



# **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



from ISO 73 standard



### **Risk treatment in practice**

Risk identification





**Risk treatment in practice** 

Risk analysis **Risk identification** 



### **Risk treatment in practice**





# Flow of this presentation

RISK PEDUCE

- ▷ 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
- $\,\triangleright\,$  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**

- $\,\triangleright\,$  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!





Image source: Banksy

# **Risk transfer**

- $\,\triangleright\,\,$  transfer the financial consequences of the risk to some one 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
- $\,\triangleright\,\,$  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.



#### A Farmer Prepares A Wheat Crop

A farmer purchases fertilizer, fuel, seed and everything else necessary to grow a wheat crop.

#### 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.

#### 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. 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.



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 is, he 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
- $\triangleright$  credit event:
  - default on a security
  - downgrade in credit rating
  - ...
- $\,\triangleright\,\,$  in return, the buyer makes a periodic payment to the seller

Protection buyer							
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### 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

existing risk profile	The current level and distribution of risks across the entity and across various risk categories	
risk capacity	The amout of risk that the entity is able to support in pursuit of its objectives	determination of
risk tolerance	Acceptable level of variation an entity is willing to accept regarding the pursuit of its objectives	risk appetite
attitudes towards risk	The attitudes towards growth, risk and return	





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?
- $\,\triangleright\,$  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?
- $\,\triangleright\,\,$  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?





Source: Enterprise-risk-management practices: Where's the evidence?, McKinsey Working Papers on Risk, Number 53, 2014

### 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





### Example corporate risk-management process

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?

Risk governance and organization realignment

#### 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 ?

Core service lines in investment/ project risk, financial risk, operational risk, regulatory risk, and commercial risk (including hedging/trading, credit contract negotiation, pricing, and sourcing)

#### 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?

Corporate risk diagnostic (CRD)

> Integrated risk-return management (IRRM)

#### Risk culture

 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 overinsured?

> CFaR, VaR, capital structure review

#### 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?

Natural ownership of risk review





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- 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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