks
   - Key risk domains at enterprise level: Strategic, Financial, Operational, Legal ,Regulatory , Hazard , (Reputation)

2. Consolidate pension risks with other enterprise risks with similar risk characteristics
   - Have a better understanding of exposure and risk correlations
   - Look across risk silos to better evaluate risk / reward profile

3. Identify risks that can be effectively and efficiently managed

4. Prioritize risks (opportunities) that the enterprise will exploit, finance, or mitigate
   - Difficult to address all risks – implement incrementally

5. Implement risk strategies in accordance with strategic business goals

6. Monitor risk polices and control procedures
   - Establish sound governance and robust risk metrics

Summary - Approaches to PRM with ERM

The approach will depend on:

- Form and structure of the Pension Plan (single employer versus multi-employer) and governance
- Size of pension plan relative to enterprise value
- Disclosure to stakeholders of pension information on income statement and funded status on balance sheet
- Impact of 'mark to market' accounting disclosure
- Level of funding contributions relative to free cash flow
- Impact of pension plan on enterprise earnings
- Maturity of pension plan (ratio of active and inactive liabilities)

Pensions in an Economic Capital Model

- Different definitions of Capital at Financial Institutions
  - Required: Capital to support the business
  - Regulatory: Capital Required by regulators to support the business
  - Economic: Capital to ensure that the business is solvent over a prescribed time horizon at a pre-determined likelihood

- Primary Drivers for measuring Economic Capital:
  - Allocation of Capital and enterprise risk budgeting
  - Measurement of risk adjusted performance
  - Making strategic or tactical decision
  - Good business practice
  - Stakeholder reporting

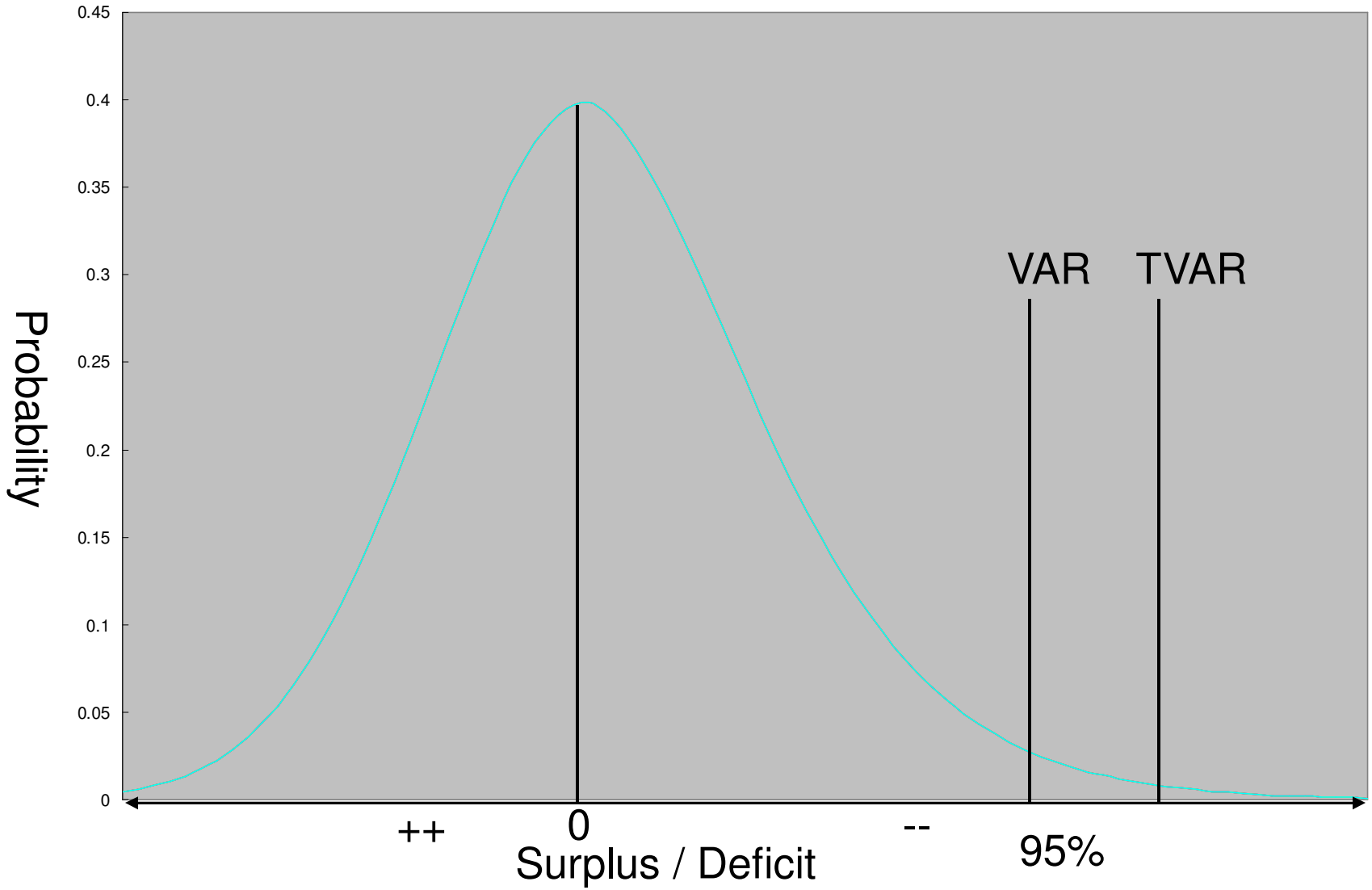
Pensions in an Economic Capital Model

- "Capital" for Pension Plans
  - Surplus / Unfunded : Excess of Assets over Liabilities
    — Going-concern, Solvency, Accounting, Target (Economic)
  - Required/Regulatory: 100%(?) funded on a going-concern, or solvency
  - Reporting: based on prescribed accounting principles
  - Economic: Account for use of economic and business principles, variation in economic scenarios, asset performance, liability experience and margins for adverse deviations

Pensions in an Economic Capital Model

- Economic Capital measures
  - Value at Risk (VaR), Conditional Tail Expectation (CTE, or TVaR)
    - — VaR – Capital to remain solvent at a pre-determined confidence level
    - — TVaR– Expected value of all losses exceeding the pre-determined confidence level
- Approaches
  - Liability Runoff :
    Level of assets required to pay all beneficiaries on a pre-defined measure of liabilities at a chosen confidence level over the life of the pension plan
  - One Year Mark to Market:
    Level of assets less liabilities needed to cover a fall in market value of assets over a one year time horizon at a chosen confidence level

Economic Capital : Value at Risk, Conditional Tail Expectation, (Illustrative)

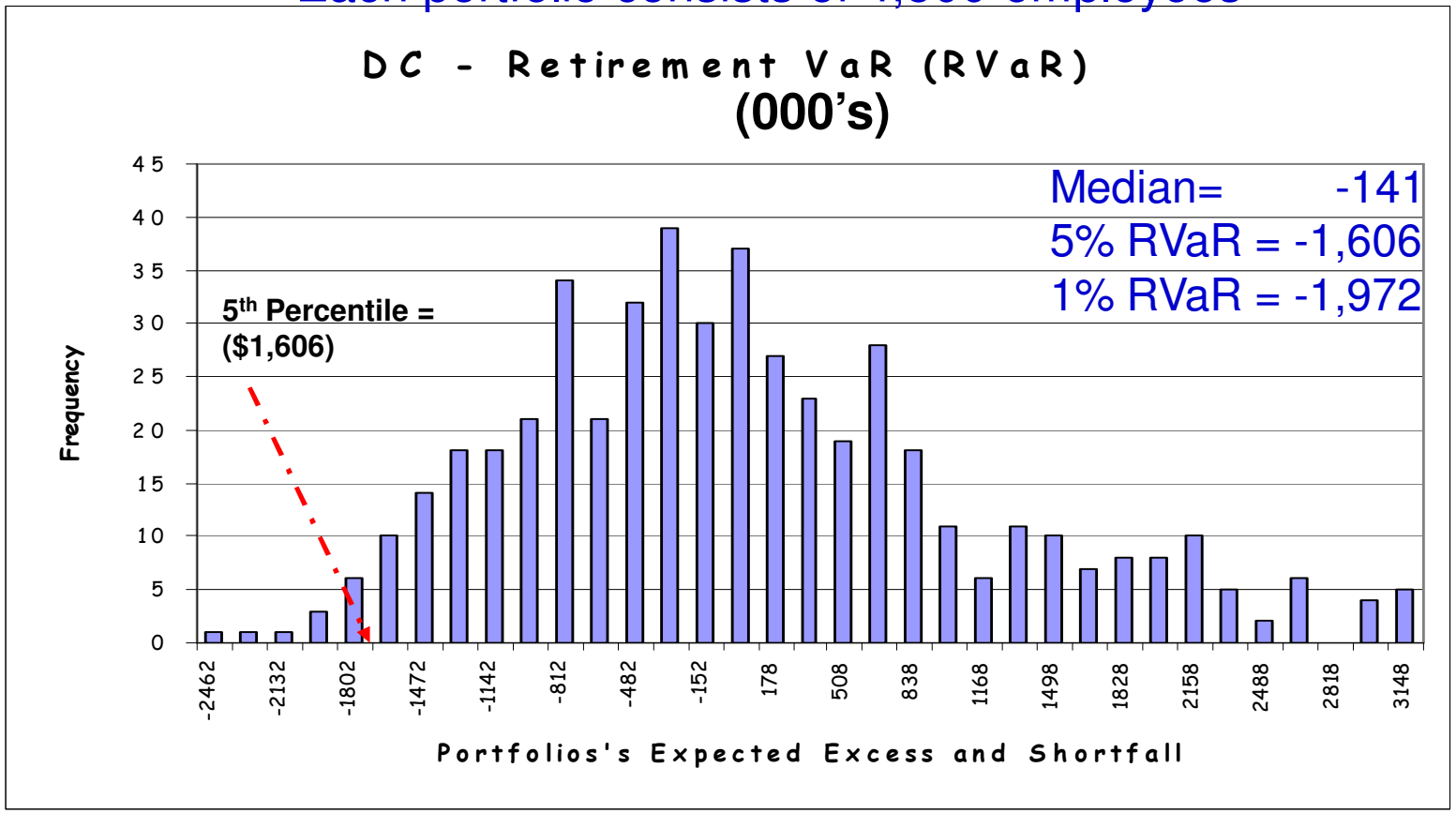


Pensions in an Economic Capital Model

- More on VaR
  - Summary measure of the downside risk expressed in dollars (other downside risk measures: Semi-standard deviation)
  - General definition:
    - — Maximum loss over a target horizon such that there is low pre-specified probability that the actual loss will be larger
    - — What will be the maximum deficit for a plan sponsor over the lifetime of the plan (over a one year horizon) at a confidence level of 95%?
    - — Note : CFAR- Cash Flow at Risk is also a useful measure to measure the shortfall in cash flow due to unfavorable risk factors
- VaR caveats
  - VaR does not describe the worst loss : we expect a loss greater than VaR at least “p” out of 100
  - VaR does not describe the losses in the tail : the tail may have a different distribution
  - VaR has measurement errors: different data samples, and statistical simplification will lead to different VaR

DC "Economic Capital" Retirement VaR (Illustrative)

Each portfolio consists of 4,500 employees



The "shortfall" is determined for each employee by comparing the results of a stochastically simulated employee account against an account determined on an pre-determined target rate of return.

Measurement – Quantitative versus Qualitative

- Quantifying Risks using 'normalized' and simple models may not be possible :
  - Simple model may not represent the true underlying distribution
  - Complex model may be required and this may be difficult to justify
  - Lack of data to simulate and generate usable distributions
- Quantitative
  - Simulation – analytical/parametric, historical, Monte Carlo
  - Non-parametric – rank correlations
  - Tail distributions – extreme value theory
  - Causal models – Bayesian
  - Multivariate models – Copula
- Qualitative
  - Heat maps
  - Decision tree analysis
  - Delphi studies
  - Stress testing
  - Scenario analysis

Pension Plan within ERM
Case Study (Optional)

- ABC is a public company in the transportation sector
  - — Total assets : $15.5b
    Current assets: $1.1b
  - — Shareholder equity :$6b
  - — Net Income: $0.61b
    Other Comprehensive Income: $0.04b
  - — Cash flow from Operations: $1.1b
    Cash at year-end: $0.12b
  - — Shares issued : 154m
  - — Earnings per share : $4/share (rounded)
  - — Market Capitalization : $5. 7b

Source: Financial statements of a publicly traded company

Pension Plan within ERM
Case Study

- ABC sponsors defined benefit, defined contribution and post retirement benefit plans and for their employees
  - The following summarizes the financial information on these plans:
    - — Pension assets : $6.1b
    - — Accounting liabilities:
      Pension plan : $7.1b
      Post retirement benefit plan: 0.4b
    - — Accounting expense:
      Pension cost : $41m
      Benefit cost : $55m
      Note: there was a net gain in the pension cost of $1.2 b due to change in year-end discount rate
    - — Funding contribution – registered (previous year): $90m
      Other contribution – benefit plan (previous year): $42m
    - — Accounting current service (previous year) : $97m

Source: Financial statements of a publicly traded company

Pension Plan within ERM Case Study

- Additional Pension Plan information
  - Asset Allocation:

	Policy Range	Actual Mix
Equity	45 – 51 %	42 %
Debt	37 – 43 %	45 %
Real Estate /Infrastructure	8 – 16 %	13 %

  - The company's investment strategy is to earn a long term nominal rate of return of 8.0% per year based on a real return rate of 5.5 % (net of expenses) and inflation of 2.5% per year

Source: Financial statements of a publicly traded company

Pension Plan within ERM
Case Study

- Risk Management
  - "The company has an integrated Enterprise Risk Management (ERM) framework to support consistent achievement of business objectives through daily pro-active management of risks"
  - The company has identified the following business risks:
    - — Its supplier contract for raw material is expected to expire during the year. The curtailment , or lack of a satisfactory contract would have a material adverse impact on the company
    - — The cost structure of the competitors could impact the price charged and thereby reduce profitability. Risk mitigation includes cost control and improving quality of service
    - — Rating is BBB from S&P and other rating agencies. Revolving credit lines are available in excess of $1b

Source: Financial statements of a publicly traded company

Pension Plan within ERM
Case Study

- Risk Management continued
  - The company has identified the following business risks:
    - — Violation of environmental laws could materially impact the business and operating results. Special programs are in place to address emissions, waste management, vegetation, storage tanks and refueling facilities.
    - — The operations are subject to extensive federal laws in US and Canada with regards to health, safety, security, environmental, shipper rates and completive line rates. Legislation is pending in the US to establish fair competition for small and medium size competitors.
    - — The company plays a critical role in transportation, including carrying hazardous waste, therefore it could become a target for terrorist attacks. Insurance premiums for coverage could increase dramatically, or coverage could be terminated

Source: Financial statements of a publicly traded company

Pension Plan within ERM Case Study

- Risk Management continued
  - The company has identified the following business risks:
    - — The company has certain union contracts under negotiation. Work stoppage could occur if the negotiations are not resolved. 78% of workforce is unionized and 73% of the workforce is in Canada.
    - — There are significant transportation capacity / volume issues. There is substantial current investment in infrastructure, however, here is limited ability to increase capacity / volume in the short term.
    - — Financial Risks:
      - – Pension plan - There is significant volatility in the pension funding contribution
      - – Fuel Cost volatility – this accounts for a significant portion of the operating costs
      - – Foreign Exchange – a significant portion of business is undertaken in the US

Source: Financial statements of a publicly traded company

Pension Plan within ERM
Case Study

- Risk Management continued
  - — Financial Risks:
    - – Interest rate – in order to meet long term capital requirements, the company enters into long term contracts. The risk is mitigated by entering into forward rate agreements, or swaps
  - — General and other risks – there are other factors and developments that are beyond the influence and control of the company that could materially impact operations and business results.

Source: Financial statements of a publicly traded company

Pension Plan within ERM
Case Study

1. Volatility in funding contributions was identified as one of the key company risks

a) How would you consolidate pension risk with the company's integrated risk management framework?

b) What specific financial analysis would you undertake to support your process in a) above?

c) How would you open discussion with management to better reflect pension risk in the company's integrated risk management framework?

d) How would you monitor the pension risk in the integrated risk framework on an on-going basis?

2. What are the challenges or barriers in incorporating pension into the company's integrated risk framework?

Ex:

a) fiduciary duty of Administrator

b) actuarial standards

c) actuary's skills, competencies, access to C-Suite

d) Others…

3. In general, what would plan sponsors value from an ERM/Pension Risk Management perspective?

a) What role should the actuary play to open the dialogue on risk?

b) What kind of questions should the actuary pose to plan sponsors?

c) What type of metrics the company might want to monitor going forward?

d) How can pension actuaries help plan sponsors create an ERM framework in their company?