Chapter 4

Risk Handling Techniques: Loss Control, Risk Transfer, and Loss Financing

RM Statement of Objectives and Principles

- Distinguish between pre-loss and post-loss objectives
- Pre-loss objectives
  - Survival and growth
    - Cash flow to fund stakeholders returns plus investments
  - Compliance with government regulations
  - Efficiency
  - Procedures and principles are implemented and followed

Risk Handling Techniques

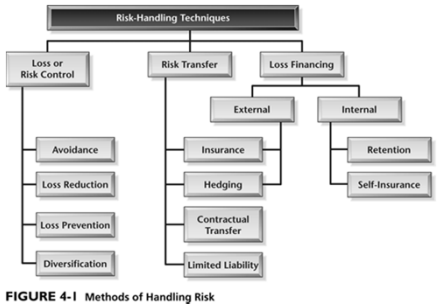

FIGURE 4-1 Methods of Handling Risk

TABLE 4-1 The Selection of Risk-handling Techniques, Based on Frequency and Severity

	Low Severity	*High Severity*
High Frequency	Self-insurance (for larger firms) and loss control	Avoidance (if possible) and loss control
Low Frequency	Risk assumption and loss control	Insurance and loss control

Selecting the Risk Management Technique

Severity	Frequency: Low	Frequency: High
Low	**Assume** loss prevention loss reduction	**Loss Prevention** loss reduction assume risk
High	**Insure** risk transfer loss reduction loss prevention	**Avoid** loss prevention loss reduction

Loss of Income

- Sources of Loss
- Problems
  - Can be seasonal in nature
  - Difficult to measure
  - Best measurement still can only be an estimate

Measure (evaluation)

- Frequency
- Severity
- Expected Loss
- Variance/standard deviation
- Maximum possible loss
- Maximum probable loss

Importance of Indirect Losses

- Large losses can cause indirect losses:
  - Lost profits
  - Clean-up costs
  - Costs of raising capital
  - Foregone investment opportunities
  - Bankruptcy costs
- Thus, reducing probability of large losses (MPL) can reduce indirect losses

Importance of Indirect Losses

- Main point: need to consider reduction in expected indirect losses when making risk management decisions
- Diversification does not change expected direct losses,
  - Reduces maximum probable loss
  - Therefore reduces expected indirect losses

Types of Loss Control

- Loss control:
  - Expenditures of time, money, or effort to reduce expected losses
  - Loss Prevention – reduce probability of loss
  - Loss Reduction – reduce severity of loss

Losses

- Loss Prevention:
  - Activities that prevent losses.
  - Must be cost-efficient.
  - Some losses will occur regardless. Hence:
- Loss Reduction
  - Aim is to minimize impact when losses occur.
  - Duplication and Separation.

Loss Control - Prevention

Always engage in, if beneficial

- Loss Prevention
  - Take various steps to ***reduce the probability*** of losses occurring
- How do you value the loss of life in the cost/benefit equation?

Loss Control - Reduction

Always engage in, if beneficial

- Loss Reduction
  - Steps designed to ***reduce the severity***
  - Take steps to reduce the damage before and after a loss

How Loss Control Affects a Probability Distribution

- How would the probability distribution for property losses change if
  - Install a sprinkler system?
  - Replace old wiring?
- Loss Distribution:

Property Losses for the coming Year	Probability
$1.000 million	0.01
$0.500 million	0.05
$0.250 million	0.10
$0.100 million	0.20

Cost – Benefit Analysis

- Should compare costs and benefits of loss control
- Identifying costs and benefits
  - Example: Safer work environment
    - What are the costs?
    - What are the benefits?

Cost – Benefit Analysis - Example

- Example:
  - Average Loss Severity = $20,000.
  - Total number of employees = 5,000

Safety Expenditure	Annual Accident Frequency per Employee	Expected Accident Costs per Employee	Total Expected Accident Costs
0	0.100		
500,000	0.080		
1,000,000	0.070		
1,500,000	0.066		
2,000,000	0.063		

Identifying Costs and Benefits in Practice

- Benefits of loss control can be difficult to estimate
- Can use historical data on your own firm
- Use industry data
  - Hire consultants, brokers
- Get estimates of insurance premium reductions
  - Brokers and insurers

Valuing Life

- Loss control decision may change the probability of death
- How do you value a life?
  - One approach: Use wage differentials for jobs with different probabilities of death
    - (actual studies are more complex)
    - Estimates: ~$5MM, range is $4-9MM

Valuing Life

- How do you value a life?
- Example:
  - Job 1 has .0002 higher probability of death on the job per year
  - Job 1 has $1,000 wage premium per year, holding all else equal
  - Employees willing to receive $1,000 for a .0002 increased chance of dying.
  - $1,000 = .0002 x (Value of Life)
  - ➔ Value of Life = 1,000/.0002 = $5 million

Diversification by Segregating Assets

- No segregation:
  - 1 plant worth $100 million,
  - Probability of complete loss = 0.05
  - Expected direct loss =

Diversification by Segregating Assets

- Segregation:
  - 2 plants each worth $50 million,
  - Probability of complete loss at each plant = 0.05
  - Outcome at each plant are independent of the other
  - What is the probability distr for total losses:
  - Expected direct loss =

Diversification by Segregating Assets

- Now assume an indirect loss equal to $10 million occurs if a $100 million direct loss occurs
  - No segregation ➔ expected indirect loss =
  - Segregation ➔ expected indirect loss =
- Main Point: diversification that reduces probability of high losses, can reduce expected indirect losses

Risk Transfer

- Methods:
  - Risk-bearing financial institutions – Take on financial risk for a fee
  - Contractual transfer agreements - transfers risk to another party
  - Hold harmless agreements - transfer of risk through a contract
  - Limited Liability – provided to the owners of certain types of business organizational forms

Loss Financing - 1

- Insurance:
  - Transfer of risk to an insurer for a premium
  - Appropriate when loss-frequency is low, but potential severity is high
  - Also has financial advantages: Tax Issues
  - Moral Hazard and Deductibles

Loss Financing - 2

- Risk Assumption
  - Deliberate decision:
    - Size of firm
    - Not always a choice
    - Funded Risk assumption.
  - Or not:
    - Ignorance?

Loss Financing - 3

- What is self-insurance?
  - Why do companies self-insure?
    - Save money
    - Better control
      - Loss prevention incentives
      - Improved claims settlement
      - Profitability and investment earnings
  - Difference between self-insurance and risk assumption

Captive Insurance Companies

- A method of self-insuring
- A company formed to write insurance for a parent company
- Motives for starting a captive
  - Save the overhead and profits of the insurance company
  - Earn investment income on the premium
  - Tax advantages

Government Safety Programs

- Examples:
  - OSHA
  - EPA
  - CPSC
- Why have safety regulations?
  - Firms may not consider all benefits of loss control if workers or customers are not fully informed
  - Avoids duplication of expenditures on safety research

Government and Loss Control

- Occupational Safety and Health Act of 1970 (OSHA)
- Consumer Product Safety Act of 1972 (CPSA)
- Comprehensive Environmental Response, Compensation Liability Act of 1980 (CERCLA) (Superfund)
- Food and Drug Administration (FDA)
- The Clean Air Act
- The Water Pollution Control Act

Government Safety Regulations

- Estimated costs and benefits of safety regulation
  (source: K. Viscusi, Pricing Environmental Risks, 1992)

Regulation	Passed	Agency	Cost per life saved (1984$ mill.)
Unvented space heaters	1980	CPSC	$0.10
Passive restraints/belts	1984	NHTSA	$0.30
Crane suspended personnel platform	1988	OSHA	$1.20
Grain dust	1987	OSHA	$5.30
Uranium mill tailings (inactive)	1983	EPA	$27.60
Asbestos	1989	EPA	$104.20
Arsenic/low-arsenic copper	1986	EPA	$764.00
Formaldehyde	1987	OSHA	$72,000.00

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Remember: Review and Update

- Regularly review and update the process
  - New assets or disposal of assets
  - Valuation changes
  - New products and processes, materials
  - New personnel
  - Law changes
  - Currency fluctuations
  - New contractual relationships