



# Willis

## **Enterprise Risk Management: The State of the Art**

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# Agenda

- Our focus is on the profession of Enterprise Risk Management
- **What do we know in principle?**
  - What is the **state of our knowledge**: our most sophisticated understanding of how to measure, model, and manage a firm's aggregate risk
- **What do we do in practice?**
  - What is the **state of our practice**: how do firms in fact measure, model, and manage their aggregate risk?
- **What are the pitfalls?**
  - What are the **gaps between what we know and what we do?**

# Introduction

Our focus is on **pitfalls** -- **gaps** between **what is known** (in principle) and **what is in fact done** in implementing ERM

- We identify **a few** of the **key steps in implementing ERM** in a firm
- We then describe **the pitfalls at each step**
- In particular, we **focus on pitfalls that can dramatically affect the conclusions obtained and the actions consequently taken**
- Errors in these fundamentals make ERM **worse than useless** – they can make it **misleading**

## **Part I: Building Blocks for ERM**

# Step 1: Goal specification

## **Goal specification: Establish a clear and specific purpose for implementing ERM**

Covey, *Seven Habits*: “Begin with the end in mind”

Historical example: Dynamic Financial Analysis

- We developed these very comprehensive and complex financial models, at great cost, to answer our questions
- Does anyone remember the questions we set out to answer?

# Pitfall 1a: Denial

## **Pitfall 1a: Denial that ERM is different from current practice**

- Consequent denial of a need to do anything more or different
- “We do ERM all the time, every day. We just don’t do it formally and we don’t call it ERM. But that’s what it is.”
- “We don’t take any risk, so we don’t need to do ERM”

# Pitfall 1a: Denial

**Here is a test: You ARE indeed doing ERM if you have coherent & specific answers to questions like these :**

- How much risk is your firm taking (give me a specific number)?
- Is it taking more risk or less risk than a year ago? How do you know?
- Has your investment risk increased or decreased during the past three months? How do you know?
- How much investment risk are you taking relative to your underwriting risk? How do you know?
- Do you have the right amount of capital to support the risk you are taking? How do you know?

**If you can't answer, you aren't doing ERM**

## Pitfall 1b: Setting infeasible goals

- “I just want to get through my next meeting with A. M. Best (and/or S&P). Tell me what I need to say.”
- “We meet with A. M. Best in four weeks. How can we implement ERM between now and then?”

# Goal specification: Why do ERM?

**AN AUDIENCE SURVEY (you must vote on one or more):**

**What is the goal of ERM at your firm?**

- a. Getting a better handle on risk
- b. Getting rid of internal silos
- c. Making the board more confident that we are managing risk
- d. Making someone directly responsible for managing risk
- e. Complying with Sarbanes-Oxley and COSO principles
- f. Making more effective use of our capital
- g. Making better decisions
- h. Maintaining our financial ratings
- i. None of the above

# More goal specification pitfalls

- 1c. Goal **lacks specificity**: how will you know if it is achieved?
- Getting a better handle on risk (“better handle?”)
  - Making more effective use of our capital (“more effective?”)
  - Making better decisions (meaning of better? What decisions?)
- 1d. Goal **focuses on process, not objective**
- Getting rid of internal silos (for what purpose?)

# More goal specification pitfalls (continued)

## 1e. Goal **is really a means** to some other unspecified objective

- Making someone directly responsible for managing risk
  - Isn't that a CEO/CFO/CUO/CIO job?
- Making the board more confident that we are managing risk

## 1f. Goal **confuses ERM with other objectives**

- Maintain our financial rating (see 1b)
- Compliance (SOX)
- Controls (COSO)
- Power (legal versus accounting versus actuarial versus CFO)

# Goal specification: Conclusions

## Our candidate for a clear and specific purpose for ERM:

- **To manage risk and capital so as to maximize the value of the firm to its stakeholders**
- **So defined, ERM has implications for both public and private firms re:**
  - A firm's mix of business
  - The nature of its reinsurance program
    - Attachments/retentions
    - Limits
    - Contractual specifications
    - Consistency and coherence across different lines of business
    - Sustainability over multiple time periods (more on this from Raj)
    - How different reinsurance contracts fit together
    - The level of the firm's combination of surplus and reinsurance
  - Dividend policy
  - Stock Buybacks
  - Mergers and acquisitions

## Goal specification: Conclusions (continued)

This goal (maximizing the value of the firm to its stakeholders)

**assumes agreement on a model of the value of the firm**

- Why not an explicit model rather than an implicit model based on executive intuition?
- Such a model will surely incorporate the following variables:
  - The economic value of the firm's current balance sheet
  - The present value of the firm's future potential income
  - The risk that the firm's future potential income will not be achieved, due to downgrades, impairment or insolvency

*Reference: Panning, Managing the Invisible*

## Step 2: Risk identification

### **Step 2: Risk identification: systematically identify the principal risks to which your firm is exposed**

The principal risks will typically be the following:

- Underwriting risk
- Reserve development risk
- Fixed income risk (including default risk and credit spreads)
- Equity risk
- Credit risk (receivables and recoverables)

## Pitfall 2a: Too many risks

### **The winner is the firm with the most risks**

- **“As of today we have identified some 175 risks to which our firm is exposed.” – an ERM staffer at a major firm**

When risks are narrowly defined, correlations become a problem

Narrowly defined risks invite inappropriate micromanagement

ERM should be strategic, not tactical

## Pitfall 2b: Failure to distinguish financial vs. other risks

- Financial risks are those whose potential damage can be reduced by having additional capital
  - They can also be managed in other ways
- Non-financial risks are those whose potential damage is unrelated to available capital
  - Reputational risk
  - Criminal activity
- **Financial risks** raise the question of appropriate **capitalization**
- **Non-financial risks** raise the question of appropriate **controls**

## Step 3: Risk Definition

Risk Definition: adopt a clear, understandable, and universal definition of risk that can be applied to all of a firm's **financial** risks

Value at Risk (VaR) was the first widely used risk definition

- Create scenarios
- Rank scenarios by loss magnitude
- Specify threshold scenario by percentile (e.g., 99<sup>th</sup> percentile)
- Then 99<sup>th</sup> percentile loss is the 99% VaR

## Pitfall 3a: Select a risk definition that is difficult to understand

- Standard deviation is a widely used measure of risk
- So is the variance, which is the square of the standard deviation
- For a set of numbers, the variance is (their mean squared value less their squared mean value)
- And the standard deviation is the square root of that number
- Got that?
- Willing to explain that at the next employee meeting?

## Pitfall 3b: Select a risk definition that is irrelevant

- In contrast to Standard Deviation or Variance, VaR seems readily understandable and explainable
- But it has a problem: combining two portfolios can result in a higher VaR than either portfolio taken separately
- This is rare, but makes some people reject VaR as “incoherent”
- They advocate using Tail VaR or TVaR, which is the average loss exceeding some specified percentile: How big is the average loss when that loss exceeds the 99<sup>th</sup> percentile?
- It is not clear that TVaR matters or should matter. Suppose this number goes up for our firm. Should we care? Why?

## Pitfall 3c: Ignoring the effect of time horizon

- Quantitative risk measures evolved in banking, where the **time horizon** for risk management was short: typically **overnight**
- In insurance, the typical horizon for risk management is **a year**
- Most ERM calculations focus on risk measures calculated **at the end** of this one year horizon.
- But there are some scenarios – especially for equities – that can have substantial losses during the year but end well.
- But since equities are marked to market, the possibility exists that **intra-year losses may result in downgrades or impairment**
- **An appropriate risk measure should reflect this**
- **Example: have VaR reflect the X% worst intra-year loss**

## Pitfall 3d: Ignoring the effect of strategy

- When the implicit time horizon of a risk measure is very short, as in overnight, there are only two variables that determine a firm's risk profile: its portfolio of assets and liabilities, and the volatility of each
- When the time horizon is longer, as in a year, **strategy becomes an additional variable**
  - Example: few CEO's will simply sit still for a year and watch their equities plummet in value.
- **Our ERM models should reflect the potential reactions of management to changing circumstances**

## Pitfall 3d: Ignoring the effect of strategy (continued)

### Different strategies can have great impact on firmwide risk

- Example: three portfolio managers with initially identical portfolios: 50/50 stocks and cash
- Three different strategies: buy and hold, momentum (buy as market rises), buy low sell high (buy as market falls)
- Under real and simulated market conditions, the three strategies have different returns and risks
- Buy and hold is always in the middle, in both return and risk
- **Returns are highest**, on average, but **not by much**, for buy low sell high
- **Risks are highest, by a lot** for buy low sell high (VaR is 3x VaR for momentum strategy)
- Sharpe ratio (of return to risk) is far greater for momentum strategy
- Reference: Panning, *Strategic Uses of Value at Risk* (NAAJ)

## Pitfall 3d: Ignoring the effect of strategy (continued)

### Implications:

- Most ERM projects would consider the three portfolios as having identical risks, since their initial composition is identical
- They would be wrong, since they ignored the effect of differences in portfolio strategy
- They would be wrong by a factor of three or more, depending on the percentile chosen for the risk measure used

**Conclusion: a good risk measure should reflect strategy**

**Further crucial implication: one great potential value of ERM lies in identifying strategies than can reduce firmwide risk**

## Pitfall 3e: Ignoring the limitations of strategy

**Although strategies are important, there are circumstances in which they cannot be executed as assumed**

- The typical problem is that something that one assumed could always be bought (a hedging instrument) or sold (a security) becomes illiquid
- Even Treasuries can become illiquid, as occurred on and after August 17, 1998, when Russia defaulted and LTCM began to hemorrhage
- Sometimes even basic trading info is unavailable, as on October 19, 1987, when the NYSE deliberately unplugged its feed to the Chicago exchanges

**Conclusion: although ERM should reflect strategy, it should also reflect limitations on the ability to execute strategy**

## Pitfall 3f: Select a risk definition with an arbitrary percentile

- So VaR is looking good. It's simple and seems relevant.
- But it is arbitrary. What percentile should one pick?
  - The 95<sup>th</sup>, the 99<sup>th</sup>, the 99.9<sup>th</sup>?
  - How should one choose?
  - Note: this same question applies to TVaR as well.

## Pitfall 3g: Restrict yourself to a single risk definition

VaR is a reasonable risk definition for comparing different risk categories (e.g., investment vs. underwriting risk) or for tracking single risk categories over time (has investment risk increased?)

But for the firm's **aggregate** risk, it may be better to use multiple measures of risk with meaningful percentiles (see next slide)

## Pitfall 3g: Restrict yourself to a single risk definition (cont.)

Example: Given the firm's capital and its aggregate loss profile, what is the probability of a loss that would lead to

- a **one-notch downgrade**?
  - a **two-notch downgrade**?
  - **prolonged impairment**?
  - **insolvency**?
- Note that these are VaR-type measures, except that instead of choosing a probability and determining the associated loss, we are instead choosing the loss and determining the associated probability. **Neither the loss nor the probability are arbitrary.**

### 3. Conclusions concerning risk definition

Use VaR for comparing different risks at the same point in time

Use VaR for comparing the same risk over time

**For the firm as a whole, use multiple VaR-type measures of risk that have particular meaning for the firm and can be incorporated into the firm's value model**

- The would be probabilities of losses than exceed particular thresholds critical to the value or survival of the firm
- The value of the firm can be thought of as the present value of cash flows from an enormous number of possible scenarios that realistically incorporate possible downgrades, impairment, and insolvency.
- This has implications for reinsurance programs: moderate losses may be as important as extreme losses, since they occur more often and can reduce the firm's revenue opportunities

### 3. Conclusions concerning risk definition (continued)

By creating an explicit model of the value of the firm, one can also ask – and answer -- whether adding capital or purchasing more or different reinsurance would change the value of the firm (by changing these probabilities).

**Conclusion: the chosen risk definition should be consistent with the goal of ERM to maximize the value of the firm**

**(This last point should illustrate the recommendation to “begin with the end in mind”)**

# Summary so far: Pitfalls to be avoided

## 1. Goal specification

1a: Denial that ERM is different from current practice

1b: Setting infeasible goals

1c. Choosing a nonspecific goal

1d: Goal focuses on process rather than on objective

1e. Goal is really a means to some other objective

1f: Goal confuses ERM with some other objective

## 2. Risk Identification

2a: Too many risks

2b: Failure to distinguish financial vs. other risks

# Summary so far: Pitfalls to be avoided (cont.)

## 3. Risk Definition

3a: Select a risk definition that is difficult to understand

3b: Select a risk definition that is irrelevant

3c: Ignore the effect of time horizon

3d: Ignore the effect of strategy

3e: Ignore the limitations of strategy

3f: Select a risk definitions with an arbitrary percentile

3g: Restrict yourself to a single risk definition

# Summary so far: positive lessons

- Base your ERM on an aggressive and appropriate goal
  - Such as maximizing the value of your firm to its stakeholders
- Construct an explicit model for achieving that goal
  - Example: an explicit model of the firm's value
- Choose risk measures that are meaningful for your firm
- Incorporate events that can occur during the time horizon

## Summary so far: positive lessons (cont.)

- Incorporate in your analysis **managerial strategies**: the potential reactions of management to changing circumstances
- Where feasible, use ERM to **identify** managerial strategies that can assist in reducing firmwide risk
  - Reference: Panning, *Managing Interest Rate Risk: ALM, Franchise Value, and Strategy* (CAS Syllabus paper)
- Choose risk definition consistent with your goal for ERM
- Use **multiple meaningful risk measures**, as appropriate

## **Part II: Modeling – using the building blocks**

## Step 4: Definition of Firm Value

- What is the “value” of the firm that is to be measured?
  - Underwriting gain
  - Economic gain
  - Net income
  - Statutory Surplus over 1 year or 5 years
  - GAAP Net Worth
  - Stock price

## Step 4: Definition of Firm Value (cont.)

- Our view is that firm value consists of two parts
  - Economic value of current balance sheet
    - Market value of assets
    - Economic value of liabilities
  - Franchise Value
    - Risk adjusted present value of future earning
    - Franchise value is the present value of future business including business not yet written
- Maximizing firm value on make sense when value is defined to include franchise value

*Reference: Panning, Managing the Invisible*

## Pitfall 4: Only looking at the Balance Sheet

- Current practice tends to focus on understanding the risk to the current balance sheet or looking at the balance sheet one year forward
  - Legacy of regulatory solvency concern
- The balance sheet represents the sum of value and risks associated with all the past decisions of the firm
  - We can work to identify and measure past risk but can't change
- Franchise value is the only portion of firm value that can be affected by implementing and changing firm strategy
  - Franchise value not only can be measured but can be managed
  - View firm as going concern

## Pitfall 4: Limitations of Balance Sheet Centric View

- For stock companies, market valuation is often in excess of book value or even asset value
  - stock value reflects future earnings, earnings growth, and risks
  - many mutual companies have existed for many decades thus exhibit strong franchise value
- Accounting rules often make looking at book surplus misleading
  - Lack UPR equity hides value of profitable growth
  - Not reflecting future growth strategy makes evaluating current capital adequacy difficult
    - Reserve growth and investment growth trail premium growth

## Pitfall 5: Misunderstanding Reserve Risk

- Much work is being done on measuring the degree of risk in the loss reserves of insurance companies
- However, understanding how reserve risk relates with other risks and ultimately impact firm value is not often well reflected in ERM models, particularly one period models
- Current practice tends to put Reserve risk in a separate silo from the rest of UW risk
- *Reserving is simply pricing “after the fact”*

## Pitfall 5: Reserve Risk Over Time

- Reserves have risk characteristics that span a greater than one year time horizon and are intimately tied to the current pricing environment
- Adverse reserve development does not happen independently across all accident years
  - If one AY develops, chances are other AY's affected as well
  - Risk to capitalization is far greater than the impact of one AY's worth of potential loss development
- Recent AY's often are estimated using same information used in prospective pricing, e.g. use of ELR based reserving methods
  - Strong dependence of risk in prospective losses and reserves

## Pitfall 6: Pricing Risk and the UW Cycle

- Prospective premiums often least analyzed portion of ERM models
- However, much of variation in historical operating results can be tied back to pricing movements
  - Outside of natural catastrophes and extreme events
- Need to measure and model components of premium movements
  - exposure changes
  - rate per exposure changes
  - relationship to macro economic variables

## Pitfall 6: Loss Ratio Modeling

- Many modeling exercises look at UW risk by modeling loss ratio distributions
  - Loss ratios reflect loss and premium volatility
  - Better to separate the two components
  - Otherwise UW cycle variations confused for true loss volatility
- Also correlations between line of business often measured by statistical correlation matrices of historical loss ratios by line
  - Captures “loss correlation” between lines that have little expected relationship, e.g. personal auto and WC
  - Probably due more to common management view of market competition resulting in similar pricing levels in disparate business units

# Pitfall 7: Total Firm Risk and Granularity of Modeling

- Is there “conservation of risk” in our modeling?
- Should we get more or less risk if more granularity is used?
  - Summary net losses vs explicit reinsurance modeling
  - Level of asset class specification
  - Multiple lines, sub-lines, and loss types (e.g. cat vs small losses)
  - Correlation
- How do we keep concept of total risk meaningful when comparing the custom models of different firms?
- In tactical decision making (e.g. asset or reinsurance analyses) often said to be okay to keep other risk modeling to a minimum and look a change in marginal risk
- However for ERM must have some level of consistency  
*Can't change the firm wide risk by changing complexity of model*

# Conclusion

- Our objective has been to describe some important pitfalls in implementing ERM
  - Pitfalls in selecting the fundamental building blocks
  - Pitfalls in using them to model the firm and its risks
- We have focused on only a few of the essential steps needed to implement ERM
  - There are many more steps, and thus many more pitfalls
- We believe that the steps discussed here are fundamental
  - Getting these wrong makes subsequent steps far less useful