Strategic Risk Management

- Strategic Risk Vision
- Calculation of Economic Capital
- Setting Performance Targets
- Managing Economic Capital
- Allocating Economic Capital
- Measuring Performance
Strategic Risk Vision

- Increase Shareholder Value
- Instill Confidence in the Market Place
- Alleviate Regulatory Constraints
- To Provide Senior Management with World Class Risk Management Tools
Economic Capital Framework

- Definition of Economic Capital
- Setting Performance Targets
- Allocation of Risk Capital
- Measuring Economic Capital
- Managing Economic Capital
- Assessing Risk-Adjusted Performance
Definition of Economic Capital

- Covers all Risks
- Economic capital is the amount of capital that the firm has put at risk to cover potential unexpected losses under extreme market conditions.
- Capital, Economic Capital, Regulatory Capital
Setting Risk Appetite

Break Down of Firm’s Total Capital

- Non-Risk Capital: 15%
- Economic Capital at Risk: 25% - 33%
- Operational Risk Capital: 5%
- Event Risk Capital: 5%
- Liquidity Risk Capital: 5%
- Credit Risk Capital: 6%
- Market Risk Capital: 6%

Non-Risk Capital: 75%
Economic Capital at Risk: 25% - 33%
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Risk-Based Performance Targets

Board of Directors sets Risk Appetite

Total Shareholder Capital £100 M
Firm Economic Capital at Risk £33 M
Business Economic Capital at Risk

Required Return on Economic Capital
20% Budget £4 M
25% Budget £7.5 M
30% Budget £10 M

Daily VaR Limits:
1 Day VaR Limit
£1.1 M
£2.1 M
£1 M

Required Return and Budget

Business 1 £10 M
Business 2 £20 M
Business 3 £3 M

Budget £.75

20% 25% 30%
Return on Capital at Risk

Required Return on Capital at Risk = 18%

(4.5 / 25)
Allocation of Economic Capital

- Business Profitability
- Diversification Benefits of Business
- Franchise Value of Business
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Capital Allocation

<table>
<thead>
<tr>
<th>Category</th>
<th>Capital at Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Derivatives</td>
<td>£3m</td>
</tr>
<tr>
<td>Non Japan Syndication</td>
<td>£1.5m</td>
</tr>
<tr>
<td>Current Capital at Risk</td>
<td>£18 M</td>
</tr>
<tr>
<td>Equity Trading</td>
<td>£2.5m</td>
</tr>
<tr>
<td>Credit Trading</td>
<td>£7m</td>
</tr>
<tr>
<td>Co/Euros</td>
<td>£1.5m</td>
</tr>
<tr>
<td>Derivative Arb</td>
<td>£2m</td>
</tr>
<tr>
<td>Structured Finance</td>
<td>£5m</td>
</tr>
<tr>
<td>Interest Rate Prop</td>
<td>£2m</td>
</tr>
<tr>
<td>New Equity Syndication</td>
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</tr>
<tr>
<td>Investment Account</td>
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<tr>
<td>Banking</td>
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<tr>
<td>Japan Desk</td>
<td>£1.5m</td>
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<tr>
<td>Allocated Total</td>
<td>£27 m</td>
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<tr>
<td>Diversified Total</td>
<td>£18 m</td>
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<tr>
<td>Mortgage Desk</td>
<td>£10m</td>
</tr>
<tr>
<td>Emerging Markets</td>
<td>£10m</td>
</tr>
<tr>
<td>Corporate</td>
<td>£15m</td>
</tr>
<tr>
<td>Emerging Markets</td>
<td>£10m</td>
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<tr>
<td>Allocated Total</td>
<td>£35 m</td>
</tr>
<tr>
<td>Diversified Total</td>
<td>£25 m</td>
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</table>

Ideal Risk Capital - £33 Million

Allocated Total - £35 m
Diversified Total - £25 m
## Diversification Factor

### Calculation for Two Businesses

<table>
<thead>
<tr>
<th>Equity Desk</th>
<th>Governments/Eurobonds</th>
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</thead>
<tbody>
<tr>
<td>Risk Capital - £2.5m</td>
<td>Risk Capital - £1.5m</td>
</tr>
<tr>
<td>Correlation Factor = 0.1</td>
<td></td>
</tr>
</tbody>
</table>

\[
\text{Risk} = \sqrt{a^2 + b^2 + 2ab\rho}
\]

\[
\text{Risk} = \sqrt{2.5^2 + 1.5^2 + 2 \times 2.5 \times 1.5 \times 0.1} = £3m
\]

**Risk Capital of £4m = Risk of £3m = Factor of 1.33**
Risk Management Framework

- Market Risk
- Credit Risk
- Liquidity Risk
- Event Risk
- Operational Risk

Market Risk Capital
Credit Risk Capital
Liquidity Risk Capital
Event Risk Capital
Operational Risk Capital

TOTAL ECONOMIC CAPITAL

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VaR vs. Economic Risk Capital

- VaR
- Liquidation VaR
- Extreme Loss (Risk Capital)

Potential Loss

- VaR (1-Day 99%)
- Liquidation VaR (# days 99%)
- Extreme Loss (Risk Capital)

Liquidation VaR * 3

VaR * sqrt (Liquidation Period)
Calculating VaR

Example 1 Day DM/USD Volatility

<table>
<thead>
<tr>
<th>Losses</th>
<th>Profits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected Profit/Loss = 0, i.e. Normal Distribution</td>
<td></td>
</tr>
<tr>
<td>99th Percentile Change - 1.3108</td>
<td></td>
</tr>
<tr>
<td>2.32 Standard Deviations</td>
<td></td>
</tr>
</tbody>
</table>

The standard deviation of the graph is 0.565% which represents the volatility of the DM/USD exchange rate over one day. To assess the probability of loss with 99% confidence we must use 2.32 standard deviations.
Liquidity Period

Liquidity Days

- <!-- Insert chart details here -->

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Counterparty Event Risk

- Loan Equivalent Exposure
- Ratings
- Default Probabilities
- Recovery Values
<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
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<th>10</th>
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<tr>
<td>AAA</td>
<td>.09</td>
<td>.06</td>
<td>.05</td>
<td>.03</td>
<td>.15</td>
<td>.22</td>
<td>.33</td>
<td>.45</td>
<td>.58</td>
<td>.73</td>
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<tr>
<td>AA</td>
<td>.02</td>
<td>.10</td>
<td>.22</td>
<td>.34</td>
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<td>.60</td>
<td>.71</td>
<td>.82</td>
<td>.95</td>
<td>1.10</td>
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<tr>
<td>A</td>
<td>.06</td>
<td>.15</td>
<td>.30</td>
<td>.48</td>
<td>.72</td>
<td>.92</td>
<td>1.07</td>
<td>1.32</td>
<td>1.62</td>
<td>1.97</td>
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<tr>
<td>BB</td>
<td>.16</td>
<td>.52</td>
<td>.92</td>
<td>1.5</td>
<td>2.0</td>
<td>2.5</td>
<td>3.1</td>
<td>3.8</td>
<td>4.4</td>
<td>5.0</td>
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<tr>
<td>BB</td>
<td>1.8</td>
<td>4.4</td>
<td>6.9</td>
<td>9.4</td>
<td>11.8</td>
<td>13.8</td>
<td>15.3</td>
<td>16.7</td>
<td>18.1</td>
<td>19.5</td>
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<tr>
<td>B</td>
<td>8.3</td>
<td>14.8</td>
<td>21.4</td>
<td>24.8</td>
<td>28</td>
<td>31.9</td>
<td>34.3</td>
<td>36.7</td>
<td>38.4</td>
<td>40.0</td>
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</tbody>
</table>
## Recovery Values

<table>
<thead>
<tr>
<th>Class of Debt</th>
<th>Average</th>
<th>Standard Deviation</th>
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</thead>
<tbody>
<tr>
<td>Senior Secured Bank Loan</td>
<td>71.2</td>
<td>21.</td>
</tr>
<tr>
<td>Senior Secured Public Debt</td>
<td>63.5</td>
<td>26.2</td>
</tr>
<tr>
<td>Senior Unsecured Public Debt</td>
<td>47.5</td>
<td>26.3</td>
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<tr>
<td>Senior Subordinated Public Debt</td>
<td>38.3</td>
<td>24.7</td>
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<tr>
<td>Subordinated Public Debt</td>
<td>28.3</td>
<td>20.0</td>
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<tr>
<td>Junior Subordinated Public Debt</td>
<td>14.7</td>
<td>8.7</td>
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<tr>
<td>Unsecured Public Debt</td>
<td>Amount</td>
<td>Rating</td>
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<tr>
<td>------------------------</td>
<td>--------</td>
<td>--------</td>
</tr>
<tr>
<td>Abbey National</td>
<td>10M</td>
<td>AA</td>
</tr>
<tr>
<td>Gazprom</td>
<td>10M</td>
<td>B+</td>
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<tr>
<td>Hanil Bank</td>
<td>5M</td>
<td>BB-</td>
</tr>
<tr>
<td>KDB Bank</td>
<td>15M</td>
<td>BB</td>
</tr>
<tr>
<td>Swiss Air</td>
<td>50M</td>
<td>A+</td>
</tr>
<tr>
<td>Lehman Brothers</td>
<td>10M</td>
<td>BBB+</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Graph Year 1 Total ....... Year 100,000 Total
Credit Risk Distribution

Example Distribution of Losses From Monte Carlo Simulation

Economic Capital

____________________________

____________________________

____________________________

____________________________

____________________________

____________________________

____________________________
Operational Risk Capital

- Audit Rating
- Transaction Volume
- Product Specific
- Subjective Factors
Identify all Possible Risks
Quantify Maximum Possible Loss
Assess the Probability of Loss
Calculate the Potential Loss

This process has already been completed and all risks have been incorporated in a risk map.
This will be a subjective exercise in a lot of cases, but figures should be sufficiently accurate if they are based on historic information and prudently estimated. Distributions of past losses will be used in some cases.
This will be calculated using a combination of historic data, measurable risk drivers (e.g. rate of staff turnover) and prudent estimation.
This will be calculated by multiplying the loss by the probability of the loss. We will use a Monte Carlo simulation to get a more accurate result.
Back-Testing

- Testing Accuracy of VaR Model
- Evaluate Mark to Market
- Explanation of P/L
Stress Testing / Scenario Analysis

- EMU
- Liquidity Crisis
- Asian Currency Crisis
- Breakdown in Parameters
  - Correlations
  - Default Probabilities
Limit Framework

- VaR Limits
  - Risk Type
  - Risk Factor
  - Higher Order
- Loss Limits
  - Mgmt. Alert
  - Stop-Loss
- Concentration Limits
  - Large Exposure
  - Counterparty
  - Country
  - Region
Fixed Income Desk Loss Limits

- One Day VaR: 327
- 1-100 Day MAL: 327
- 5 Month MAL: 500
- Stop Loss Limit (Half the Economic Capital): 2500

Risk Management Department
Portfolio of 25 BB-Rated Bonds (10M USD each.)

<table>
<thead>
<tr>
<th>Confidence Level</th>
<th>Required Risk Capital</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>99%</td>
<td>10M USD</td>
</tr>
</tbody>
</table>

Portfolio of 1000 BB-Rated Bonds (10M USD each.)

<table>
<thead>
<tr>
<th>Confidence Level</th>
<th>Required Risk Capital</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>99%</td>
<td>20M USD</td>
</tr>
</tbody>
</table>
Advantages

- Dynamic
- Consistent
- Less Concentration Risk
- Transparent
Risk-Adjusted Performance

- Return on Economic Capital
- Charge for Under-Utilisation
- Activity Based Costing
- RAROC Based Bonuses
JGB Performance Assessment

- Net Cumulative P&L = £89,300
- Annualised ROEC (Utilised) = 65%
- Annualised ROEC (Allocated) = 35%
- Average Utilised Economic Capital = £539,179

Cumulative Profit for Period: £89,300
Total Direct Costs for Period: £32,500
Average Utilised Economic Capital: £539,179
Cost Allocation

Allocation of Risk Management Costs

Total Risk Management Costs: £1,300,900
Marginal Costs: £269,680
Fixed Costs: £1,031,220

Cost Allocation

Fixed cost
Marginal cost

Total Risk Management Costs
£1,300,900
Marginal Costs: £269,680
Fixed Costs: £1,031,220
Return on Capital at Risk

Performance Assessment
Return on Economic Capital

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