Market Risk
Economic Capital
Introduction

- Financial business is exposed to many types of risk due to the nature of business.
- To guard against the risk, financial institutions must hold capital in proportion to the potential risk.
- Market risk economic capital is intended to capture the value change due to changes in market risk factors.
Economic Capital (EC) Definition

- Economic loss is the loss in economic due to market movement.
- Economic Capital is intended to cover unexpected losses rather than expected loss, illustrated as follows.
Economic Capital vs Regulatory Capital

- **Economic Capital (EC)**
  - Economic Capital is an internal measure for internal risk control purpose.
  - Economic Capital is statistically measured for 1-year time period at 99.95% confidence level (consistent with the probability of default (0.05%) targeted by most institutions)

- **Regulatory Capital (RC)**
  - Regulatory Capital is an external measure used by regulators.
  - Regulatory Capital is statistically measured for 10-day time period at 99% confidence level
Economic Capital Calculation

- Economic Capital falls into the category of Value at Risk (VaR) measures as both try to capture value change due to market movement.
- VaR system computes the market risk of 1-day time period at 99% confidence level, while EC measures the market risk of 1-year time period at 99.95 confidence level.
- Scaling methodology is the key to compute economic capital, i.e., scaling from 1-day to 1-year and from 99% to 99.95%.
Economic Capital Scaling Methodology

◆ Time horizon Scaling: scaling 1-day VaR to 1-year VaR
  
  ◆ The simplest and most commonly used approach is
  
  $$ \text{VaR (1-year, 99\%CL)} = \sqrt{T} \times \text{VaR (1-day, 99\%CL)} $$

  where $T = 365$ for calendar days or $T = 250$ for business days and $CL = \text{confident level}$. 

  ◆ Assumptions of this scaling formula
    
    ▶ 1-day loss distribution is independently and identically distributed (IID)
    ▶ Constant mean and volatility
    ▶ No autocorrelation

  ◆ Comments: This approach is very simple and intuitive but most likely under-estimates risk as the assumptions don’t match reality.
Final economic capital:

\[ EC = \text{VaR} \text{ (1-year, 99.95\%CL)} = K \times \sqrt{T} \times = K^*\sqrt{T} \times \text{VaR (1-day, 99\%)} \]

where VaR includes general VaR, equity specific VaR, debt specific VaR.

Banks are required to establish and maintain a Board-approved definition of materiality to assess modifications to regulatory capital models. The definition of materiality should reflect the Bank’s view of what constitutes a material change, must include quantitative and qualitative factors, and meet FRB’s principles.
Thanks!

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