

Regulatory Update: Findings and Recent Developments for AMA

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Agenda

- Overview
- AMA benchmarking exercise
- Loss Data Collection Exercise (LDCE)
- QIS-4
- Conclusion

Disclaimers

- The analysis is based on information gathered from institutions on a voluntary basis.
 - Information is now dated, so results may not reflect current practices.
- Conclusions are based preliminary analysis. Caution should be exercised in the use of the data and conclusions.
- Comments should not be taken as statements of official policy of the Federal Reserve System or other US regulatory bodies.

AMA Benchmarking Exercise

- Occurred in 2004.
- Objective was to understand management and measurement of operational risk at 9 domestic mandatory institutions.
- A “deep dive” focusing on processes and structures underlying governance, data, and quantification.
- Focus was not on exposure estimates.

QIS-4

- Occurred in 2005.
- Objective was to understand the likely effect of proposed Basel II MRC standards at the industry, institution and portfolio level.
- Consisted of worksheets and questionnaires.
- Focus was on exposure estimates.

Loss Data Collection Exercise

- Occurred in 2005.
- Objective was to better understand the exposure estimates reported in QIS-4, and to better understand the completeness of the loss data on which these estimates are based.
- Requested data on individual losses.
- Focus is on data analysis and statistics.

Some common themes

- Several common themes reappear throughout the agenda for the next two days.
 - Data: collection, aggregation, classification, and validation.
 - Oprisk Reporting: how, what, and who?
 - Weighting of the four AMA elements.
 - Scenario analysis.
 - Validation of models and benchmarking results.

Results of the AMA Benchmarking Exercise

Benchmarking Project Overview

- Objective: Understand industry practice in the management and measurement of operational risk.
 - Draft Supervisory Guidance on Operational Risk AMA was used as basis of review.
- Structured by governance, data, and quantification
- Aggregate results used to:
 - Inform revisions to the Draft Supervisory Guidance.
 - Develop examiner training programs.
 - Provide feedback to institutions on range of operational risk management and measurement practices.

Governance Observations

- Governance framework implementation varied, but good progress was noted in most institutions.
- All but one had the 3 independent components.
- Reporting processes at all organizational levels were still in development or maturing.
- Testing and verification of the overall operational risk framework was the least developed function;
 - Scarce quantification skills hamper the ability to perform independent model validation and review.

Data Observations

- Institutions had made considerable progress in developing internal loss data collection systems.
- Most institutions had acquired external databases, but use of external data varied considerably.
 - Selection and review criteria were less developed.
 - Four institutions identified losses that represent their risks and circulated them to increase understanding of their exposures.
- Four had begun using scenario analysis, but significant work remains in this area.

Data Observations

- All were using some form of tools to assess BE&ICF.
- Six institutions used “risk and control self assessments” to identify and assess business environment and internal control factors.
- One institution used a scorecard process.
- Three institutions were in development stages of employing business environment and internal control factor tools.

Quantification Overview

- Four of nine institutions had existing LDA-type frameworks, one had a transitional process and was moving, along with three others, towards LDA approaches.
- There was considerable variation in:
 - The quantitative techniques underlying each element.
 - How the four elements were weighted and combined.
 - How diversification benefits were calculated.

Use of the Four Elements

- The four institutions with a framework were taking a variety of approaches to incorporating the four elements.
 - Internal data: all four were using internal loss data.
 - External data: three were using it as a direct input into the quantitative process; two used it as input into scenario analysis.
 - Scenarios: two institutions had existing processes.
 - Business environment and internal control factors: two were using as actual inputs into the analytical process.

Expected Losses (EL)

- Institutions indicated that they prefer a UL-only approach, but:
 - Only one attempted to show that EL included small losses.
 - Institutions were not yet able to demonstrate how EL is covered.

Correlation/Diversification

- Institutions were taking varying approaches to estimating diversification effects. All rudimentary.
 - Correlation levels relied on judgment rather than data.
 - No institution demonstrated the appropriateness of their assumptions, either empirically or by logical argument.
 - Methods vary. Institutions were using, or planned to use:
 - “Normal” formula approximation,
 - Correlations built into Monte Carlo simulations,
 - Copulas.

Documentation

- Most institutions had not developed model documentation.

Number of Institutions with Model Documentation		
Documentation Type		
Philosophy/ Assumptions	“How to” Manual	Audit Trail
2 complete 1 partial	1 complete 1 partial	1 partial

Other Quant. Observations

- Model validation was only in the planning stages.
- Institutions were using third parties for a variety of issues.
 - Third party involvement in any element of the analytical framework does not change expectations.
- Only one institution had explicitly modeled insurance effects.
- Significant work remained in all areas.

Policy & Implementation Issues

- Board Responsibility
 - What level of involvement is expected by the Board?
- AMA by legal entity
 - No one has developed separate AMAs by legal entity.
- Unit of analysis
 - At what level of granularity (by line of business and loss type) should institutions measure loss distributions?
- Combination of the four elements
 - What is the permissible range of practice for how the four elements may be combined?

QIS-4 Overview, with Focus on AMA Results

U.S. QIS-4 Overall Goals

- QIS-4 requested exposure estimates in a series of “worksheets”
 - Goal was to better understand the likely effect of the proposed Basel II MRC standards at the industry, institution and portfolio level
- QIS-4 also requested narrative description of analytical methods in a “questionnaire”
 - Objective was to gain insight into banks’ estimation processes for reported risk assessment values
- Use the results in formulating the NPR and guidance.

QIS-4 Overall Results

- Limited U.S. QIS-4 results released with congressional testimony on May 11, 2005:
 - material reductions in the aggregate minimum required capital for QIS-4 participants
 - the percentage change in minimum MRC varied significantly across institutions.
- Results also showed that Operational Risk accounted for 9% of Basel II Minimum Regulatory Capital.

Caveats

- Caution should be used in drawing any inferences from these preliminary results.
- The U.S. banking agencies are undertaking additional work to determine whether these results reflect:
 - differences in risk,
 - limitations of QIS4,
 - variations in the stages of bank implementation efforts (particularly related to data availability), and/or
 - the need for adjustments to the Basel II Framework.

Preliminary Oprisk Results

- Progress is being made, with some institutions beginning to have credible, risk-sensitive measures of operational risk exposure.
- Institutions appear to be converging toward LDA-type approaches with considerable variation in model specifics across institutions.
- Significant bank and supervisory challenges remain in building credible AMA frameworks.

Progress is being made

- Benchmarking review - only 4 or 5 institutions had working AMA models - none fully robust
- QIS4 – 6 months after benchmarking:
 - 24 institutions submitted an oprisk exposure estimate
 - Over half institutions have working AMA frameworks,
 - None fully meet ANPR standards
- Of the institutions with AMA-like frameworks, all are using some variant of the LDA.
- But methodologies vary significantly

Use of the four elements

- Internal data:
 - Most prominent direct input for over half of banks with working AMA frameworks
 - Some used internal data indirectly, and a few not at all
- External data is being used by most banks
 - Direct input for half of the banks
 - Indirect input of about a third of the banks with working AMA frameworks
 - Common use – supplementing internal data at LOB or loss event type level

Use of the four elements

○ Scenario Analysis

- Most significant input for over a third of the banks with working AMA frameworks
- Significant driver of operational risk capital charge for at least a quarter of banks with working AMA frameworks

○ BE&ICF

- Only half of the banks with working AMA frameworks, have developed processes to incorporate BE&ICFs
- Of those, most use BE&ICF as qualitative adjustment in allocating capital to LOB or to business units

Unit of measure

- Level of granularity varied significantly, with number of units of measure ranging from 1 to over 100
- Several banks submitted only 'top of the house' capital computations
- The others computed capital at LOB or loss event type level

Expected losses

- Majority of institutions submitted data on EL+UL basis. However...
 - Less than half of the banks with working AMA frameworks provided specific estimates of EL. We used LDCE data to help estimate EL for the remaining banks
 - EL is a significant number for many banks
 - Answers on questions regarding support of EL offsets limited and not very useful.

Diversification

- Over half banks assumed no dependence across business lines and event types
- There is a range of diversification benefits
 - On average, diversification averaged 33% of undiversified capital
- There is a relationship between diversification effects and the number of units of measure.

Distributional choices

- Almost all use Poisson distribution to model loss frequency
- There is more variation in the choice of severity distribution
 - Lognormal is the most common choice for modeling the body of the severity distribution
 - GPD and Transformed Beta are most common choices for modeling the tail
 - Some institutions use multiple severity distributions

Risk mitigation

- Approximately half of the banks estimated risk mitigation (insurance) in some manner
- Most did so on an ex-post basis, not embedding effects of insurance into their capital model
- Given the approaches taken, comparisons of relative impact of risk mitigants cannot be made

Significant challenges remain...

- There are significant technical variations in approach, e.g.,
 - Not all banks employ all four elements of the AMA framework
 - Scenario analysis and BE&ICFs least used elements
- Do they matter?
- If they do, does the variation affect the quality or integrity of the bank's AMA framework?

Significant challenges remain...

- Capital numbers submitted have some variation
- Is there a better way to evaluate the AMA framework and resulting capital numbers than by scaling by assets, existing capital, or gross income?

The 2004 Loss Data Collection Exercise

LDCE Overview

- LDCE requested full internal loss data underlying the QIS4 results.
- We received 23 LDCE responses between December 2004 and April 2005.
- Results were released at Boston Fed conference in May 2005.
- Two prior LDCEs were sponsored by the RMG.

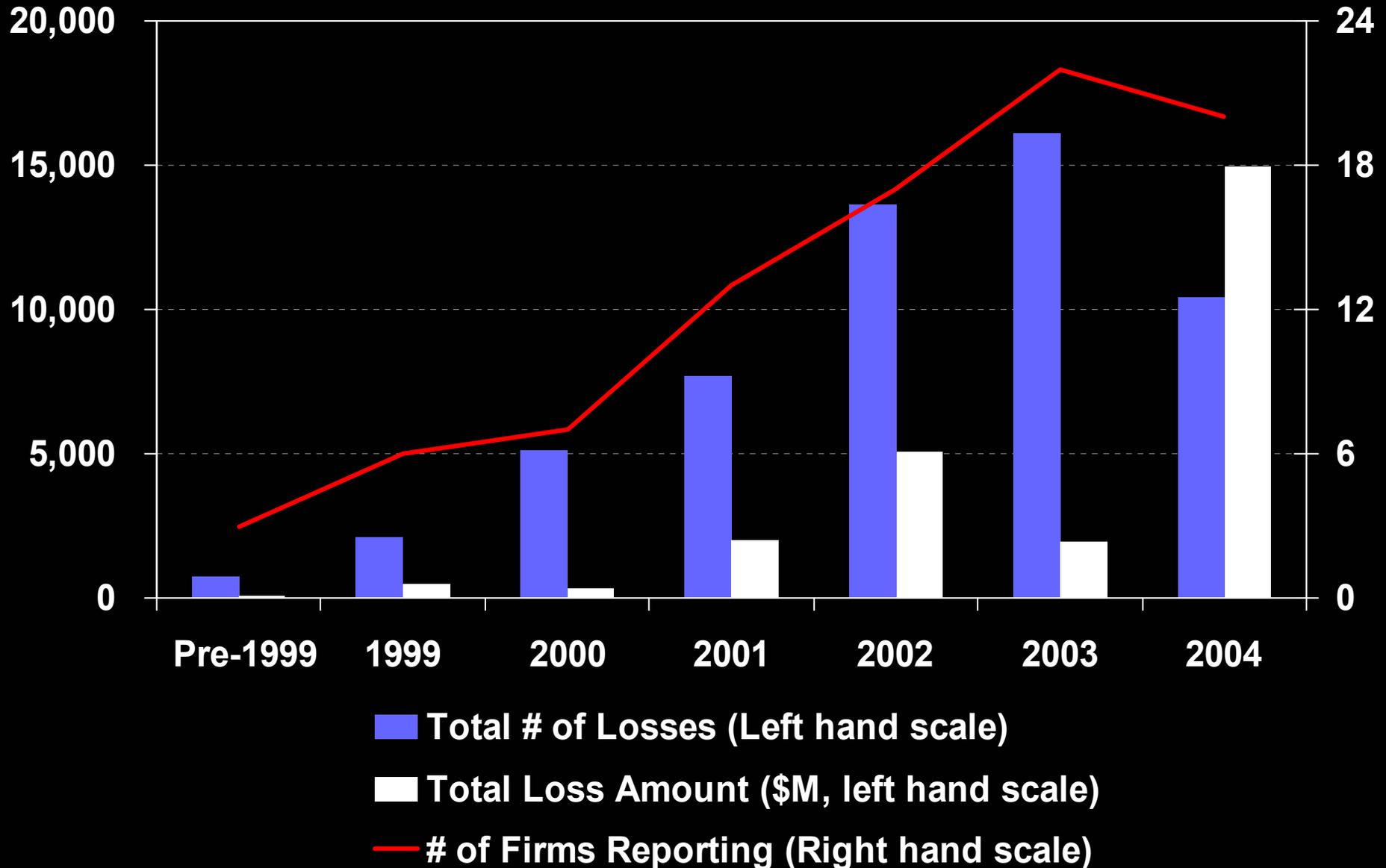
Key questions for LDCE

- Can LDCE results help us understand QIS results?
- What does LDCE tell us about the quantity and quality of data at participating institutions?
- What differences do we see across different business lines and different institutions?
- How can banks and supervisors use the results?

Descriptive statistics

# of Losses \geq \$10,000	# of Firms	# of Firms with Comprehensive Data	Total # of Losses \geq \$10,000	Total Loss Amt. (\$M)
0 – 250	6	2	640	\$212
250 – 1,000	5	2	2,253	\$283
1,000 – 2,500	8	5	13,404	\$8,151
2,500+	4	1	39,469	\$17,275
Total	23	10	55,766	\$25,920

Data collection by year



Frequency and Severity

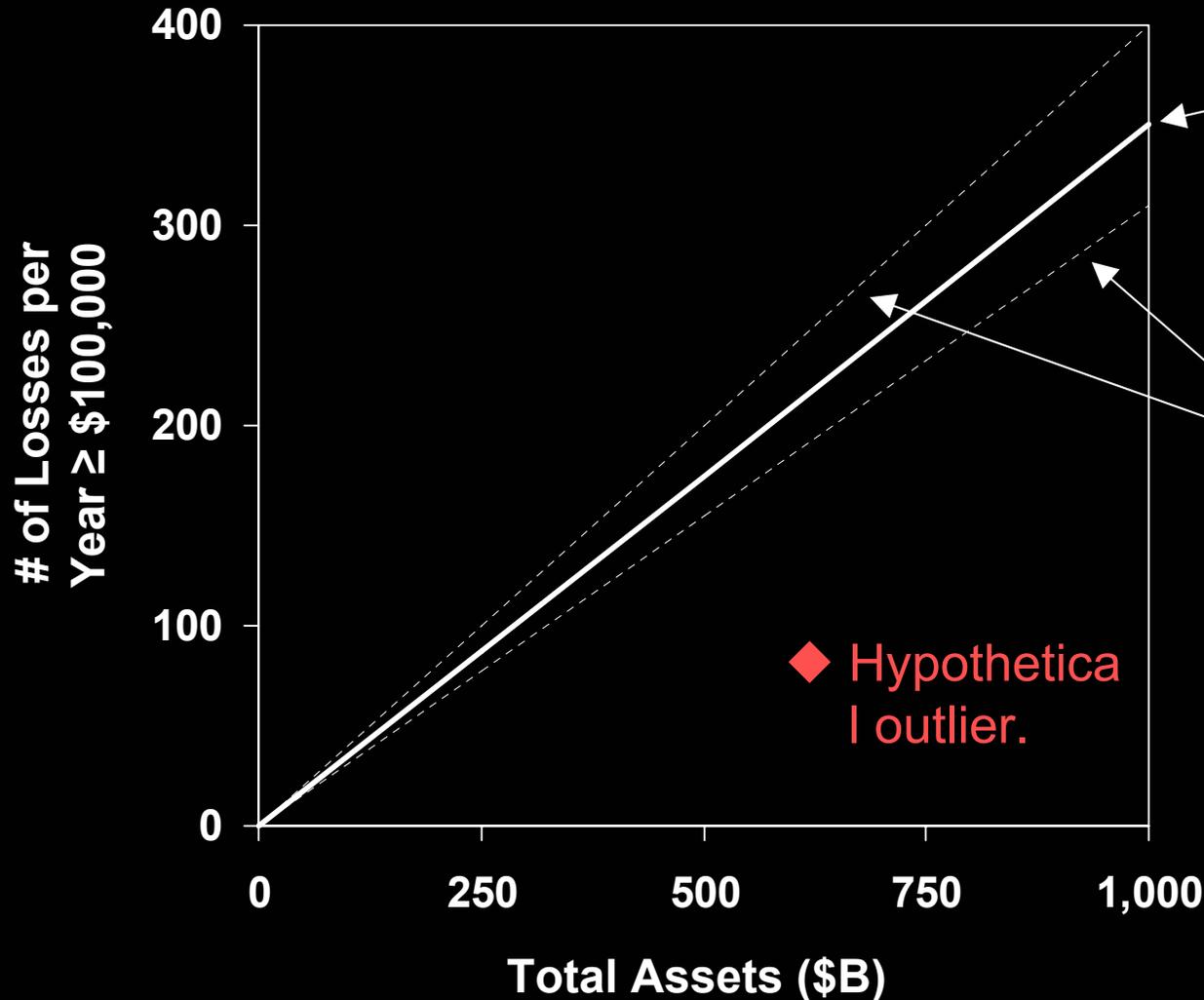
- Distribution of loss frequency:
 - With respect to business line, most losses (60%) occur in Retail Banking.
 - With respect to event type, most losses occurs (39%) in External Fraud, and the second most (35%) in EDPM.
- Distribution of loss severity:
 - 71% of total loss amount attributed to “Other” business line.
 - 80% of total loss amount attributed to Clients, Products and Business Practices event type.

Analysis of loss frequency

Table 8. Annualized loss frequency per Trillion dollars in Assets.

	Losses \geq \$20k	Losses \geq \$100k	Losses \geq \$1M
Firms w. \geq 1,000 losses			
Median	1760	350	35
IQ Range	(1530 – 2180)	(310 – 400)	(22 – 46)
Firms w. $<$ 1,000 losses			
Median	1230	370	33
IQ Range	(910 – 2100)	(100 – 440)	(0 – 38)

Graphical illustration



● A cross-firm median of 350 losses per year in excess of \$100,000 for each \$Trillion in Total Assets.

● Interquartile range: half of firms had between 310 and 400 losses per year in excess of \$100,000 for each \$Trillion in Total Assets.

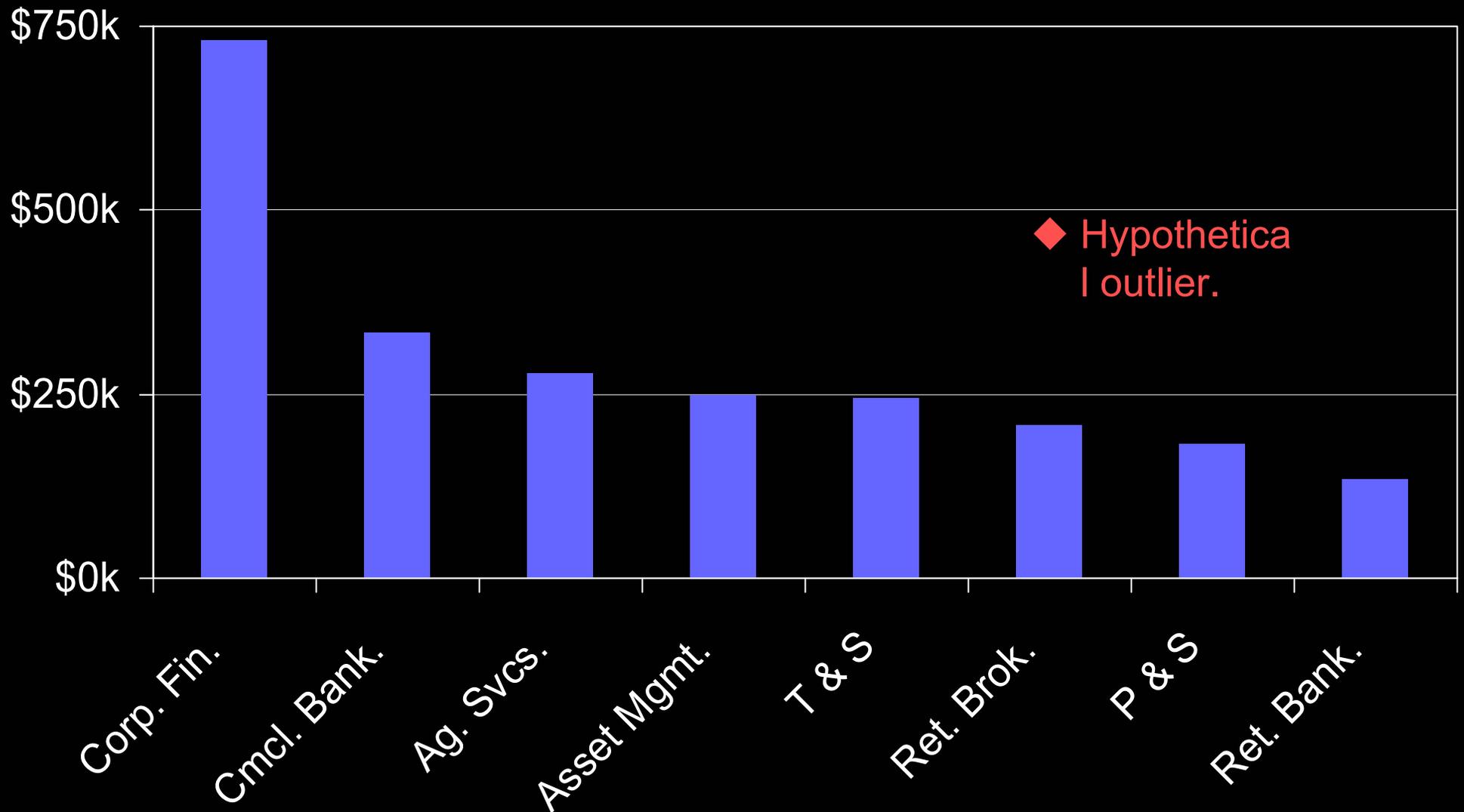
◆ Hypothetical outlier.

Potential explanations for variation

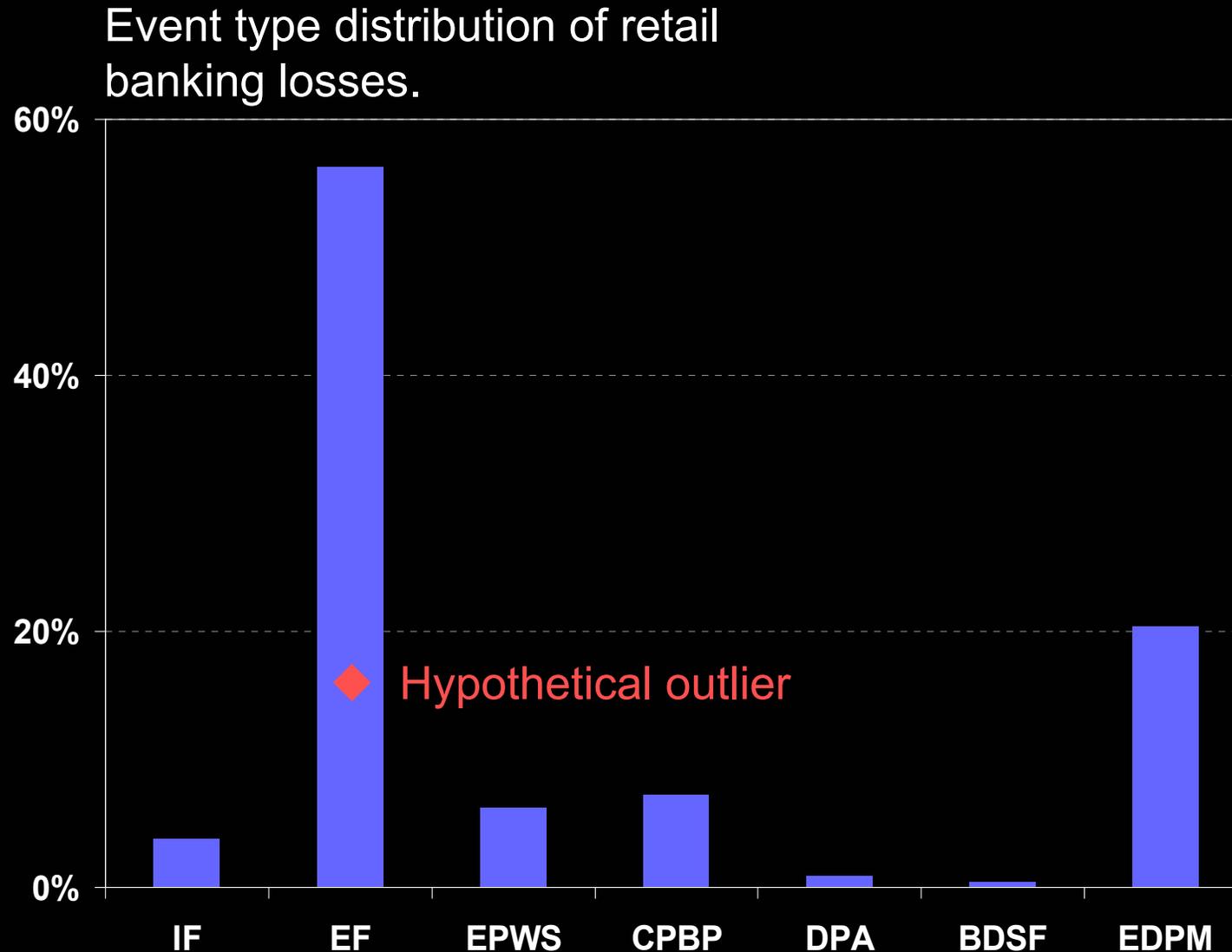
- Differences in business mix.
- Differences in control environment.
- Differences in data quality, completeness.

Analysis of severity distribution

Figure X. 95th Percentile of Reported Loss Data, by Basel Business Line
(Results reported as cross-firm medians.)



Distribution across event types



Insurance recoveries

- 8.4% of all losses had associated recoveries.
- 2.2% of losses \geq \$10k had associated recoveries.
- The dollar amount recovered is about 5% of the total loss amount.
- Recovery rates vary significantly across event types.

LDCE Conclusions

- The exercise was a success given the breadth of participation and the amount of data collected.
- Results provide a reasonable basis for characterizing the industry's operational loss experience.
 - For example, we found that loss frequency appears to scale well with Total Assets and other exposure indicators.
- Data appear sufficiently rich to support serious analysis of outstanding issues.

Outstanding issues

- Think about reasoned way to consider outliers
- Large loss reporting:
 - Business line attribution
 - Aggregation
- Missing information.
 - Insurance recovery information.
 - Exposure by Business Line and Event Type.
- Other
 - Data threshold selection

Conclusions

Conclusions

- The LDCE, QIS-4, and the benchmarking exercise formed a comprehensive approach for gathering information required for sound policy
 - LDCE focused on inputs (data)
 - Benchmarking focused on process (framework)
 - QIS focused on outputs (capital)
- Together they suggest that significant progress is being made in all areas, ...
- ... but that challenges remain for both banks and their regulators.

Next Steps

- Work to better understand differences and variations in models and capital results
- Further leverage LDCE data to understand QIS results.
- Monitor industry efforts in areas including
 - Use of risk mitigants
 - Correlation/diversification
- Provide LDCE feedback to participating institutions.

Next Steps

- Address outstanding regulatory issues including
 - EL/UL
 - Unit of measure
- Pursue research on key technical issues such as the choice of severity distribution.

Questions?