Some Consequences of Conglomeration on Risk and Financial Stability

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Overview

I. **Introduction**

II. **Prudential Challenges**

III. **Economic Capital**

IV. **Risk Types and Modeling Approaches**

V. **Economic Capital & Integrated Risk Management**

VI. **Conclusion & Recommendations**

I. Introduction

- **Joint Forum definition (2001):"Any group of companies under common control whose exclusive or predominant activities consists of providing significant services in at least two different financial sectors (banking, securities, insurance)"**

- **Driving Forces Behind Financial Conglomeration:**
  - **Deregulation**
  - **Cost and Revenue Synergies**
  - **Risk Consolidation**
  - **Other Diversification Benefits**

- **Lack of an adequate (domestic and regional) consolidated prudential framework has raised concerns about the vulnerability of the financial system**

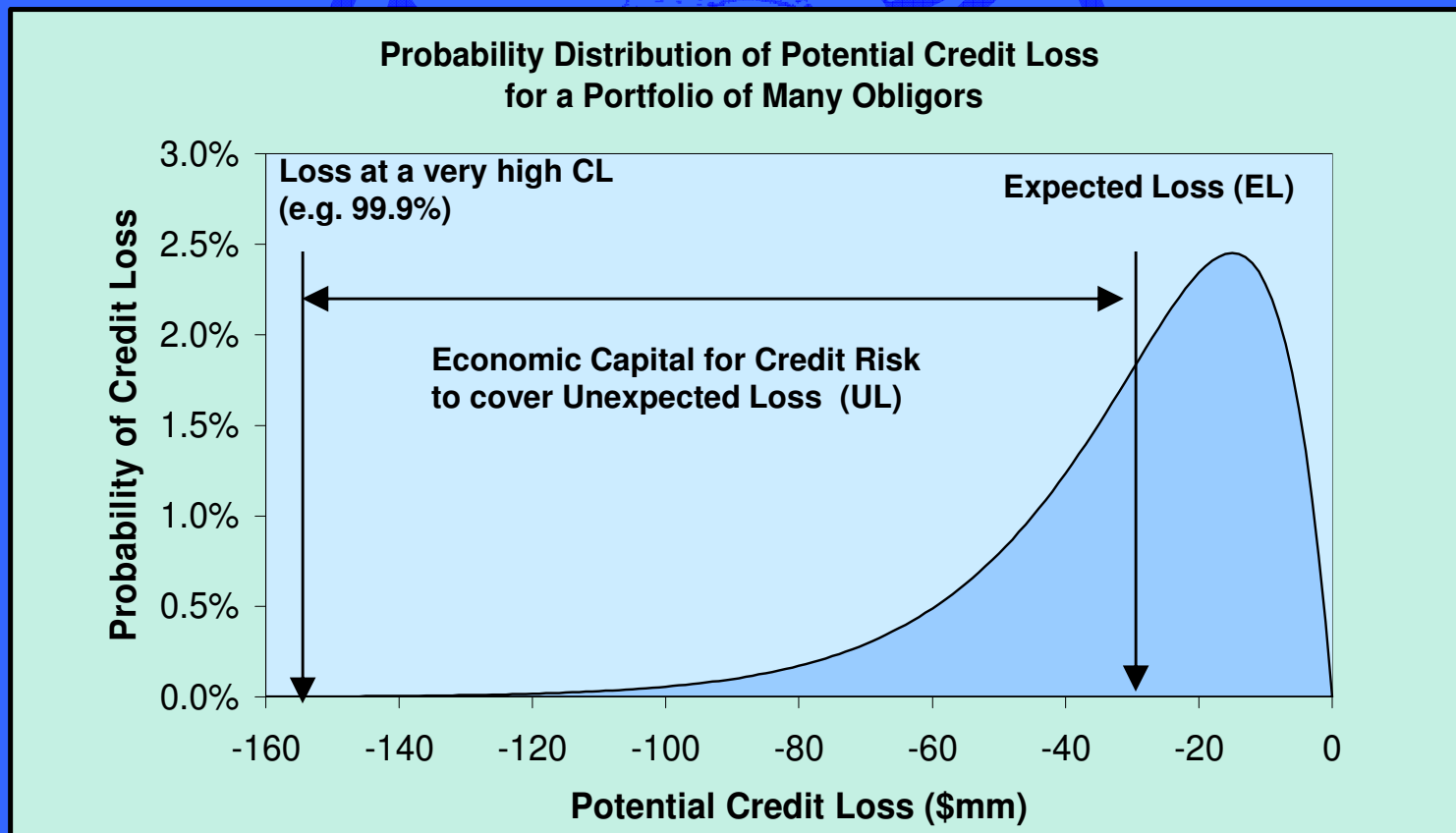- **Regulation is geared towards risk mitigation rather than risk portfolio optimisation**

II. Prudential Challenges

- **Regulatory Arbitrage: "Excessive Leveraging" or "Multiple Gearing"**
- **Incomplete Regulatory Coverage**
- **Concentration of Exposures**
- **Contagion between Business Lines**
- **Conflicts of Interest**
- **Lack of Transparency**
- **"Too Big To Fail"**
- **Basel II & Solvency II**

III. Economic Capital

- **International 'best practices' in consolidated supervision recommend the measurement of group-wide risk aggregation by the computation of 'economic capital'**
- **EC is the amount of capital required to protect the group against economic insolvency over 1 year time-horizon**
- **EC reflects enterprise-wide risks**
  - **aggregates the results of internal risk models and allocates capital accordingly**
- **The economic capital framework allows for a 'common denominator' by enabling the aggregation of multiple risk types across business lines into a single metric**

ECONOMIC CAPITAL: e.g. Credit Risk

**Probability Distribution of Potential Credit Loss
for a Portfolio of Many Obligors**

Loss at a very high CL
(e.g. 99.9%)

Expected Loss (EL)

**Economic Capital for Credit Risk
to cover Unexpected Loss (UL)**

Probability of Credit Loss

3.0%
2.5%
2.0%
1.5%
1.0%
0.5%
0.0%

-160   -140   -120   -100   -80   -60   -40   -20   0

Potential Credit Loss ($mm)

- **Economic Capital = The potential unexpected loss of economic value, at a high confidence level, in excess of the expected loss, over one year.**

Differences in Core Business

	COMMERCIAL BANKING	SECURITIES	INSURANCE
Main Risk Types:	•Credit Risk •Liquidity Risk	•Market Risk •Liquidity Risk	•Technical Risk
Other Risk Types:	•Operational risk •Business risk		

Differences in Risk Horizons

- **Banking**
  - **Trading book**
    - *daily measurement*
  - **Banking book**
    - *daily to monthly measurement*
- **Securities**
  - *daily measurement*
- **P&C Insurance**
  - *liabilities typically 1-2 years, monthly risk measurement*
- **Life Insurance**
  - **Traditional (fixed)**
    - *fairly stable liabilities, monthly to yearly measurement*
  - **unit linked (variable)**
    - *allocation decisions made by policy-holders, daily measurement*

Differences in Regulatory Framework

- **Regulatory objectives**
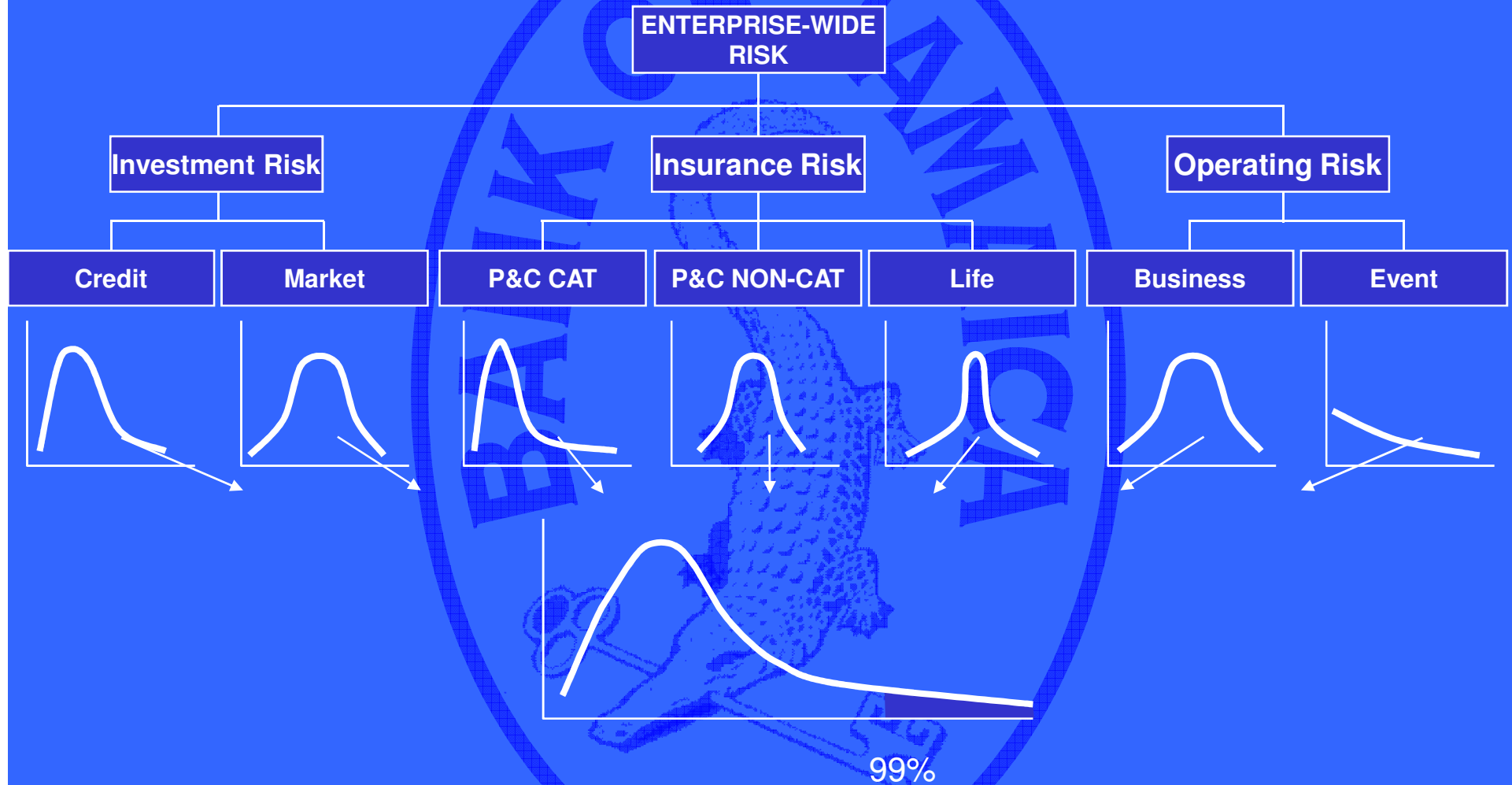
- **Capital requirements**

- **Capital charges**

- **Accounting rules**

IV. Risk Types and Modeling Approaches

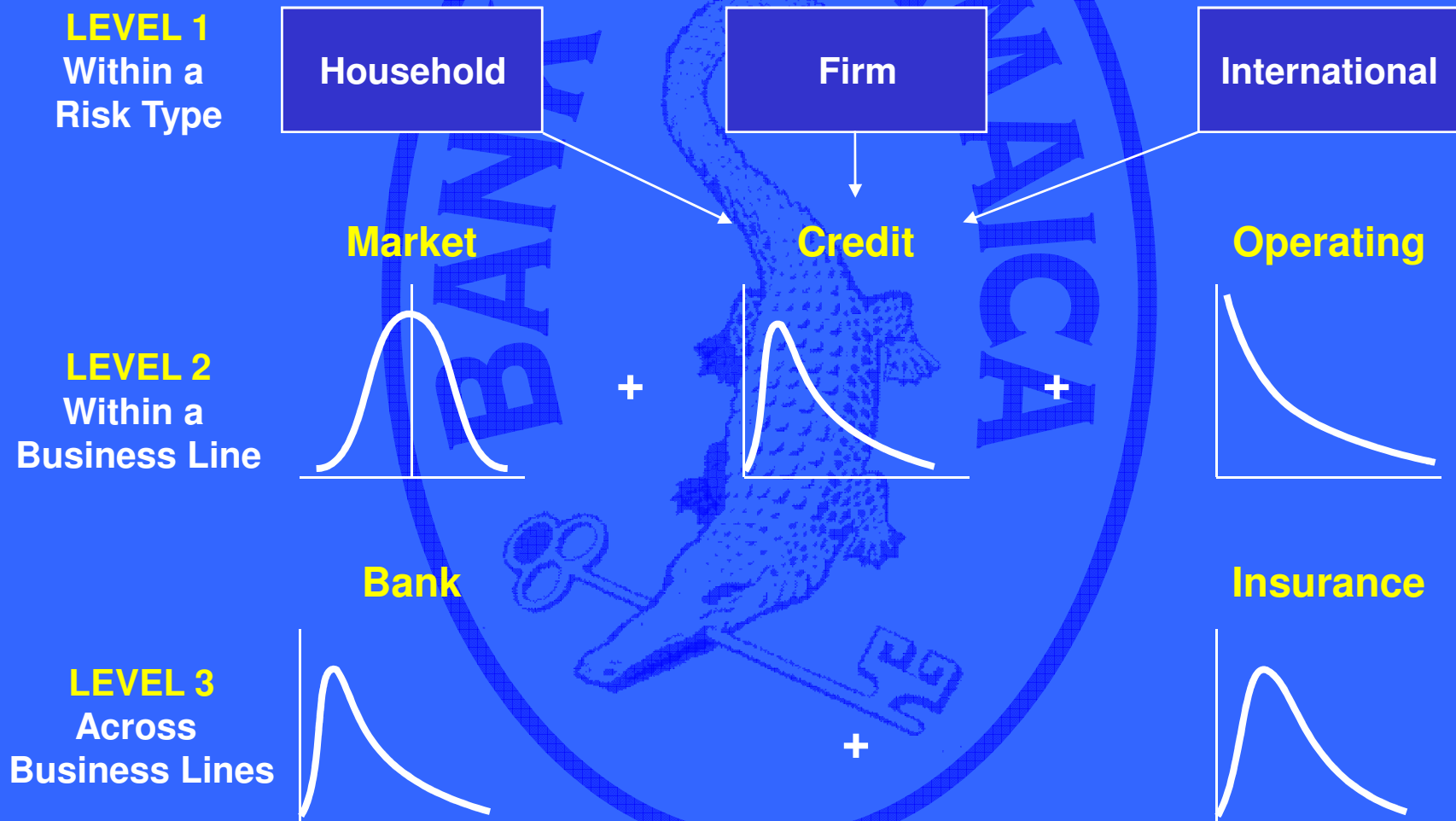| Risk Type	Risk Measurement	Risk Type	Risk Measurement
Market / ALM	Gap, Duration; VaR	CAT	Exceedence Prob. Curves; EVT
Credit	Default Prob.; EL, UL; VaR	Non-CAT P&C	Frequency Severity; Loss Triangles; EVT
Life	Surplus Testing; Contingent Claims Anal.	Operational	Systems Dynamics, EVT

- **Diversification effects between risk types decrease slightly the economic capital at group level**

Risk Types and Distributions

ENTERPRISE-WIDE RISK

Investment Risk · **Insurance Risk** · **Operating Risk**

Credit · **Market** · **P&C CAT** · **P&C NON-CAT** · **Life** · **Business** · **Event**

99%

How Should Risk Distributions be Aggregated?

Levels of Risk Aggregation in a Financial Institution

LEVEL 1
Within a Risk Type

| Household | Firm | International |

LEVEL 2
Within a Business Line

Market + Credit + Operating

Bank ... **Insurance**

LEVEL 3
Across Business Lines

+

- Diversification effects typically decrease at successive levels in an organization: Level 1 > Level 2 > Level 3

Economic Capital & VaR

- **Risk management is concerned with estimating the tail probabilities and quantiles of P&L distribution**
- **Risk or "unexpected loss" is commonly reflected in VaR**
- **Risk decomposition: use VaR to set position limits for traders and make capital allocation decision**
- **Definition of IRM: "An integrated framework for managing credit risk, market risk, operational risk, economic capital, and risk transfer in order to maximize firm value"**

Economic Capital &VaR

- **Maximum potential loss in the value of an enterprise over a fixed horizon and for a given (small) probability;**

  or

- **The value at risk (VAR) of an enterprise is the loss in value in the enterprise that can be expected over a given period of time (e.g., 1-Day) with a probability not exceeding a given number (e.g., 5%).**

- **Probability (Enterprise Loss < - VAR) =α**

  α = Given Probability

$$VaR_p = x_p = F^{\leftarrow}(p)$$

$$= \inf\{x \in \Re : F(x) \geq p\}$$

1-day VaR below indicates a 5% chance that the enterprise could lose more than $20mm in the next trading day.

5%

1.645 Std Dev

-$20mill.

Possible Profit/Loss

- Assume that the enterprise is constant over the time period t
- Therefore, t should be chosen to reflect aggregate risk horizon of enterprise
- 5% reflects the risk tolerance of the enterprise owner

V. Economic Capital & Integrated Risk Management

- Model for simulated market value of enterprise equity:

$$EC_t = \sum_{i=1}^{n} A_{i,t} - \sum_{i=1}^{n} L_{i,t}$$

- Assume the simulation of only one return variable and that the distribution of asset prices (eg. equity, real estate, exchange rate, commodity and inflation) can be modeled by a geometric Brownian motion:

$$dS_t = \mu S_t dt + \sigma_t S_t dz$$

  in which dz is distributed normally with mean zero and variance equal to one.

EC: Integrated Risk Management (cont'd)

- Approximate continuous time process by a discrete one:

$$\Delta S_t = S_{t-1}(\mu \Delta t + \sigma \varepsilon \sqrt{\Delta t})$$

in which $\varepsilon_t \sim N(0,1)$

- Take random draws from the N(0,1) distribution and simulate errors $\varepsilon_{t+1}, \varepsilon_{t+2}, ..., \varepsilon_{t+T}$, in which T is length of the forecasting horizon in units of observation frequency (for example daily data and a 10 day horizon gives T = 10). Then take starting value of S_t and calculate S_{t+1} by using the equation, after that S_{t+2} etc. to get a full path for the whole forecasting horizon.

EC: Integrated Risk Management (cont'd)

- After calculating time path for S use it as an input in pricing equations to calculate values of the financial instruments.

- Repeat the above path generation, for example 10 000 times, to get forecast of instrument and portfolio level value distribution.

- Also model dynamics of interest rates (& other risk drivers):

$$dr_t = \kappa\left(\theta - r_t\right)dt + \sigma r_t^\gamma dz$$

- Let value of the portfolio be F, then Value-at-Risk over a T step horizon at confidence level c is

$$VaR(c,T) = E(F,T) - Q(F,T,c)$$

in which Q(F,T,c) is quantile of distribution of F so, that its value will be exceed c times per 100 simulations.

EC: Integrated Risk Management (cont'd)

- Simulation methodology may be extended to enterprise case i.e., multiple sources of risk
- Cholesky Factorization: e.g., to account for correlation in variables for a bivariate normal distribution, construct:

$$\varepsilon_1 = \eta_1$$

- where $\varepsilon_2 = \rho\eta_1 + \left(1 + \rho^2\right)^{\frac{1}{2}}\eta_2$

  η_1, η_2 =independent random samples from standard normal distribution

  ρ =correlation coefficient between ε_1 and ε_2

VI. Conclusion & Recommendations

- **Regulators should expedite their efforts to design an appropriate consolidated prudential supervisory framework and implement appropriate legislation consistent with the maintenance of financial system stability**

- **Regulators should agree with the senior management of FHCs on a reasonable schedule for the implementation of a formal enterprise-wide risk management structure for each group**

- **Policy should be geared towards providing incentives for conglomerates to continuously modernize their risk management and internal control systems with the general aim of minimizing contagion risk**

Conclusion & Recommendations (cont'd)

- To achieve proper evaluation of a conglomerate's risk management systems including internal risk quantitative models, the off-site supervisors should satisfy minimum technical skill requirements

- The consolidated regulatory framework must mandate and assess institutional compliance of direct integration of consolidated risk management into company culture and decision-making