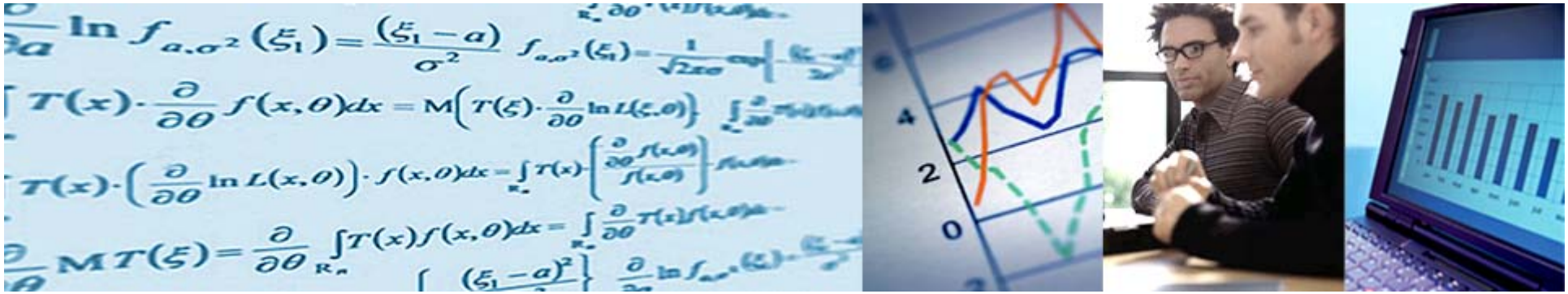
Specific Issues of Economic Capital Management: Economic vs. Regulatory Capital and Business Risk



Corinne Neale

Managing Director, Capital Management

Algorithmics

Regulatory Capital

The Pillar 1 Model

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Stress Testing

Management Actions

Communication of Risks

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Pillar 1: A Regulatory Model for ERM

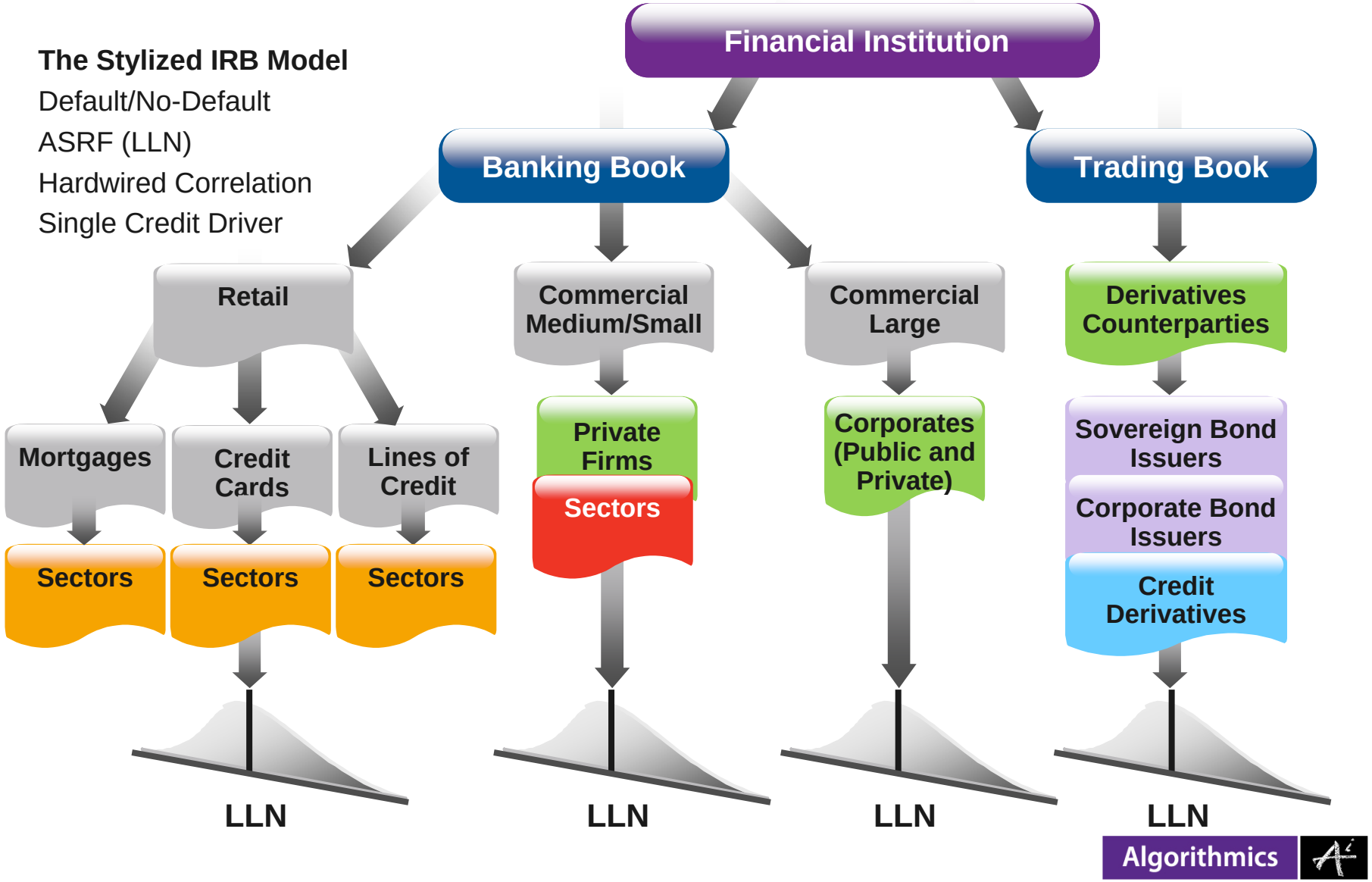
The Stylized IRB Model

Default/No-Default

ASRF (LLN)

Hardwired Correlation

Single Credit Driver



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The IRB Model: Limitations

Many Risks not captured

- Concentration risk
  - Single name
  - Sector (industry, geography)
- Losses driven only by defaults, not by **ratings migration**

One-size-fits-all within each Basel II-defined asset class (e.g., all residential mortgages subject to the same formula / correlation values; new financial products?)

Only considers one confidence level (i.e., the 99.9%)

Thus, does not address stress scenarios nor tail risk (i.e., what are potential losses beyond 99.9%)

Rigidity of modeling assumptions creates disconnect with true economic capital

Algorithmics

Pillar II: Expectations for Risk Management

In a nutshell, the objectives of Pillar II are to:

Compensate for **limitations of the IRB Model**

Promote **enterprise-wide** measurement and management of risk

Evaluate impact of **stress scenarios**

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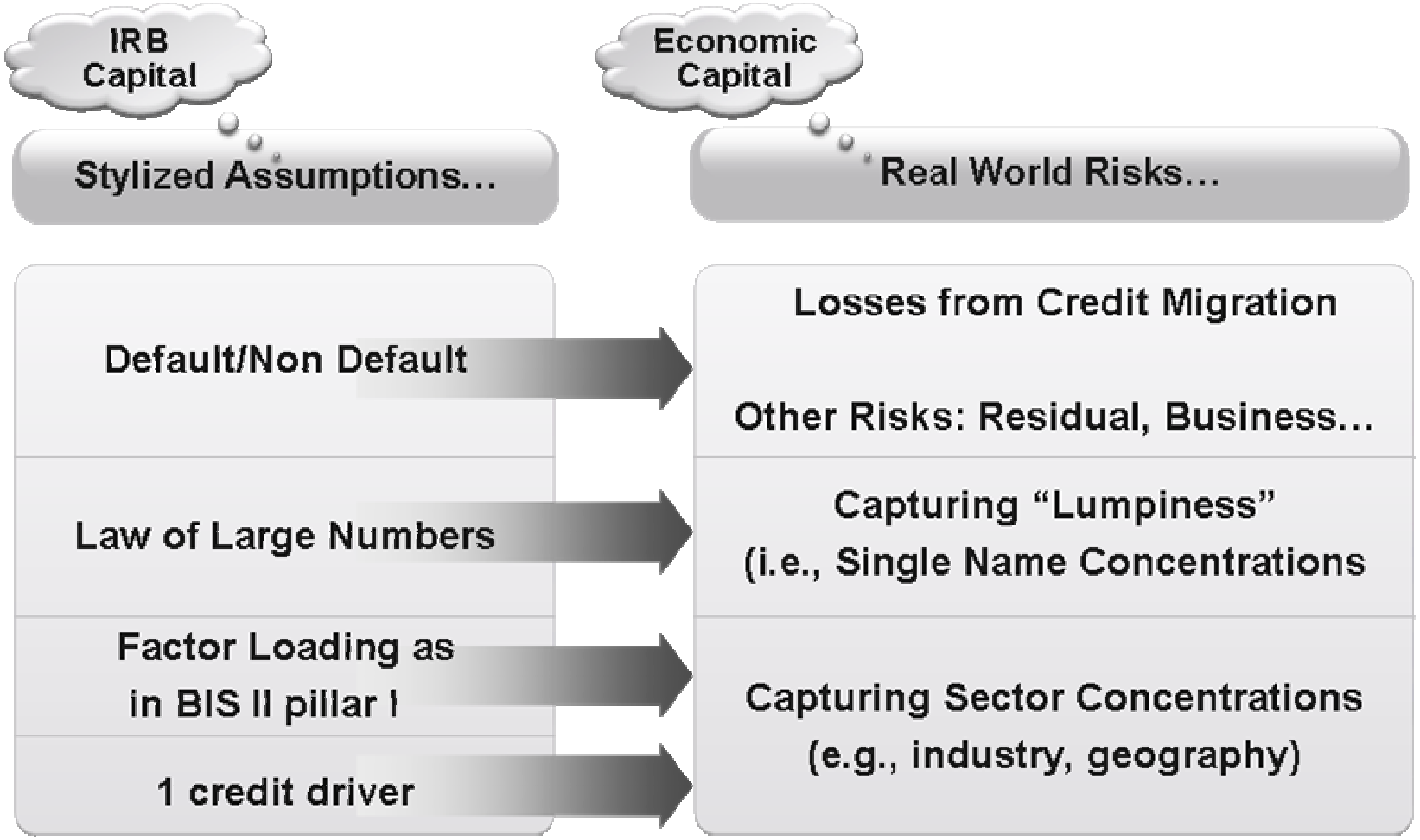
ERM: A Model to Evaluate Real World Risks



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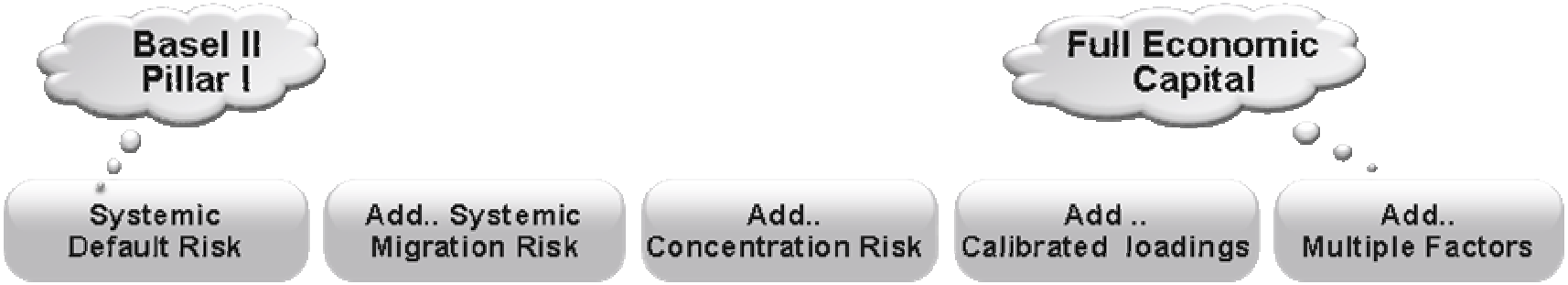
Quantifying the Impact of Real World Risks



Assumptions:				
Default/Non Default transition matrix	Full Migration	Full Migration	Full Migration	Full Migration
Law of Large Numbers	Law of Large Numbers	Sampling + Stochastic RR	Sampling + Stochastic RR	Sampling + Stochastic RR
Factor Loading as in BIS II pillar I	Factor Loading as in BIS II pillar I	Factor Loading as in BIS II pillar I	Factor Loading From Calibration	Factor Loading From Calibration
1 credit driver	1 credit driver	1 credit driver	1 credit driver	Multi-Factor Model
16,277.59 **Loss 99.9%**	24,169.17	**33,205.06**	**34,560.70**	**28,318.34**

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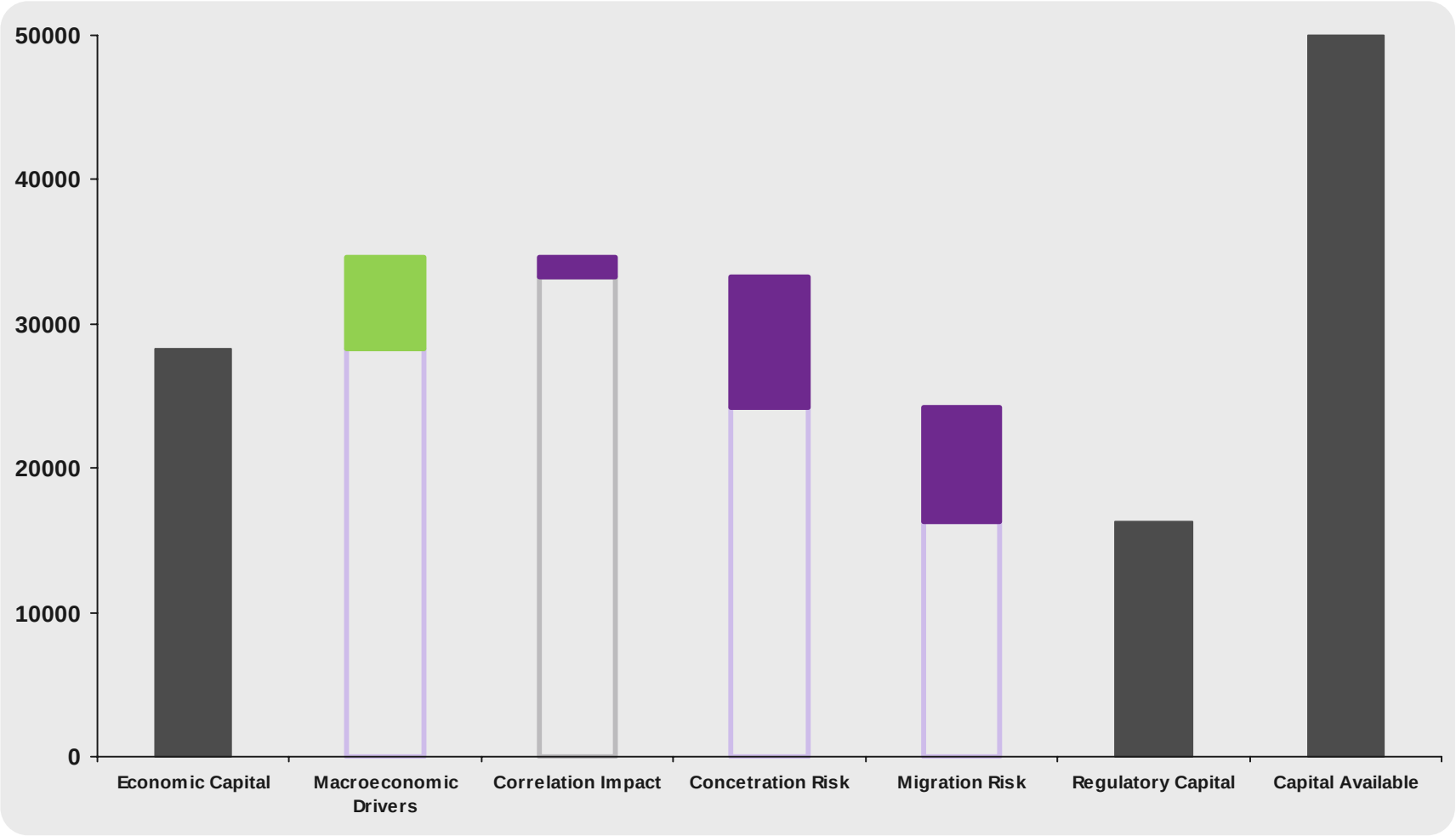
Bank ICAAP Results



Source: for this chart

Banks' ICAAP Content

Current and Project Capital Positions

Risk Appetite:

- Confidence Interval
- Horizon
- Scenario the confidence level corresponds to
- **Risks covered by Capital**

Quantification technique for each risk

Control process for risks not covered by capital

Risk aggregation techniques used

- Description
- Assumptions
- Limitations

Details of stress and scenarios applied

Controls and ICAAP validation process

ICAAP and Pillar 1 comparisons

Internal use of ICAAP

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Quantification Issues: Concentration

How concentrated is my portfolio?

Possible answers:

- HH Indexes
- Ratio of largest to smallest exposures
- Ratio of Additive UL to Absolute UL
  → this is the only one to capture correlation!

Where are the higher-aggregate concentrations?

- This requires multi-level results?

How do correlations interact with concentrations?

- Only a full EC model can help to articulate this

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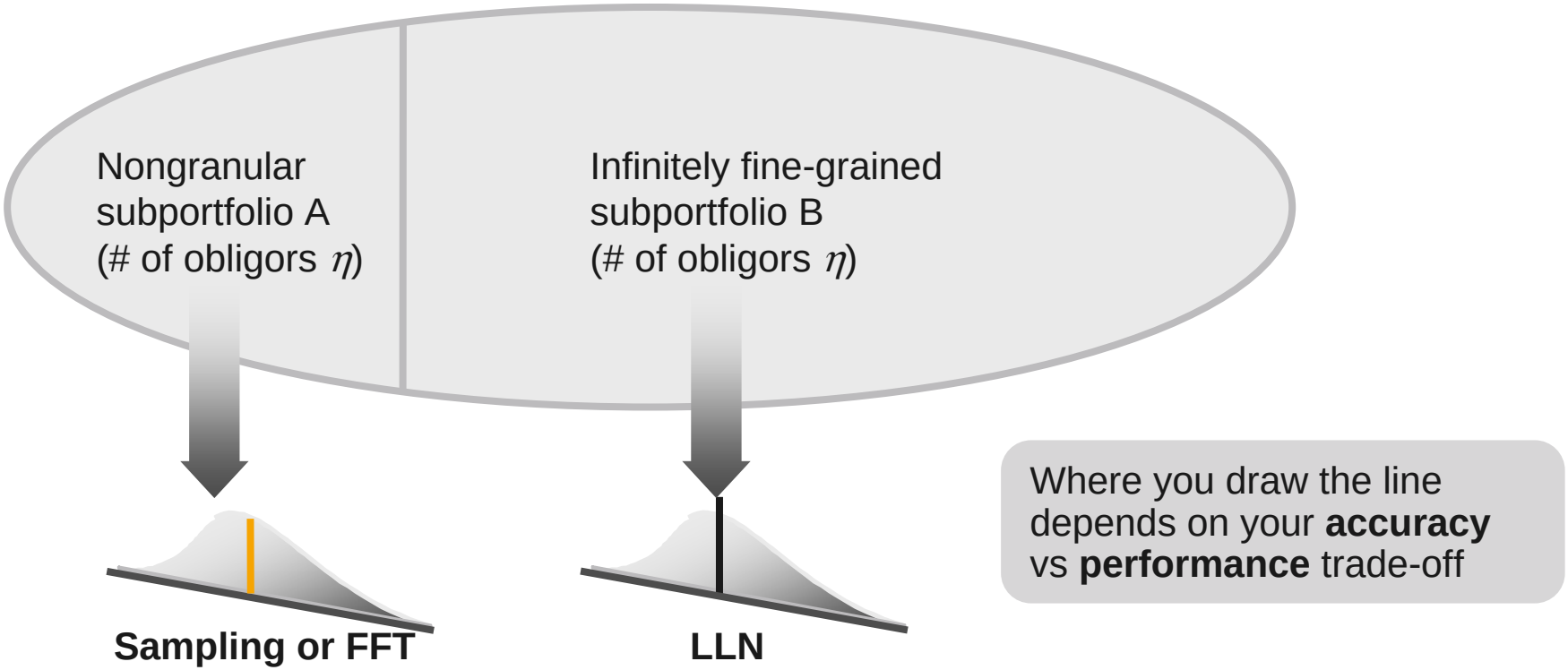
Modeling Single Name Concentration: An Example

Chart 2. A nongranular portfolio containing an infinitely fine-grained subportfolio
Note: Entire portfolio (subportfolio A plus B) is nongranular



Where you draw the line depends on your **accuracy** vs **performance** trade-off

Source: Bank of Japan Working Paper Series "An Efficient Monte Carlo Method for a Large and Nongranular Credit Portfolio" Hideaki Higo
See: http://www.boj.or.jp/en/type/ronbun/ron/wps/wp06e19.htm

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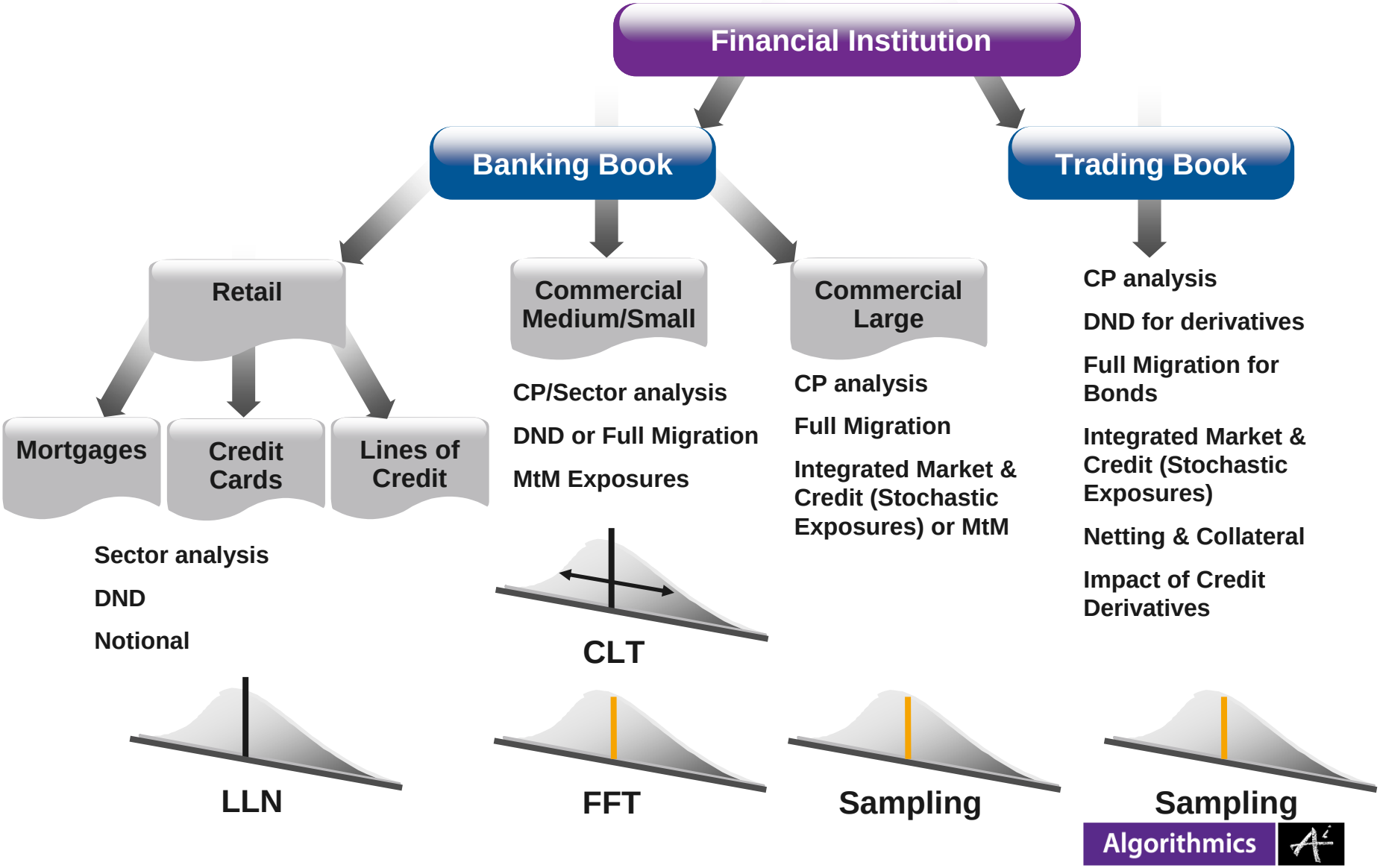
Modeling Single Name Concentration: An Example



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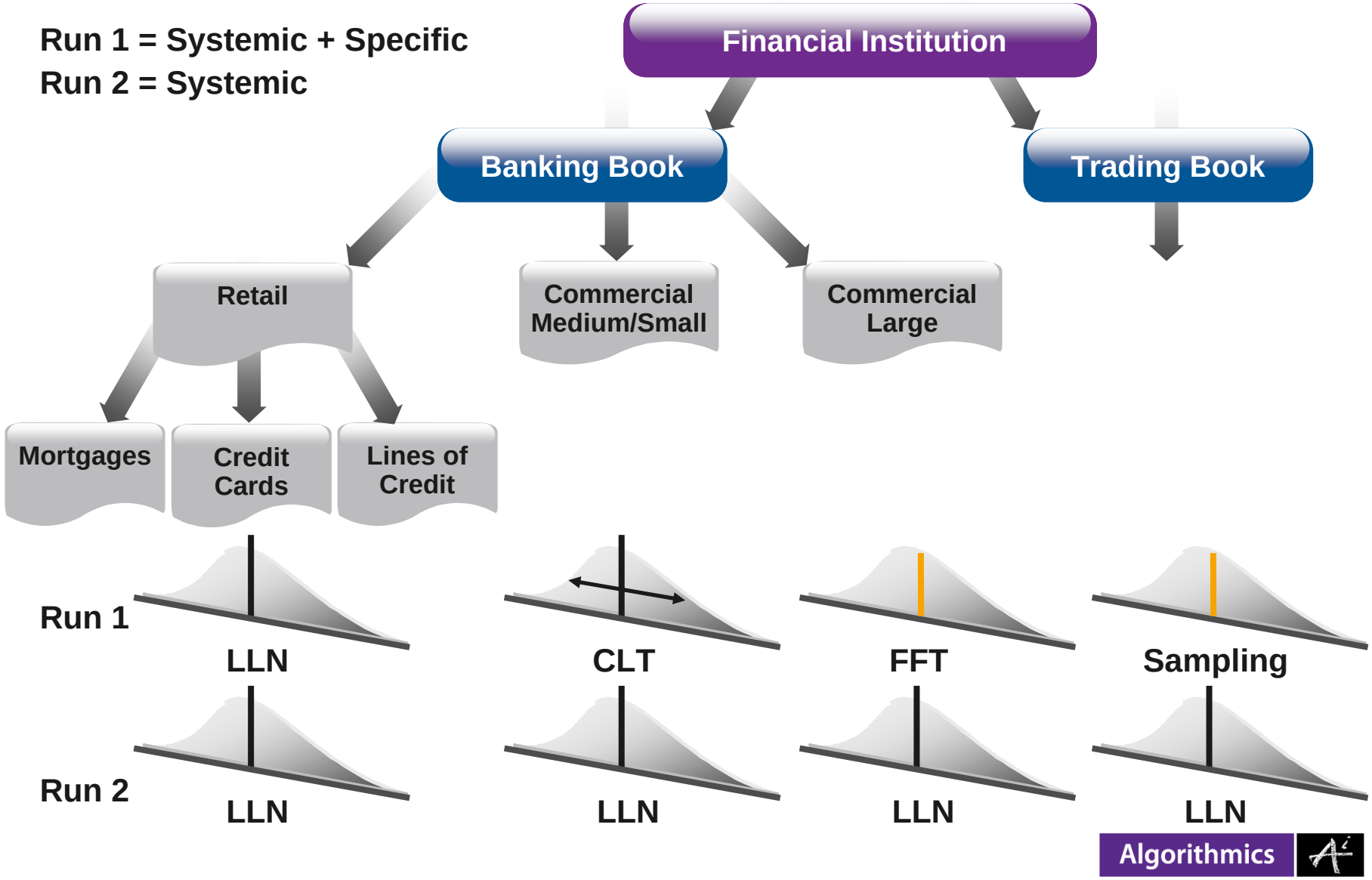
A Model – Basel Granularity Adjustment

Run 1 = Systemic + Specific
Run 2 = Systemic



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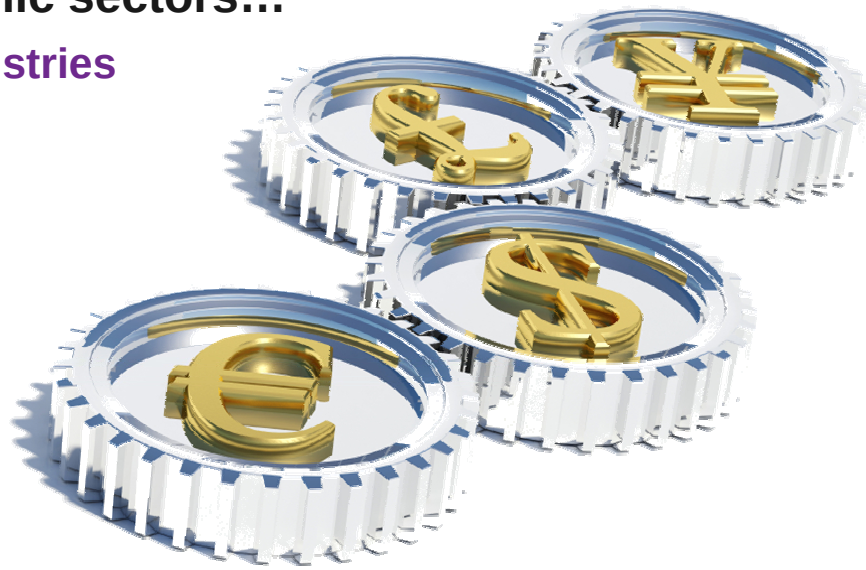
Quantification Issues: Sector Concentration

The other form is Sector concentration

- *"…relates to imperfect diversification across systematic components of risk, namely sectoral factors…"**
- E.g., exposure to the U.S. automobile industry, which might be highly correlated to other sectors (e.g., energy, aluminum manufacturing, consumer finance, etc.)

Multi-factor modeling enables the full capture of correlations across industry/geographic sectors…

- Identify exposures to **highly correlated industries** or geographies that increase portfolio risk
- Likewise, capture **diversification benefits** that mitigate portfolio risk



*Basel Committee on Banking Supervision, "Studies on credit risk concentration", Working Paper No. 15, Nov 2006

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Multi-Factor Modeling

Illustration: The Multi-Factor Variable – Candidates

General State of the Economy

- Composite Leading Indicator
- OECD_CLI
- Industrial Production Index
- Manufacturing Utilization rate

Prices

- Producer Price Index
- Producer Sales Index
- Producer Inventory Index
- Imports

Foreign Trade

- Exports
- Import Price Index
- Export Price Index

Foreign Exchange

- FX Rate – Euro/USD
- FX Rate – Euro/YEN

Money Markets

- 3-Year Corporate Bond Yields
- Call Rate
- Commercial Paper Rate

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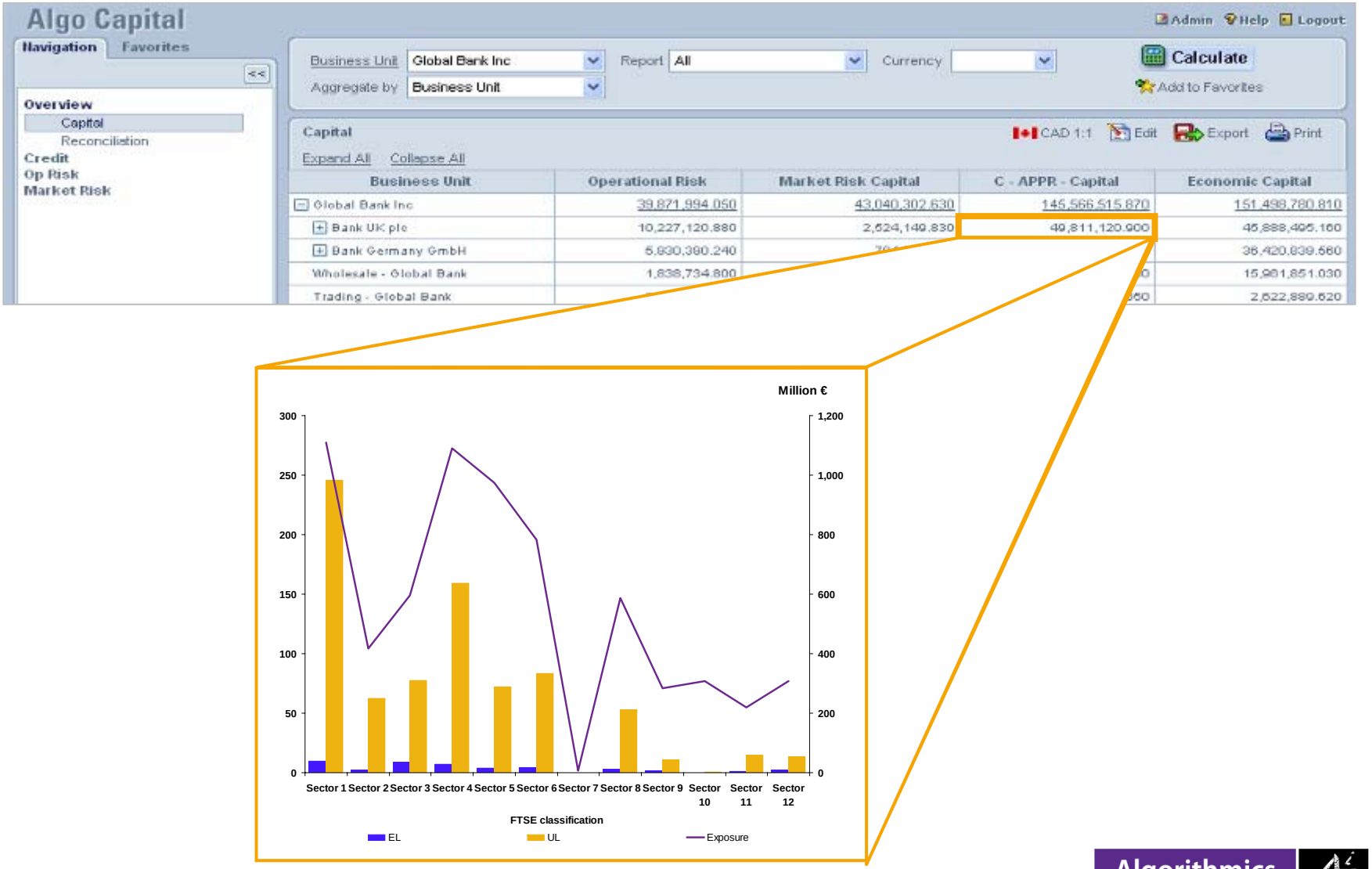
Sector / Geography / Business Concentrations



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Quantification Issues: Stress Tests

Stress-tests are part of risk management:

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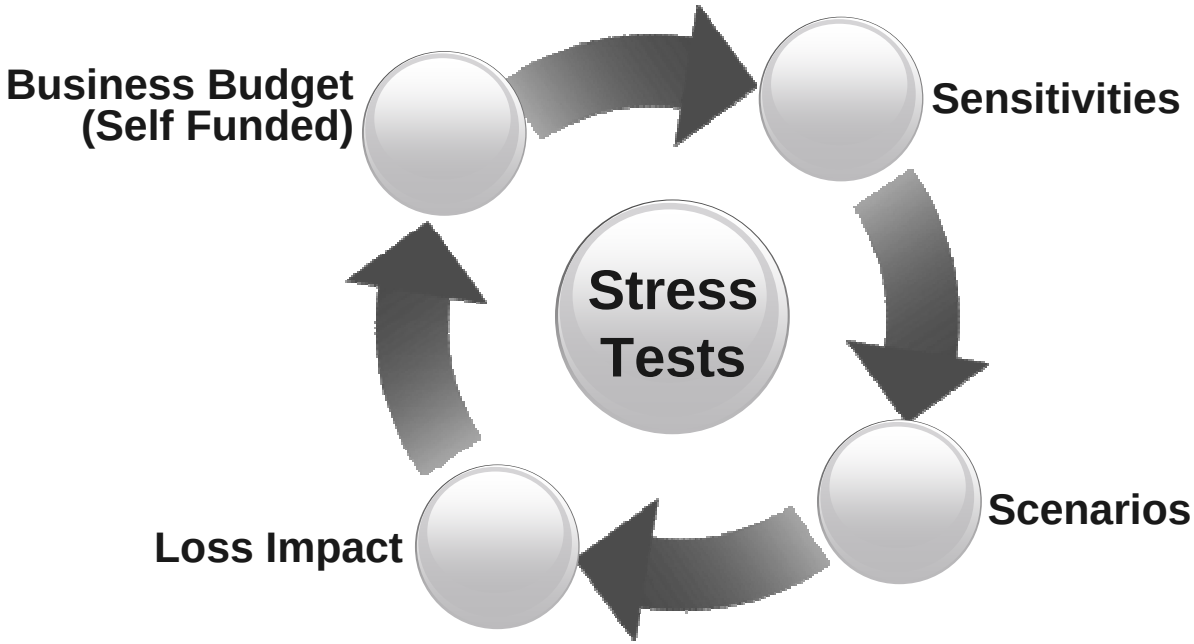
Business Risk Assessment Through Stress Tests

Definition:

The risk that, as a result of an external event, some of the bank's business expenses be not covered by the income expected from that business, resulting in a net loss that needs to be funded with capital:



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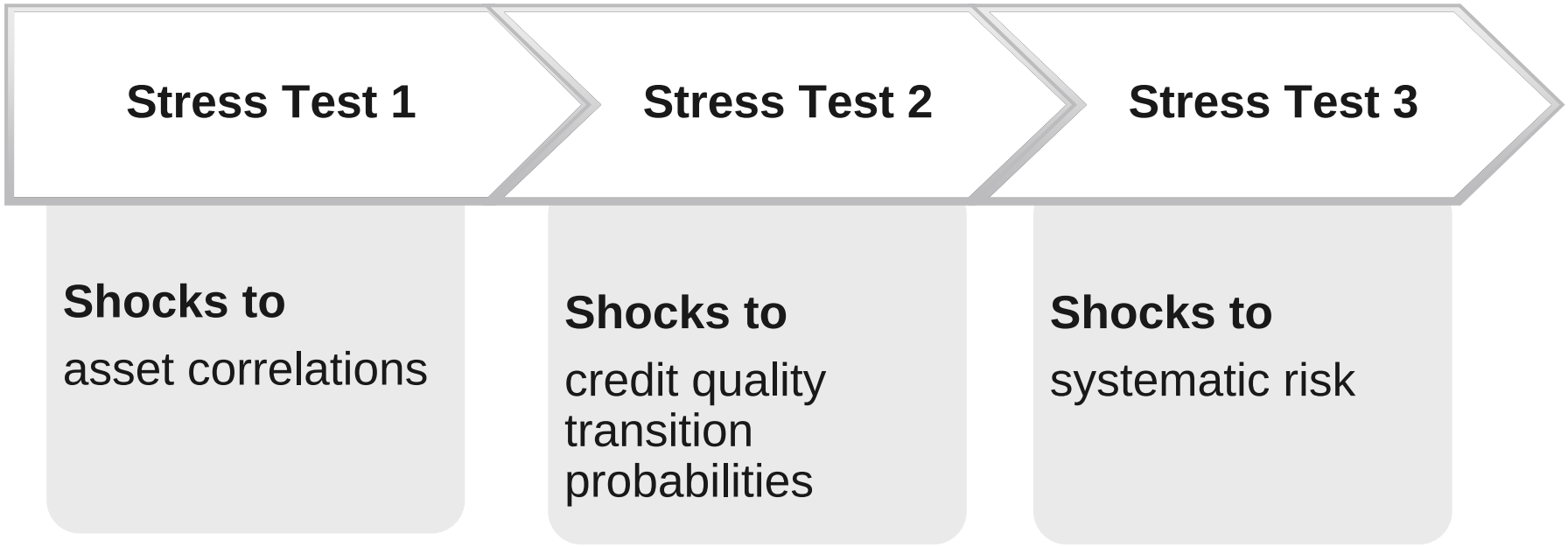
Other Risk Assessments Through Stress Tests

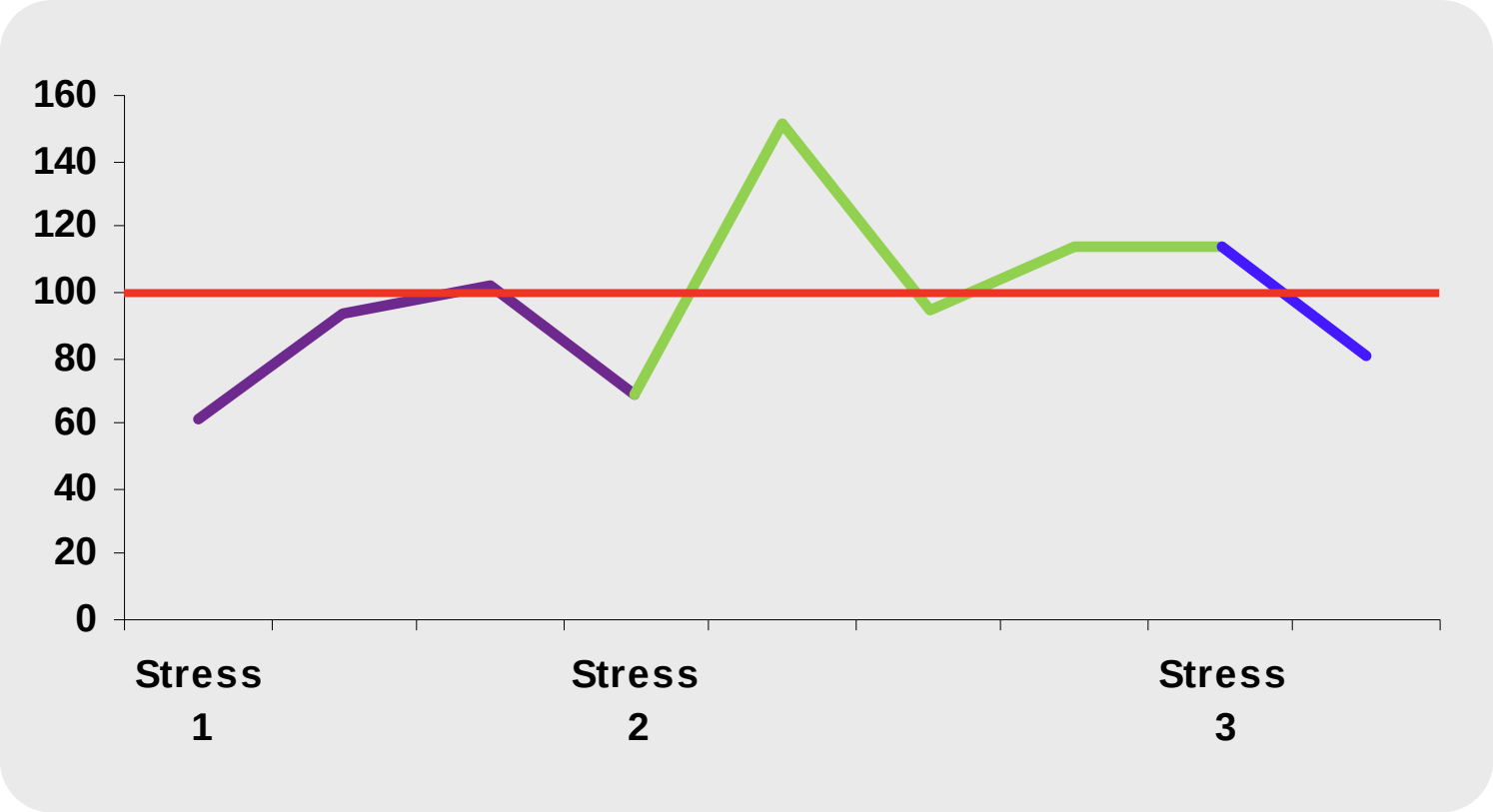
Illustration:



Other Risk Assessments Through Stress Tests

Results:

EC Base



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ERM: Tools for Management Analysis and Action

Advanced modeling techniques enable the quantification of real world risks across the portfolio

Quantification, in turn, enables financial executives to unlock value:

- Communication internally, with regulators, and to the market about risk profile;
- Active management of the portfolio;
- Pricing decisions and performance analysis; and
- …Ultimately, creation of economic value and profitable business growth

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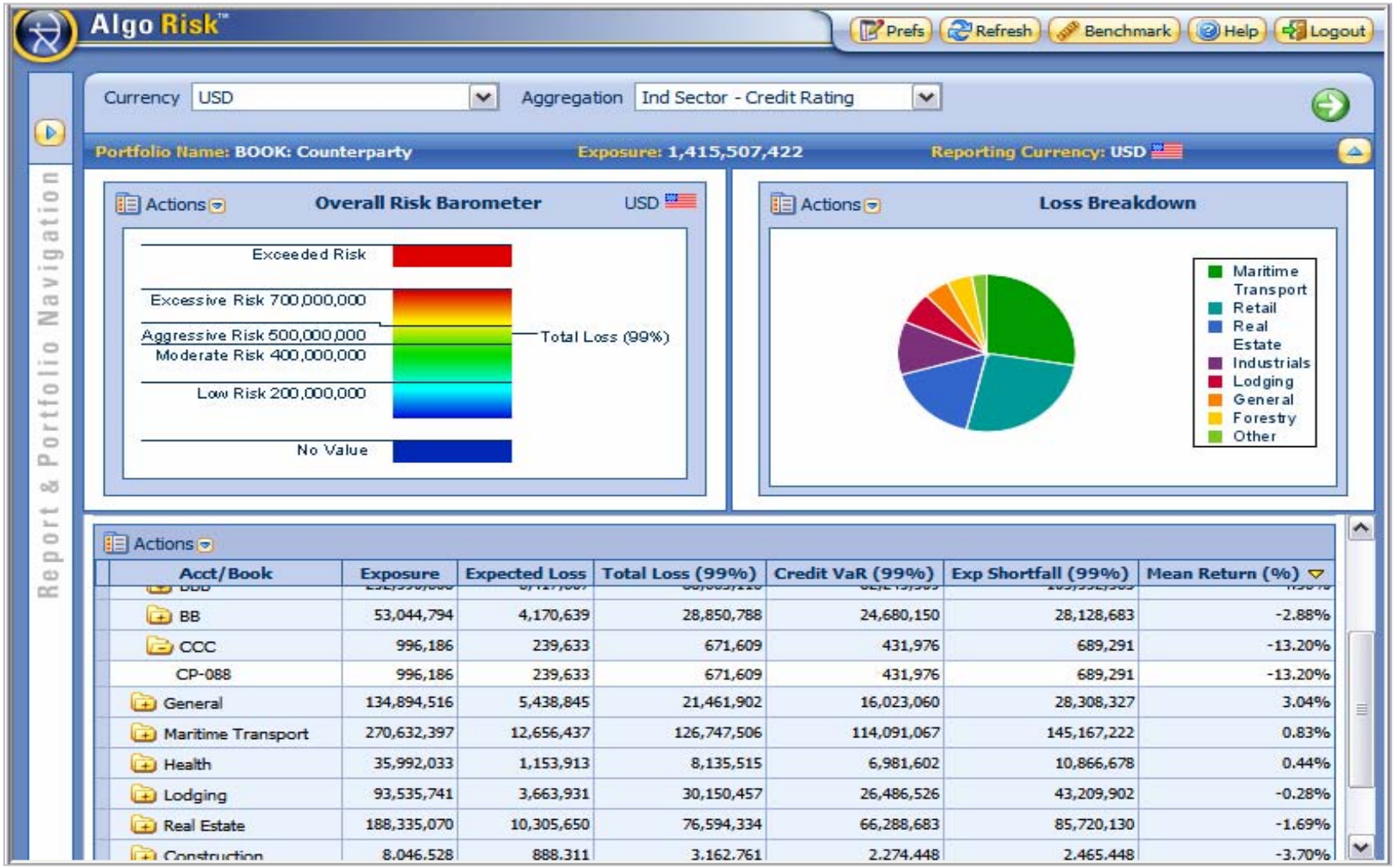
Communication of Risk



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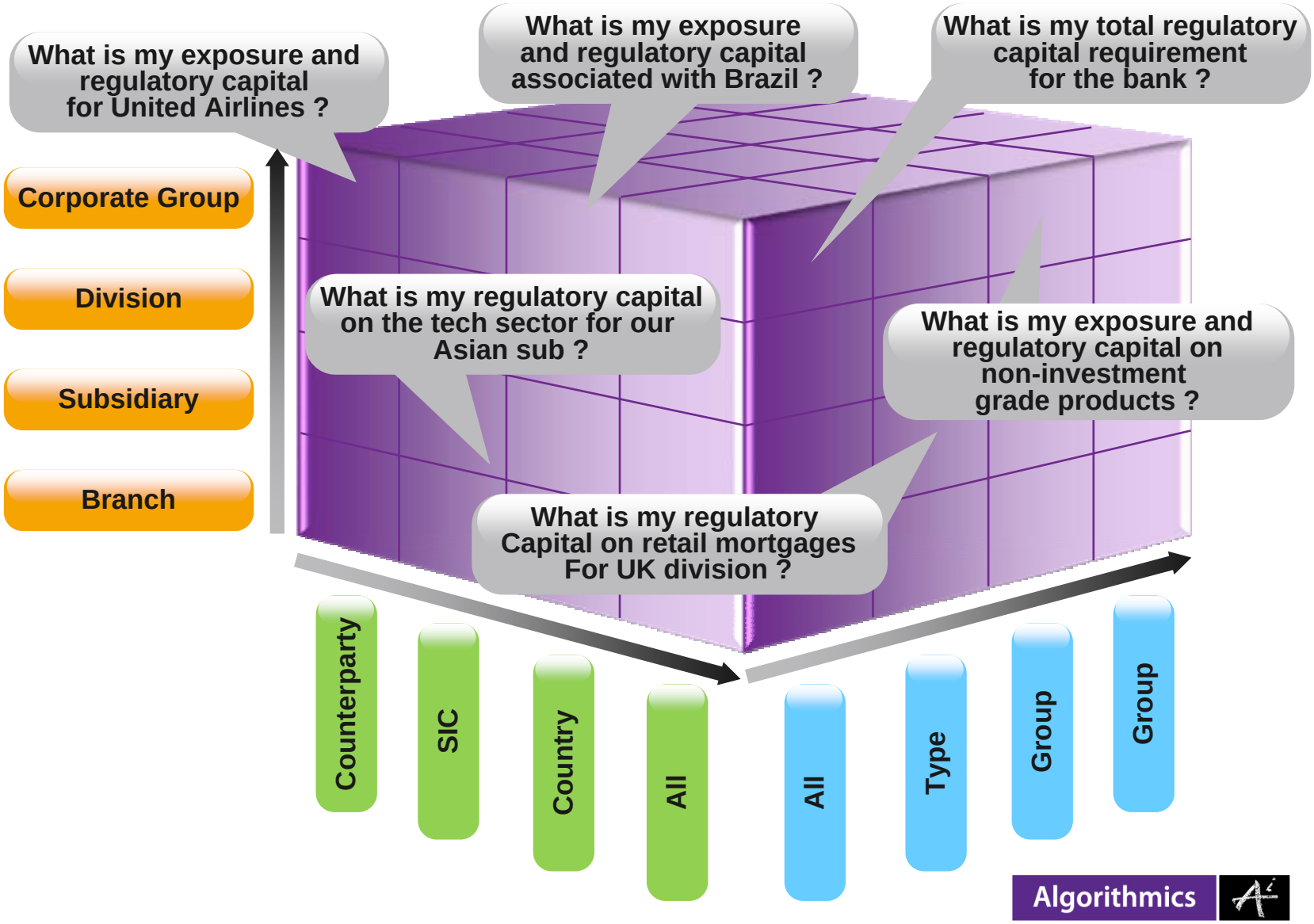
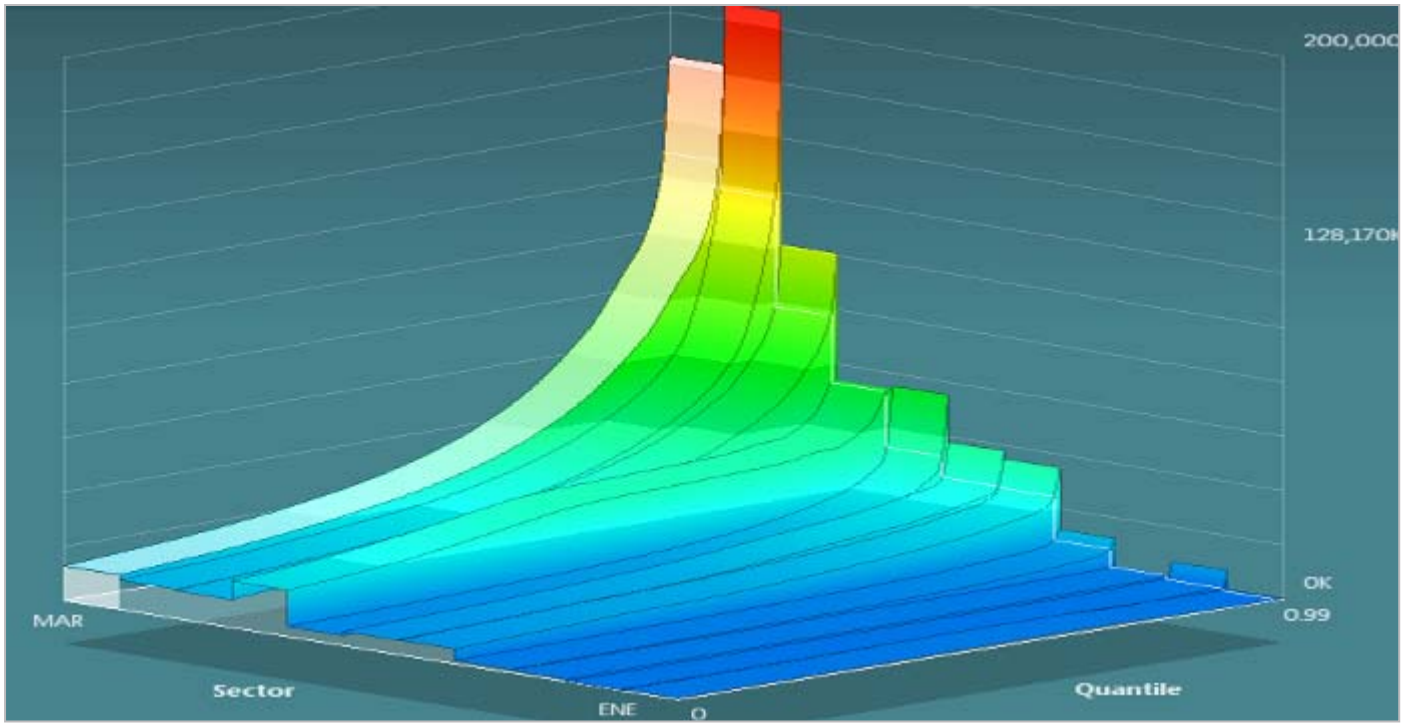
Communicating Risks



Actively Managing the Portfolio

Evaluating risk contributions across quantiles...but:

- Which cut of the portfolio (sector, geography, business line)?
- Which statistic (e.g., VaR, UL, Expected Shortfall)?
- Which quantiles (e.g., 95%, 99.9%, 99.97%)?



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Contact Us

Eric Takigawa
Eric.takigawa@algorithmics.com
Tel (81) 3 5224 4436

Toru Ohkuni
Toru.ohkuni@algorithmics.com
Tel (81) 3 5224 4437

Corinne Neale
Corinne.neale@algorithmics.com
Tel (65) 6536 7737

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