Risk treatment: introduction

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What is risk treatment?

**Risk treatment (ISO 73 standard)**

The process of selection and implementation of measures to reduce risk

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**From ISO 73 standard**
Risk treatment in practice

Risk identification
Risk treatment in practice

Risk identification

Risk analysis
Risk treatment in practice

Risk identification

Risk analysis

Risk treatment
Flow of this presentation

▷ Methods for risk treatment:
  • risk avoidance
  • risk modification
    • by reduction or containment (prevention, before-event)
    • by mitigation (protection, post-event)
  • risk sharing / transfer
    • diversification, hedging, insurance

▷ Not included in this module:
  • sector-specific risk treatment methods
Treating the financial components of risk

A firm can adopt several strategies to treat the financial component of a risk:

**Pass on**
Pass on risks to investors (stockholders, owners).

**Avoid**
Avoid the risk and reduce probability of loss to zero.

**Hedge**
Protect against the risk using hedging and insurance.

**Increase exposure**
Intentionally increase exposure to some risks because the firm feels it can control them better than its competitors.
Risk avoidance

▷ Eliminate the risky activity and reduce probability of loss to zero
  • cease activity, close facility, change business
  • example: *ban on genetically modified foods in EU*

😊 Also eliminates the benefits of the activity!

▷ Possible rationales:
  • **utilitarian ethics** (“the greatest good for the greatest number”): risk assessment suggests that costs of activity are larger than benefits
  • **precautionary principle**: after Hans Jonas’ *imperative of responsibility* (the promise of modern technology has turned into a threat of disaster: science confers to man previously unknown forces; responsible behaviour is that of long-term prudence)
Risk modification

▷ By **reduction** or containment
  - prevention, before-event
  - reduces the probability of the unwanted event
  - example: *safety valve which prevents buildup of pressure in a vessel*

▷ By **mitigation**
  - protection, post-event
  - reduces the severity of the event’s consequences
  - example: *sprinklers designed to put out a fire, to reduce damage caused by fire*

▷ The most common risk treatment option!
Risk transfer

- Transfer the financial consequences of the risk to someone else
  - obtain insurance against a fire
  - sell shares of my company on the stock market

- Contractual transfer of legal liability
  - exclusion clauses
  - outsourcing
  - partnerships & joint ventures

- Operational hedging
  - interruptible loads and load shedding in power systems

- Diversify the risk or absorb it internally
  - financial hedging

Note: employer is not legally allowed to transfer risk to health and safety of employees
What is Hedging?

Hedging: A risk management tool that is designed to limit exposure to risk as part of everyday business.

Hedging explained through a wheat farmer example:

1. A Farmer Prepares A Wheat Crop
   A farmer purchases fertilizer, fuel, seed and everything else necessary to grow a wheat crop.

2. Farmer Sets Target Price for Harvest
   Based on all his costs, the farmer determines a price he’d like to get for the wheat when he sells it to a local bakery at harvest time.

3. Farmer and Baker Consider Price Fluctuations
   The farmer is concerned that wheat prices will go down, and he won’t make enough to cover his costs. The baker is concerned that wheat prices will go up, and he’ll have to raise prices.

4. Farmer and Baker Use a Hedge to Reduce Risk
   The farmer and baker agree in advance to a set price for the wheat, regardless of the market price at harvest time.

5. The Hedge Manages Risk
   By creating a hedge, the farmer and baker managed the risk of fluctuating wheat prices. If the market price at harvest is higher than the set price, the baker benefits from the hedge. If the price is lower, the farmer benefits. In either case, the hedge protected both against the potential for serious losses.
Example: credit default swaps

Credit default swap: **insurance against bad debt**

- an agreement between two parties where the seller agrees to provide payment to the buyer in the event of a third-party credit event

- credit event:
  - default on a security
  - downgrade in credit rating
  - ...

- in return, the buyer makes a periodic payment to the seller
How much should we transfer?

▷ How do I decide how much risk to transfer?

▷ Depends on the organization’s risk appetite: the amount of risk — on a broad level — an entity is willing to accept in pursuit of value

<table>
<thead>
<tr>
<th>existing risk profile</th>
<th>The current level and distribution of risks across the entity and across various risk categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>risk capacity</td>
<td>The amount of risk that the entity is able to support in pursuit of its objectives</td>
</tr>
<tr>
<td>risk tolerance</td>
<td>Acceptable level of variation an entity is willing to accept regarding the pursuit of its objectives</td>
</tr>
<tr>
<td>attitudes towards risk</td>
<td>The attitudes towards growth, risk and return</td>
</tr>
</tbody>
</table>

Figure adapted from Improving Organizational Performance and Governance, COSO white paper available from coso.org
Expressing an organization’s risk appetite

▷ Define key performance indicators (KPIs) for all essential risks
  • will depend on risk type

▷ Determine “severity thresholds” for each risk type
  • which level of loss from an accident rates as “severe” for operational risk?
  • what extent of negative media coverage would be “severe” in terms of reputational risk?
  • which price fluctuations are “severe” for market risk?

▷ Decide whether the organization is the “natural owner” for each risk
  • can we achieve competitive advantages from taking on the risk, and generate attractive returns from it?

▷ Decide how to deal with those risks for which you are not a natural owner

▷ Decisions are linked to corporate strategy, should be made by organization’s board
How can risk appetite be expressed?

<table>
<thead>
<tr>
<th>Example risk-appetite matrix</th>
<th>Risk appetite</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk types</td>
<td>Overall</td>
</tr>
<tr>
<td>Credit risk</td>
<td><img src="image" alt="Credit risk" /></td>
</tr>
<tr>
<td>Market risk</td>
<td><img src="image" alt="Market risk" /></td>
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<tr>
<td>Liquidity risk</td>
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<td>Operational risk</td>
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<tr>
<td>Business risk</td>
<td><img src="image" alt="Business risk" /></td>
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</tbody>
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- Matrix to be prefilled by enterprise-risk-management function
- Risk appetite to be defined and aligned with board

How much should we transfer?

▷ One popular criterion is **maximization of expected utility**
  - “choose the option that most of the time leads to highest level of satisfaction”
  - reflects risk aversion or a tradeoff between expected outcome and the variance over that outcome

▷ Another popular criterion is the **“value at risk” (VaR)**
  - “probability of losing more than 10 M€ in the next 3 days should be less than 5%”
  - estimation of the probability that losses will exceed a specified amount

→ slides on VaR at risk-engineering.org
 ENTERPRISE RISK MANAGEMENT

▷ ERM is a risk-based approach to managing an enterprise, originating in accounting/internal control circles

▷ Developed by COSO organization (coso.org) in 2004

▷ A more modern framework for risk management is proposed by the ISO 31000 standard

Figure: the COSO ERM integrated framework
Example corporate risk-management process

1. **Insight and risk transparency**
   Do you have transparency across the range of risks that will affect your company’s future performance, and deep insight into the risks that matter the most?

2. **Natural ownership and risk strategy**
   Do you understand which risks your company is competitively advantaged to own and which you should seek to transfer or mitigate in order to meet your strategic corporate objectives?

3. **Risk capacity and appetite**
   Is your overall risk capacity aligned with your strategy? Do you have processes to ensure that you avoid being overextended or over-insured?

4. **Risk-related decisions and managerial processes**
   Are critical business decisions taken with a clear view of how they change your company’s risk profile?

5. **Risk organization and governance**
   Are the structures, systems, controls and infrastructure in place for you to manage risk and comply with regulatory requirements? Is your governance model robust?

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Continue with

- Slides on the economics of risk transfer, from risk-engineering.org/risk-treatment-decisions/

- Slides on the acceptability of risks, from risk-engineering.org/risk-acceptability-tolerability/

- Slides on value at risk (VaR), a measure of exposure to financial risk, from risk-engineering.org/VaR/

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