Risk Management

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- Dipl. Hydraulic Engineering
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What is Risk?

• Risk (in finance) is interpreted as the statistical (mathematical) possibility of incurring unforeseen financial losses, above and beyond expected, as changes occur in the environment (economy, etc.) which affect the value of one’s assets (also known as investment at risk)
Risk Management - Definition

• Risk management is the profession (meanwhile an entire industry) which deals with the estimation (quantification) of risk and employs techniques to mitigate or limit excessive risks
Types of risks (example)...

- **Market Risk** - risks attained from adverse changes in market parameters such as interest rates, foreign exchange rates, equity prices or indexes, commodities, etc.

- **Credit Risk** - risks attained from the failure of counterparties to respect their contractual obligations (loan losses, settlements, issuer defaults, bankruptcies, etc.)
…Types of risks (cont’d)

• Business risks: - risks attained from unforeseen environmental changes (ex. Competitive forces) causing an economic entity’s drop in earnings beyond a forecasted trend

• Operational risks: - risks relating to unforeseen failures such as fraudulent activities, systems failures (IT, technology), natural phenomena (catastrophes) or unexpected changes in legal / regulatory environments
The Risk Management Industry / Profession

• Risk management & risk control units in banks, insurance/ re-insurance companies, other financial or non financial enterprises
• IT departments in charge of providing (maintaining) IT systems geared to support risk professionals
• Research departments or firms in charge of developing/ refining analytical tools to quantify risks
• Software providers, business consultants
Lessons learned from recent financial disasters

• Losses attributed to Derivatives (1993 through 1999)

<table>
<thead>
<tr>
<th>Corporation</th>
<th>Date</th>
<th>Instrument</th>
<th>Loss ($mill)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orange County, CA</td>
<td>1994</td>
<td>Reverse Repos</td>
<td>1.810</td>
</tr>
<tr>
<td>Showa Shell Sekiyu, Japan</td>
<td>1993</td>
<td>Curr. Forwards</td>
<td>1.580</td>
</tr>
<tr>
<td>Kashima Oil, Japan</td>
<td>1994</td>
<td>Curr. Forwards</td>
<td>1.450</td>
</tr>
<tr>
<td>Metallgesellschaft, Germany</td>
<td>1994</td>
<td>Oil Futures</td>
<td>1.340</td>
</tr>
<tr>
<td>Barings, U.K.</td>
<td>1995</td>
<td>Stock Index Futures</td>
<td>1.330</td>
</tr>
<tr>
<td>Ashanti, Ghana</td>
<td>1999</td>
<td>Gold &quot;exotics&quot;</td>
<td>570</td>
</tr>
<tr>
<td>Yakult Honsha, Japan</td>
<td>1998</td>
<td>Stock Index Derivatives</td>
<td>523</td>
</tr>
<tr>
<td>Codelco, Chile</td>
<td>1994</td>
<td>Copper Futures</td>
<td>200</td>
</tr>
<tr>
<td>Procter &amp; Gamble, U.S.</td>
<td>1994</td>
<td>Differential Swaps</td>
<td>157</td>
</tr>
<tr>
<td>NatWest, U.K.</td>
<td>1997</td>
<td>Swaptions</td>
<td>127</td>
</tr>
</tbody>
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Case study 1: Barings

- Nick Leeson (28) lost $1.3 bn in Index Futures trading on the Osaka Exchange
- Ran front & back office at the same time
- Accumulated 20,000 contracts each worth $200,000 - approx 20% of the volume
- Big money attracts attention
- YMIS (Young Male Immortality Syndrom)
Case Study 2: Metallgesellschaft

- Idea: long term oil delivery contracts (180mm barrels over 10 years) - equiv. To Kuwait’s oil production over 85 days
- Rolling hedge with oil futures (3 months maturity)
- Basis risk
- Mark to market (margin calls) - „life’s a path dependent function“
Case Study 3: Orange County

- $7.5 bn portfolio of public money
- Borrowed $12.5 bn through reverse repos
- Invested in avg. Life 4 years agency bonds / notes - refinanced over short term (LIBOR)
- Exposure to yield curve steepness
- Default overmargin calls from short term financiers and collateral payments
- No mark to market accounting since: held to maturity
What to expect from this course?

• Risk view from a practitioner’s perspective
• Familiarity with the market jargon (instruments, conventions, methods, systems, players, etc.)
• Merits and pitfalls of applying math in measuring risk
• The story of the birth and evolution of the risk profession from an eyewitness
Synopsis of this lectures series

- Review of probability theory
- Intro. To Financial Instruments
- Market Risk 1 (generic concepts, measurements, computations-Jor. Ch.4,5,6)
- Market Risk 2 (parametric solutions, historical simulations, backtesting, forecasting volatilities & correlations; Basel I- Jor Ch. 7,8,9,10)
- Market Risk 3 (Monte Carlo simulations, Stress Testing, Delta Normal VAR - Jor. Ch. 11,12)
- Credit Risk 1(fundamentals, specifics, calculation approaches)
- Credit Risk 2 (analytic applications, utilization framework)
- Operational Risk 1 (analytic concepts)
- Operational Risk 2 (applications, Basel II)
- ALM Risk (theory and applications)
- RAROC 1 Basel II (theory)
- RAROC 2 (applications)

- Applications oriented
- Pragmatic solutions
- Economic value added philosophy
- Interface of art & science
- Interdisciplinarry by nature