Economic Capital

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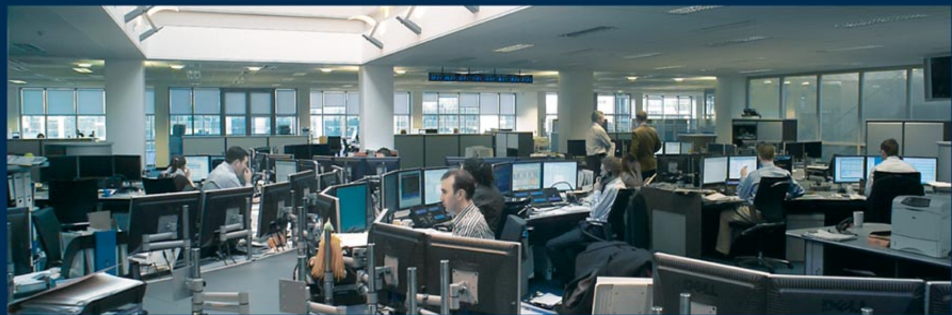


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Where are we

- **DEPFA Economic Capital Project (DEC)**
  - Started in September 2006
  - Submitted the ICAAP application by end of June
  - Internally ICAAP and ECAP are used synonymously
  - Very strong buy in from EC (steering committee of the project) and business lines
  - Progress has been good

Methodologies

- **Market Risk**
  - Current combination of Delta Normal VaR and Historical Simulation VaR used for Economic Capital purpose
  - Challenge in scaling from 10 day 99% VaR to a 1 year 99.97% VaR
    - Square root of T method
    - Management intervention factor

- **Liquidity risk capital is hard to define and quantify**
  - Asset liquidity
    - Captured by credit spread volatility and market risk
  - Funding liquidity
    - Stress testing
    - Scenario analysis
    - A robust internal process

Methodologies

- **Credit rating**
  - A comprehensive suite or rating models exists and has been in use for a number of years
  - These models have been validated and are under further development
- **Credit portfolio model**
  - A Merton type Credit Portfolio Model has been implemented
  - The choice DEPFA has made is based upon data availability, theoretical tractability and explainability
  - Full migration approach
  - Economic value methodology
  - Implemented in Algorithmics

There are two sets of parameters for the credit risk Economic Capital calculation

Correlation structure

- **Reflects the degree to which assets' creditworthiness move together**
- **Consists of two sets of parameters**
  - 'Systematic risk drivers,' representing the overall health of a country, region, or sector
  - 'Specific weights', indicating how much an asset moves for its own reasons
- **Allows a better understanding of the concentrations in the portfolio**

Migration parameters

- **Governs the changes in asset values due to migration**
- **Consists of two sets of parameters**
  - 'Migration probabilities,' representing the likelihood of a change in the credit quality of an asset
  - 'Migration impact,' measuring the change in value resulting from a migration
- **Leads to the specific size and shape of the value distribution**

Methodologies

- **Operational Risk**
  - Currently the operational risk capital is calculated based on the Basel II standardized approach (TSA)

- **DEPFA recognises and manages other types of material risk, namely, business risk:**
  - Business risk is the risk of loss due to changes in the external environment that damage the underlying operational economics. It consists of:
    - Reputational risk; the risk from adverse perception of DEPFA on the part of clients, counterparties, investors or regulators
    - Strategic risk; the risk due to adverse business decisions, improper implementation of decisions or lack of responsiveness to changes in business environment. Long term strategic risk (>1 year) need not be capitalized
    - Regulatory risk; the risk that regulators will change or impose rules that negatively impact positions already on the books

Methodologies

- **Risk aggregation**
  - In calculating Economic Capital, a VCV (variance-covariance) approach is currently taken to account for diversification between the risk types
  - The Algorithmics model will incorporate correlation between credit and market risk (which form the majority of the material risk); operational and business risk will continue to be treated with the basic VCV approach

Usage

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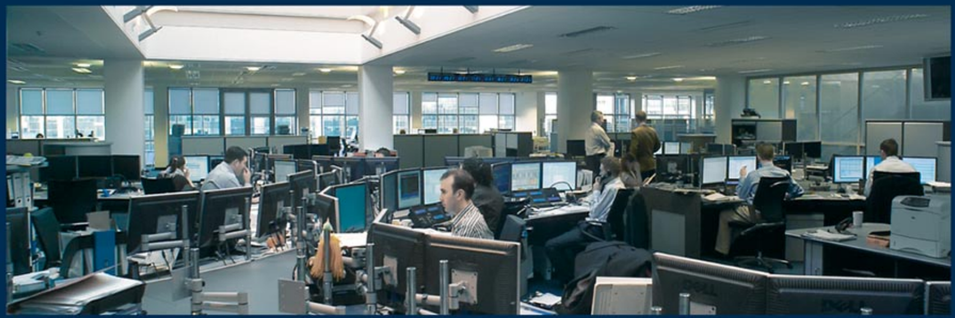

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Uses of Economic Capital

- **Capital Adequacy Assessment**
  - Economic Capital vs Available Financial Resources
  - Makes more intuitive sense than Pillar I capital vs Own funds
  - Done on a regular basis
  - Risk Dashboard
    - Presented to ExCo and Board of Directors
  - More detailed reporting produced on a regular basis
  - Cornerstone for everything else

- **External Reporting**
  - Regulators
    - Pillar II
  - Rating Agencies
    - Changing requirements from the rating agencies
    - S&P are building their methodology to include ECAP
    - Other rating agencies are also incorporating into their rating methodologies
  - Investors and debt holders
    - Increasing interest from both investors and debt holders
    - Will become a focal point of risk discussions going forward – Pillar III

- **Strategic Planning and Capital Budgeting**
  - Capital allocation among business lines
    - Politically loaded
    - Very important to do in a transparent manner
  - Business line growth and performance targeting
    - Strategic plans are gauged going forward against the capital usage and expected revenues
    - Capital forecasting – basically using the ECAP framework with the banks budget
    - Can be quite difficult to set up and estimate
  - Strategic scenario analysis
    - Look at the strategic plans in the light of different scenarios
    - These scenarios should not be confused with stress testing scenarios

Uses of Economic Capital

- **Education**
  - ECAP is an incredibly powerful tool to educate the bank in terms of risks
  - Senior management
  - Front office
  - Risk departments
    - Risk is managed in silos
  - Back office

  - Done right – this can be the cornerstone of the risk culture in a bank

Uses of Economic Capital

- **Risk and Performance Analysis**
  - RAROC and EP
  - Allocation of capital benefit
  - Hurdle rate
  - Cost of capital

- **However, no Economic Capital Framework is complete without these types of measures**

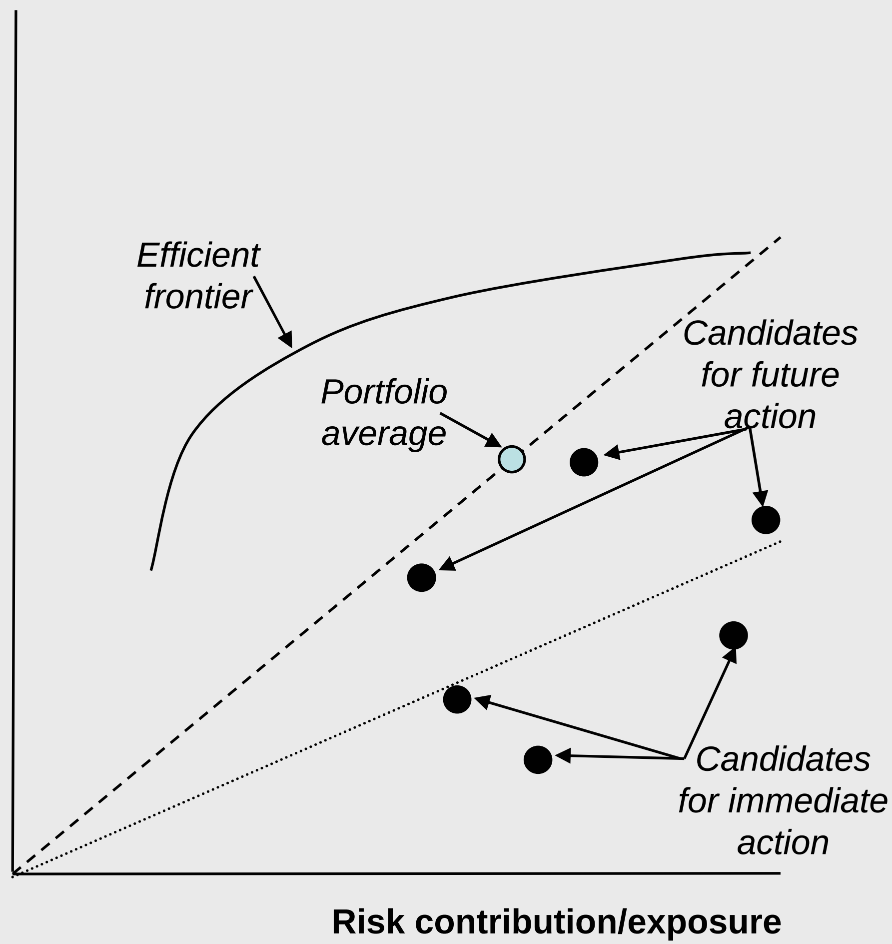
- **Risk-Based Pricing of New Opportunities**
  - Risk Adjusted Return on Capital

RAROC establishes a consistent risk-return framework

	Segment-level RAROC	Trade-level RAROC
	1 year backward (performance measurement)	**1 year forward (portfolio optimisation)**
Return	**Interest income** **– Cost of funding**	**Margin** **– Funds transfer price (FTP)**
	+ Non-Interest Income	**+ Non-Interest Income** • Fee income • Trading income • Sale of assets
	+ △ MTM **(△ provisions + △ reserves)**	**– Expected loss** **+ Expected revaluation** **+ Expected cross-sell**
	– Operating expense	**– Operating expense**
	– Tax	**– Tax**
Risk	**÷ Economic Capital**	**÷ Economic Capital** • Credit risk ECAP • Market risk ECAP • Op risk ECAP • Business risk ECAP

Portfolio Optimisation

Return / Exposure



- **Decision criteria**
  - On-strategy vs. off-strategy
  - Return per unit of risk
  - Absolute amount of risk

- **Tools**
  - Portfolio Review
  - Risk Based Pricing

- **Actions**
  - Risks currently in the portfolio
  - New risks being considered

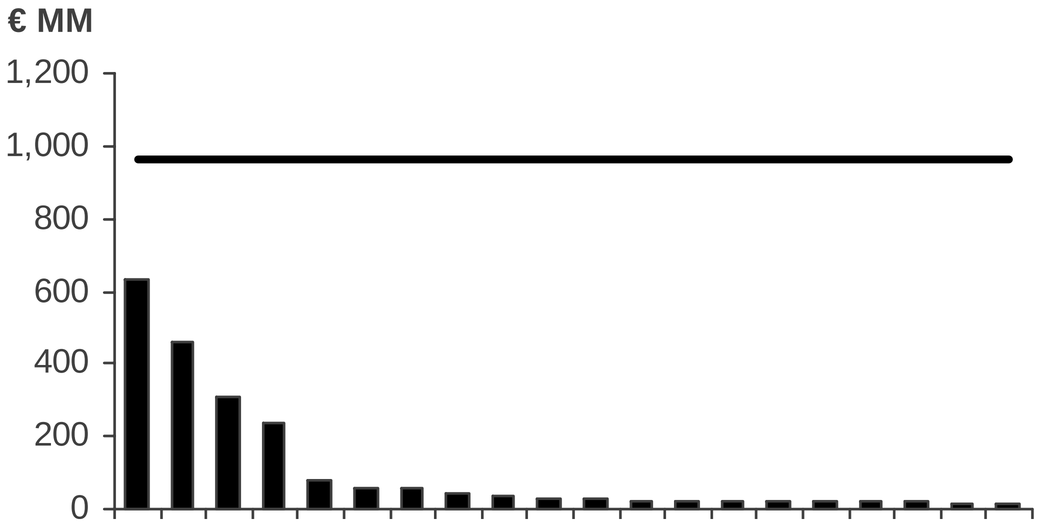
Concentration Measurement and Limit Setting

Aims of limit setting

- **Risk control**
  - Limit setting reduces concentration risk, hence the potential loss to the institution in a downturn
- **Regulatory compliance**
  - Regulatory limits specify the maximum amount that can be lent to one client, group, or sector
- **Adherence to risk appetite**
  - Limit setting reduces the risk of missing earnings and other targets

Concentration risk management for DEPFA

- **DEPFA currently has limits for:**
  - Counterparties; regulatory capital limits
  - Country risk; based on Group assets, GDP, and regulatory capital
  - Product and term
- **The aim is to include more risk-sensitive measures**



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Economic Capital – An Ideal Measure?

- **A Major Improvement on previous approaches but..**
  - Aggregation across risk types and portfolios is at best approximate
    - Accurate distributions of Operational and Business risks are difficult
    - Simple assumptions on correlations between different risk types
      - Integrated Credit & Market models are rare
  - Comparing with Book Capital as a Solvency Measure is Questionable
    - Book Capital does not correspond to Economic Capital
    - Comparison to Market-based measure of available capital is more appropriate
    - This requires full knowledge of portfolio market value, which can be difficult due to liquidity, lack of market data and questionable mark-to-model assumptions.
  - Economic Capital may not be consistent with Management Goals
    - Economic capital is based on the management of extreme losses
    - Management are more concerned with volatility of earnings
    - Loss and earnings distributions are different - Risk-based pricing using economic capital measures reduces large loss risks, but not volatility of earnings

Basel II

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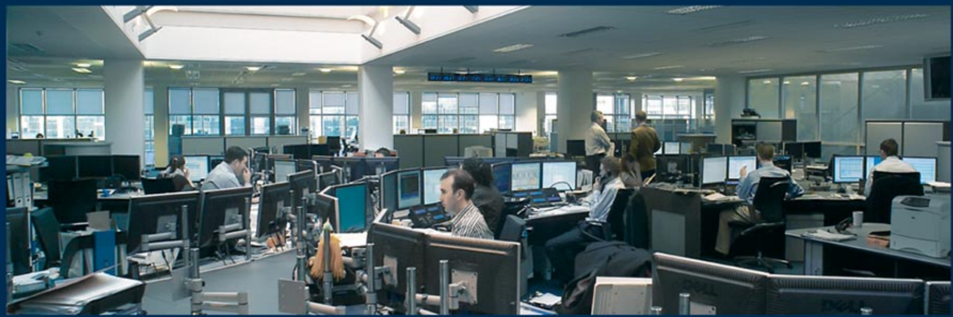


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ICAAP and the governing documents