



External Data as an Element for AMA

**Use of External Data for Op Risk Management Workshop
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Contents

- Observation of operational risk losses
- Overview of AMA quantitative aspects and issues
- Use of External Data
- Reference Information



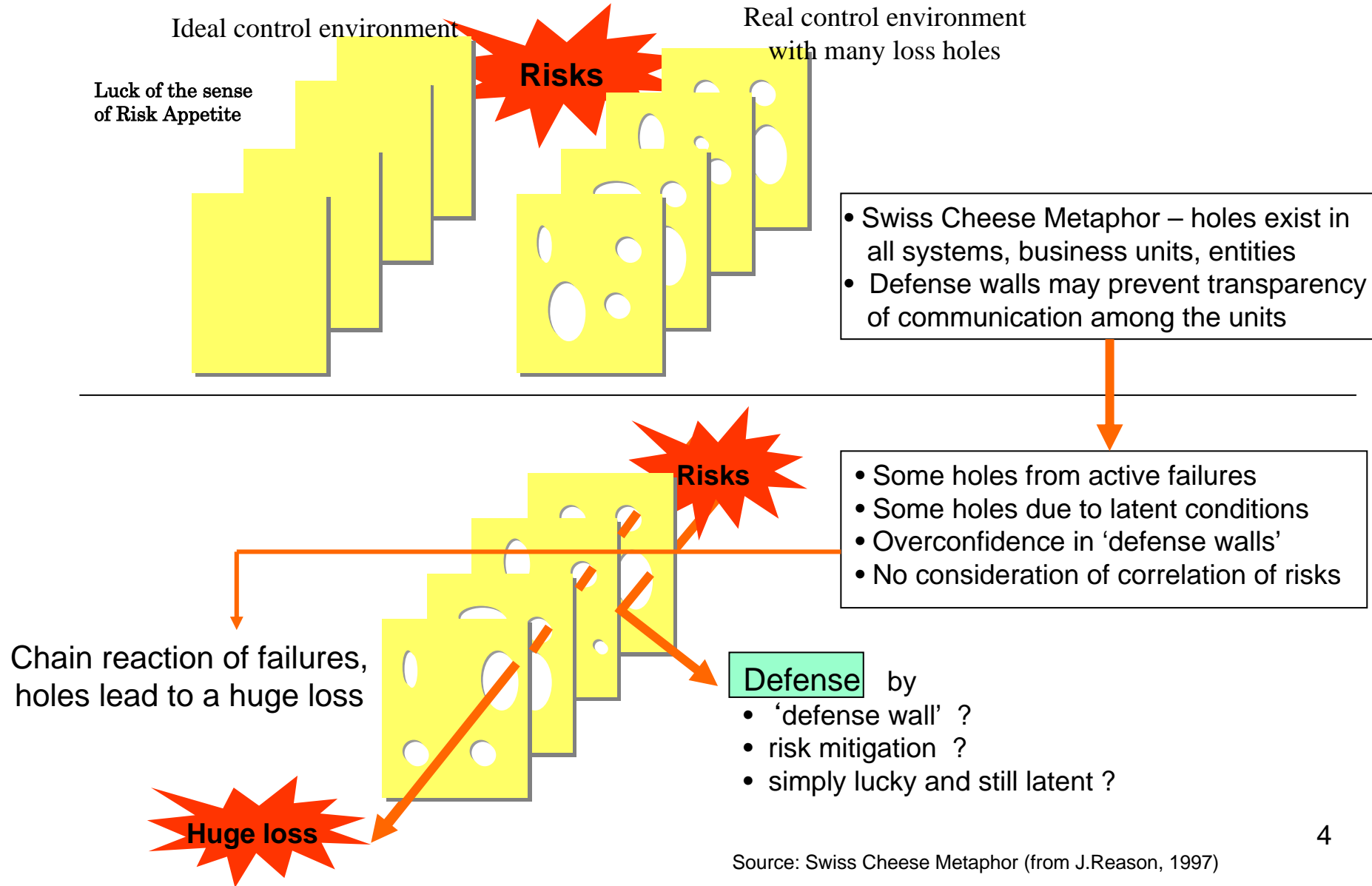
Dilemma of Operational Risk

- Zero Defect vs. Risk Appetite
- Partial Optimum vs. Whole Optimum
- Independency vs. Correlation
- Systemization vs. Manualisation
- Centralization vs. Decentralization



Why catastrophic losses occur

- Case of Swiss Cheese Metaphor On Operational Risk -



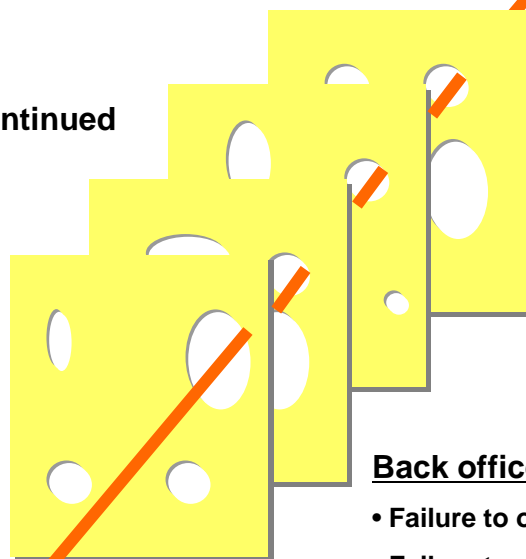
Source: Swiss Cheese Metaphor (from J.Reason, 1997)



How catastrophic losses occur

Typical case of huge loss in 1995

Falsified trade continued for 12 years



Active failure:

- Trader created bogus trades to hide losses and size of position
- Falsification of trading records and documentation

Supervision:

- Almost no supervision of front office and back office staff
- Trader and supervisor (checking record) were the same person

Personnel Aspects:

- Trader compensation scheme directly related to net trading profit
- Trader allow to trade huge amounts of money without limitation

Back office controls:

- Failure to obtain transaction confirmation
- Failure to obtain identify manipulation of amount from holdover transactions

High Level Controls:

- Senior management: Lack of appreciation of risks associated with trading strategy, instead, management showed its appreciation for fake trading profit
- No implement audit, checking or supervisory recommendation

\$ 1100 M loss

+

\$ 340 M fine and withdrawal from US

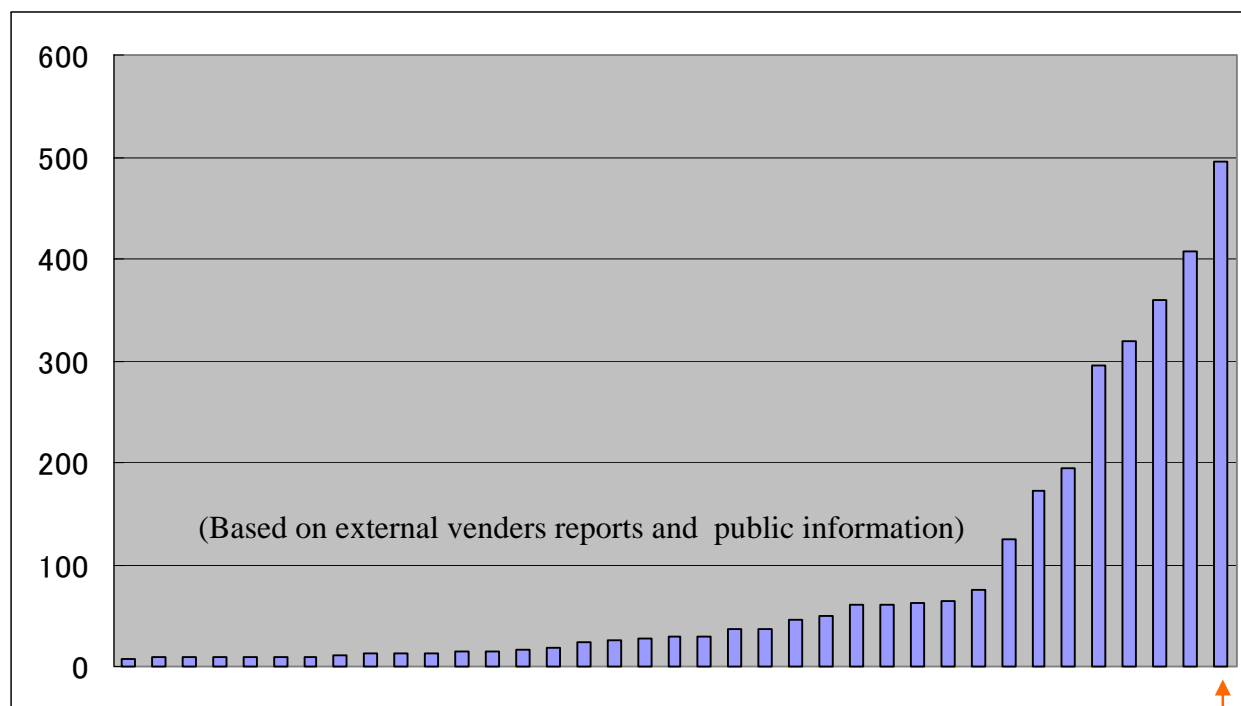
Many things bank's losses have in common



Operational Risk Losses at Japanese Firms

Main large operational risk losses in Japan
(since 1991, losses exceeding \$10 million losses)

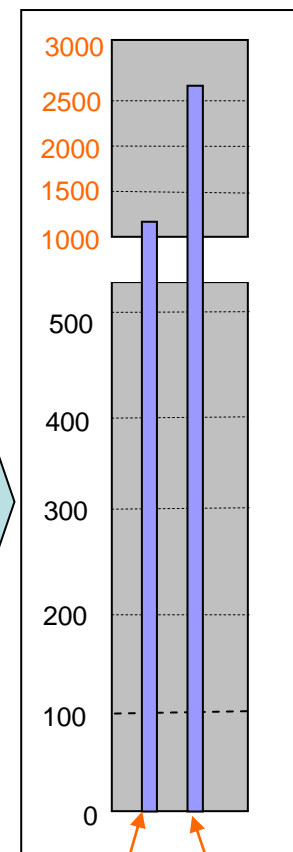
(\$ Million)



Since 1991, there have been approx. 40 losses exceeding \$10 million, and 90 losses exceeding \$1 million in Japan (Excluding losses which took place outside Japan)

for 40 min.

Catastrophic loss of Japanese firms
(\$ Million)



for 12 years

for 10 years
(not the loss of FSI)



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AMA quantitative requirement

AMA : Capital Charge = Risk measured by the bank's internal model (operational risk measurement system) using the Quantitative and Qualitative standards (Basel text, 655)

A bank must meet the qualitative standards before it is permitted to use an AMA for operational risk capital (Basel text, para 666)

A bank must be able to demonstrate that its approach captures potentially severe 'tail' loss events. (comparable to a one year holding period and a 99.9th percentile confidence interval) (Basel text, para 667)

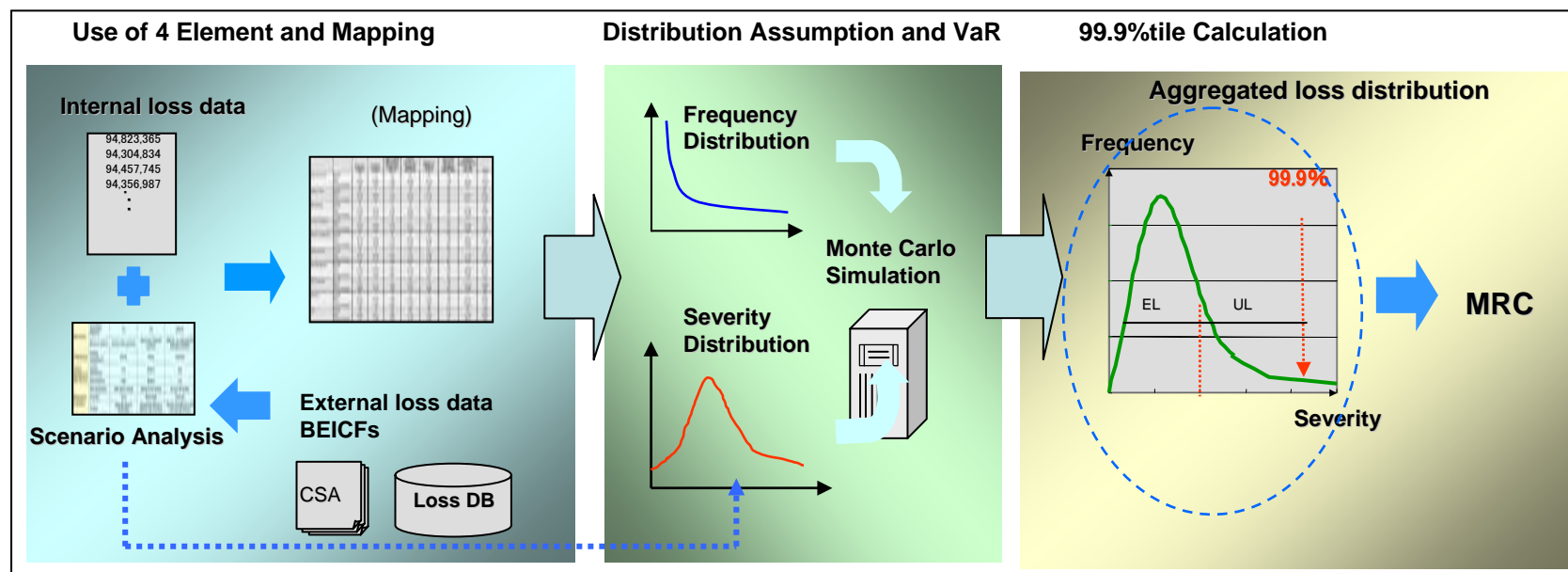
The Basel committee provides significant flexibility to banks in the development of an operational risk measurement and management system. (Basel text, para 668)

The measurement system...must include 4 fundamental elements:

- Internal data
- External data
- Scenario analysis
- BE&ICF (Basel text, 669 (e))

There may be case where estimates of the 99.9th percentile confidence interval based primarily on internal and external loss event data would be unreliable for business lines with a heavy tailed loss distribution and a small number of observed losses. (Basel text, 669 (f))

AMA Measurement Model Image



Need to overcome Issues related to AMA Measurement Model

- Parametric and Non-parametric estimates have both advantages and disadvantages
- Variety in the choice of correct distribution with correct parameters
- **Paucity of data to estimate the tail of the severity**
- **Defining the frequency of tailed losses are challengeable**
- Capture the element of BEICFs and input measurements
- Decrease biases while generating scenarios and determining their frequencies



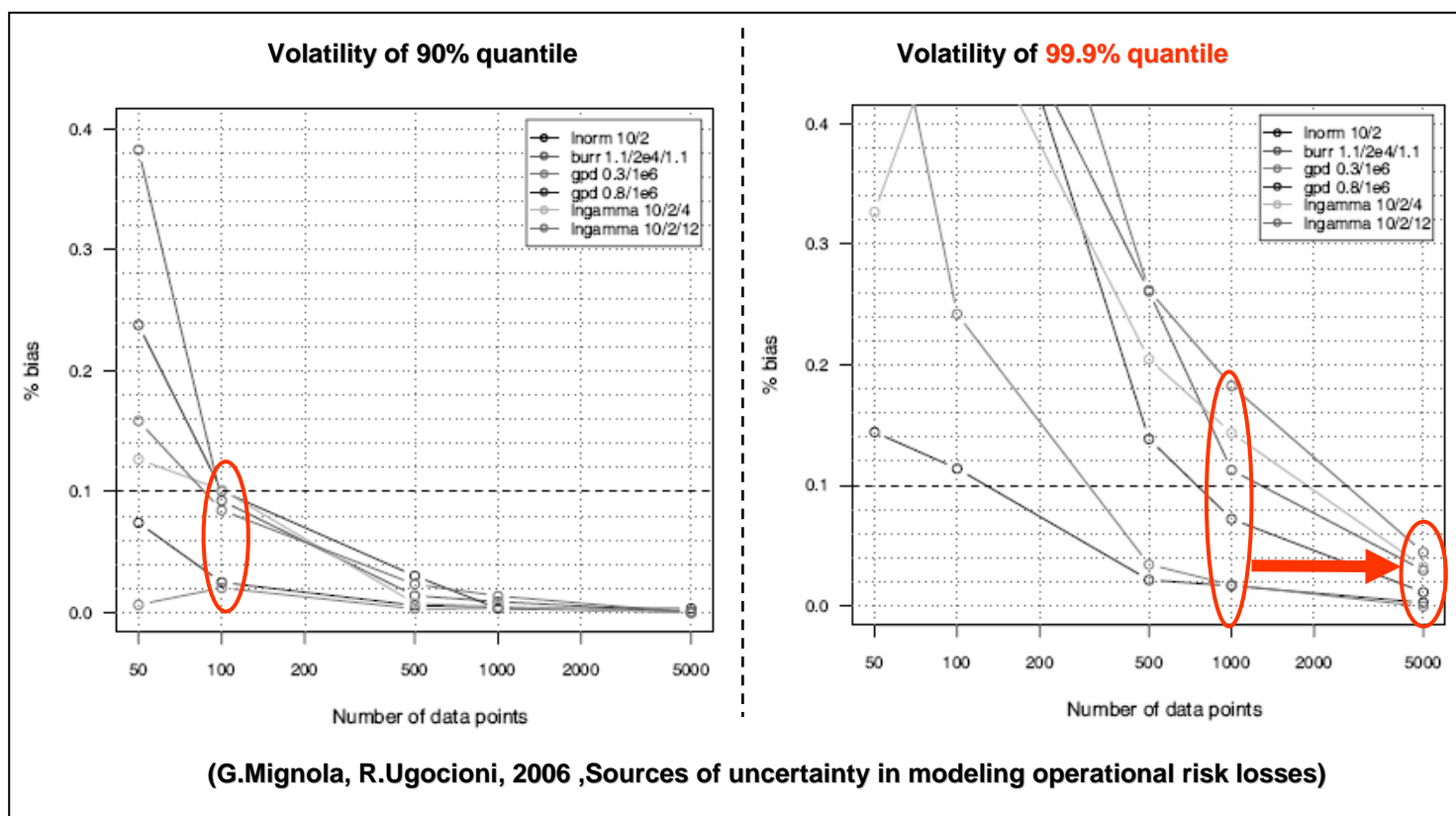
Issue of Paucity of data

“ For heavier-tail distributions (99.9 percentile), at least a thousand points are needed ”



It's unrealistic to collect thousands of data points of tail part as internal losses

At the 90% quantile, 100 data points are needed, but at the 99.9% quantile, around 3000 data point is necessary.





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How the external data is used

Banks gather external loss data.... :

- (i) Building in-house database from public sources ← (ref. CEBS guideline, para 541)
- (ii) Participating in industry data consortia ← (ref. CEBS guideline, para 540)
- (iii) Purchasing external data from vendors

Many banks use external data to inform their scenario process.... Some banks use external data as a direct input to a risk quantification model.

...may need to be adjusted depending on how the external data is used in an operational risk measurement system

(Range of Practice paper)

A bank must have a systematic process....eg scaling, qualitative adjustment or informing the development of improved scenario analysis

(Basel accord, para 674)

Scaling, qualitative adjustment: Account for differences in size, business environment and internal controls ← (ref. Bafin & Bundesbank guideline, para 6.3.2)

May need lots of exposure information for each business line for scaling and adjustment:

- gross income
- number of employees
- asset size

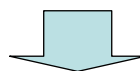


Principles for capturing potentially severe 'tail' loss events (1)

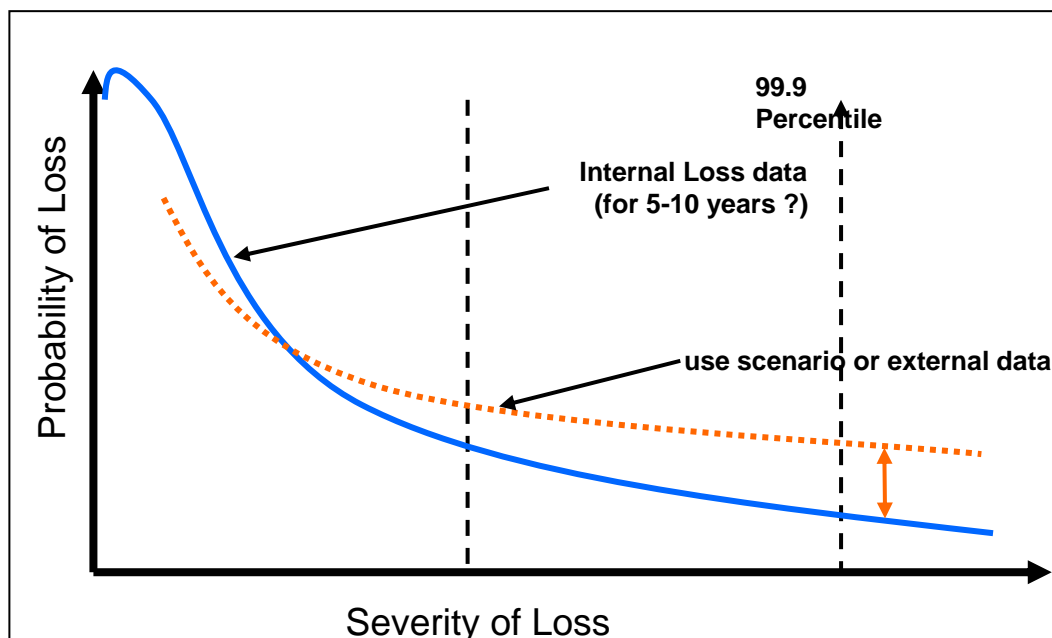
Use of scenario or external data to supplement the internal loss data to capture *Infrequent, potentially sever losses*

↕

99.9 percentile confidence interval ← { Losses taking place once in a thousand years per bank, or once in a thousand banks per year.



Internal loss data is not enough for capturing the required risk-profile



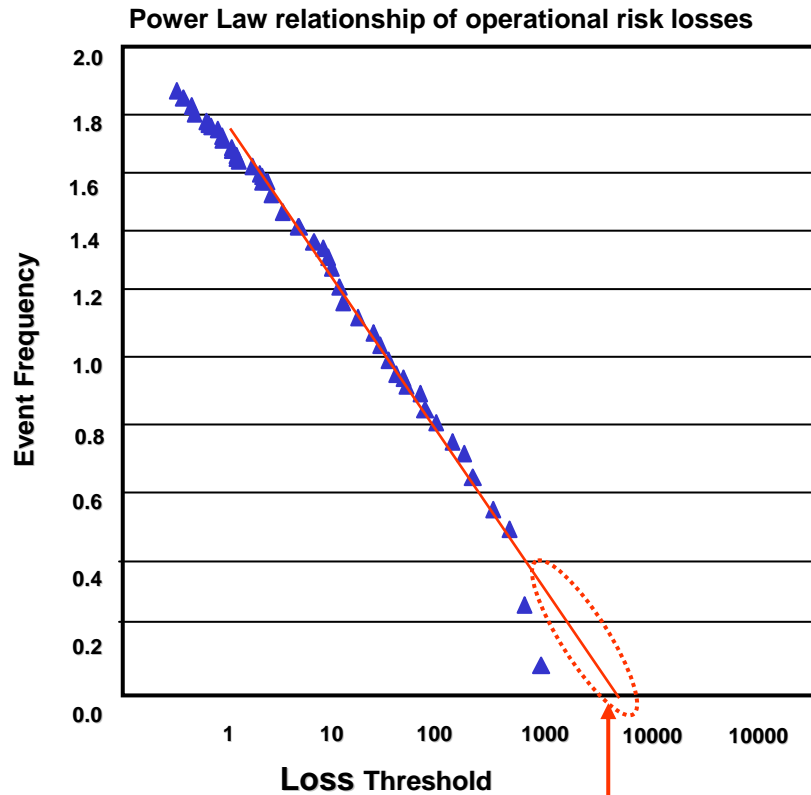
Majority of Japanese banks use external data indirectly, but material use for generating scenarios

Principles for capturing potentially severe 'tail' loss events (2)



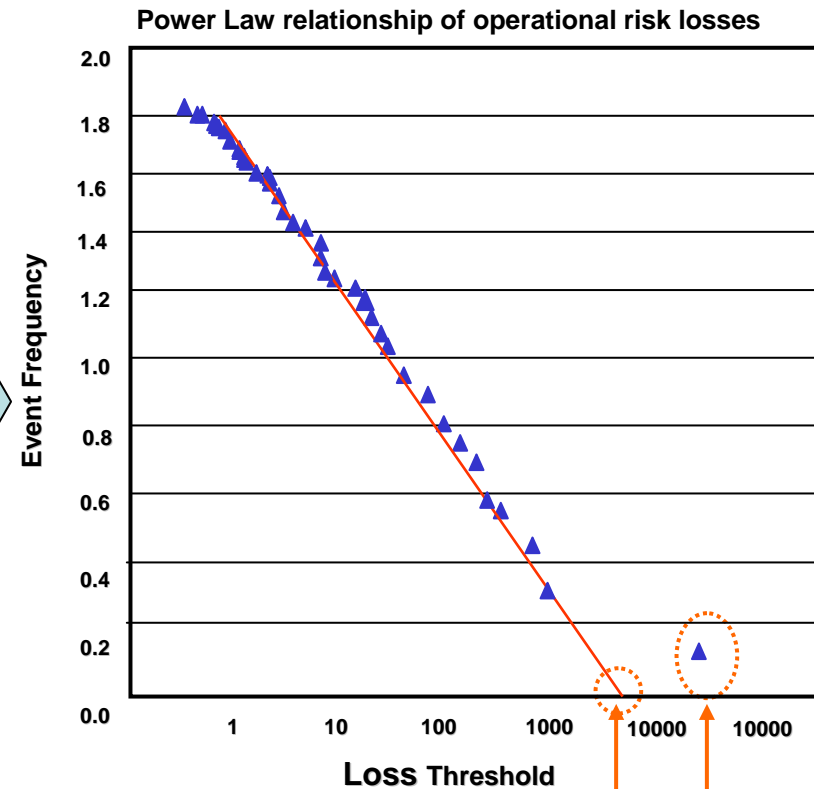
Two patterns of tailed losses

Pattern A: Short tail



- Need to capture Infrequent, potentially sever tail losses
- A bank use scenario analysis.... in conjunction with external data to evaluate its exposure to high-severity events.

Pattern B: Long tail

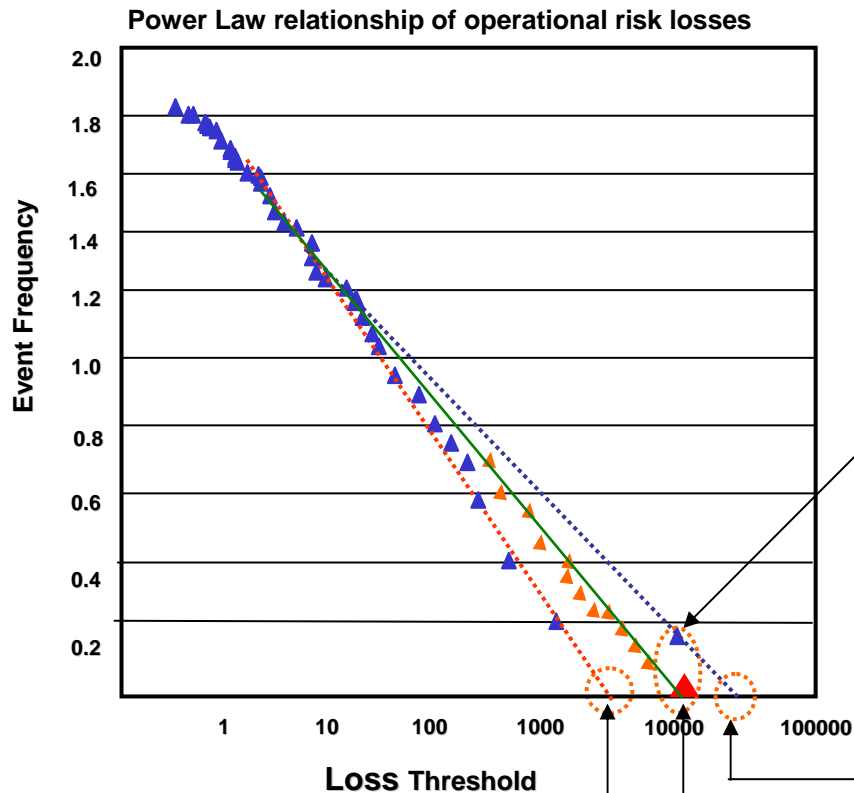


- A single largest loss has serious impact on capital
- It is unreasonable to deal with it as outlier and omit it

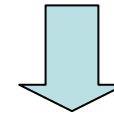
Principles for capturing potentially severe 'tail' loss events (3)



Case of active usage of external data



- Internal loss data is crucial for trying a bank's risk estimates to its actual loss experience (Basel text, 670)
- ...whether the internal loss data is used directly to build the loss measure or to validate it. (Basel text, 672)



It may not be adequate to set the frequency for the observed period for 5-7 (?) years.
Maximum loss amount would be extremely jump up

Analyze the loss to determine reasonable frequency with using external data, while its severity is unchanged

If the largest loss would not be counted, the maximum loss amount would be much smaller. But should not neglect the largest loss.



How the external data is used

External loss is inherently biased

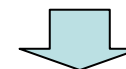
Need to consider some reporting biases

- **Scaling Biases** : What exposure are used
- **Truncation Biases** : Collecting threshold (truncation point) are vary.
- **Disclosure Biases**: Reporting probability increase with loss amount



Need to filter data points before scaling

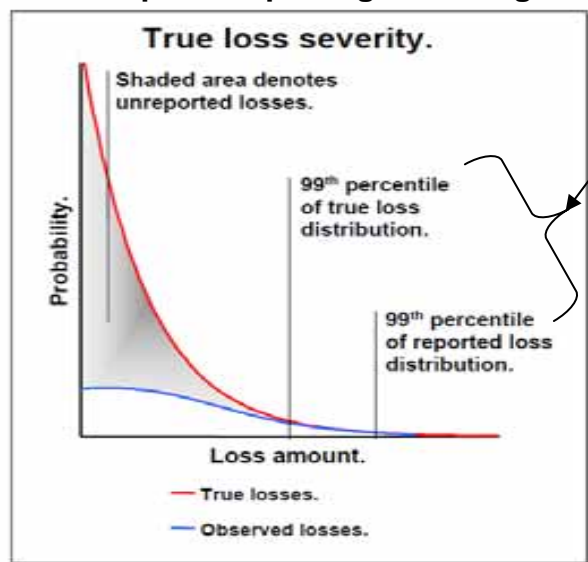
- **Country, business line, product**
- **Select competing firms**
- **Exclude firms of fraudulent activities**



Avoid data contamination and keep data homogeneity

Loss severity estimates may be biased upwards

Example of reporting bias image



Capital estimate
my be too high
*If internal data used for
frequency and external
data for severity*
(FRB Boston)

Is this practical for banks ?

May need to further consider;
• **Data collecting bias**
• **Data selecting bias**

Is external data(as samples,
parameter) is enough for banks ?

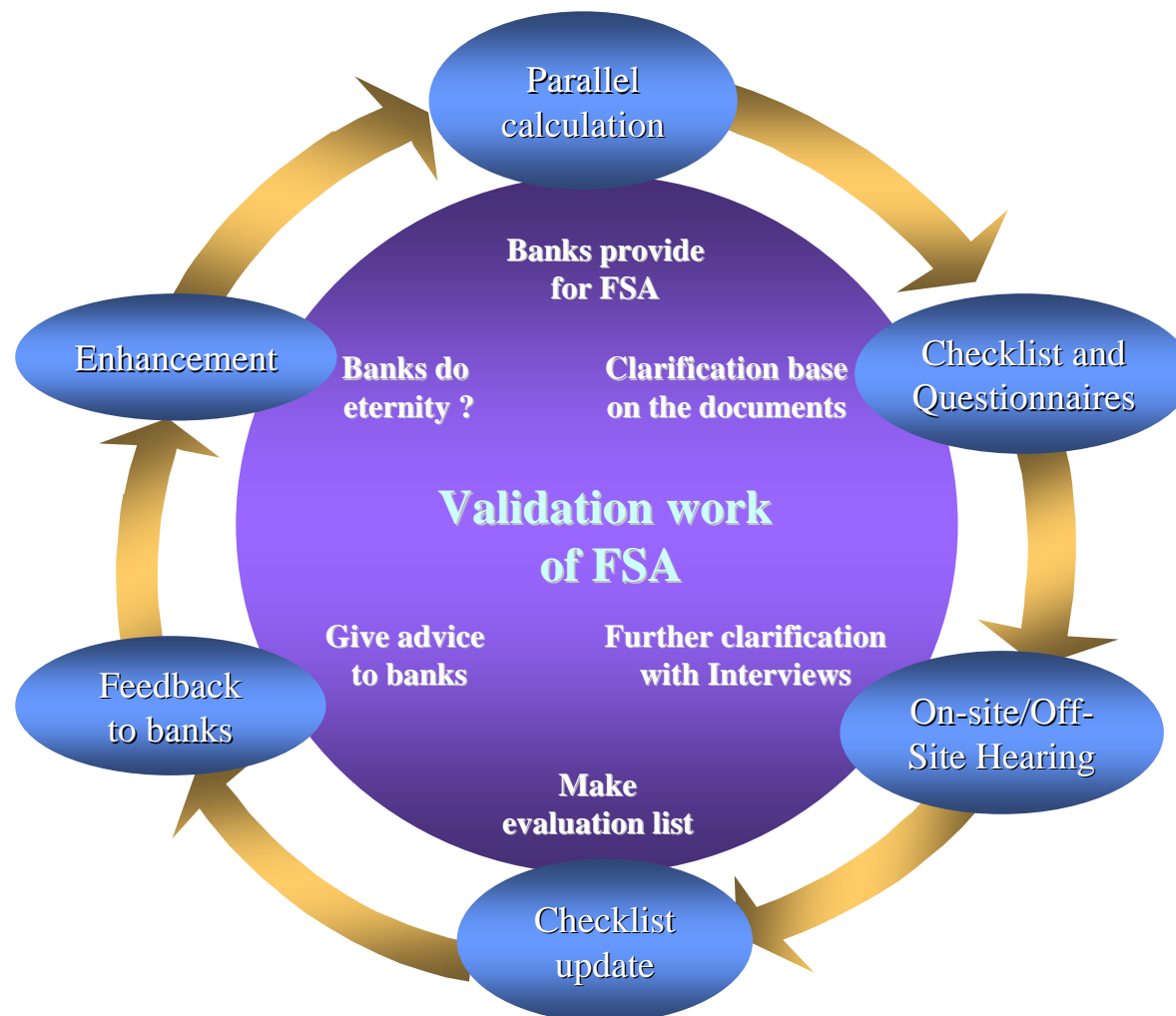


External Data Summary

- To be adjusted depending on how the external data is used on operational risk measurement system
- To correct the sufficient parameter (# of samples) of external data to quantify and verify the rationality of measurement system
- To define systematic process for scaling and filleting of external data
- To recognize, a lot of exposure information for each BL for scaling and adjustment would be necessary
- To recognize some bias with using external data, and take measures (including Data collecting bias and Data selecting bias)



the conditions and methodology employed when using external loss data to calculate operational risk charges, as well as procedures to determine the conditions and methodology, are systematically prescribed and periodically verified. (FSA, Japan Guideline on External data)





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Basel text on External Data

"A bank's operational risk measurement system must use relevant external data (either public data and/or pooled industry data), especially when there is reason to believe that the banks is exposed to infrequent, yet potentially severe, losses. These external data should include data on actual loss amounts, information on the scale of business operations where the event occurred, information on the causes and circumstances of the loss events, or other information that would help in assessing the relevance of the loss event for other banks. A bank must have a systematic process for determining the situations for which external data must be used and the methodologies used to incorporate the data (eg scaling, qualitative adjustments or informing the development of improved scenario analysis). The conditions and practices for external data use must be regularly reviewed, documented, and subject to periodic independent review."(paragraph 674)

Range of Practice Paper on External Data

Issues/background

With the paucity of internal loss data relative to what is required to reasonably assess a bank's operational risk profile, banks are exploring the use of external data to supplement their internal loss data. External loss data is available from various sources, but whatever the source it must be assessed for its relevance and may need to be adjusted depending on how it is used in an operational risk measurement system. For example, for some applications of external data adjustments may be required to account for differences in size, business environment and internal controls. Depending on the external data source, there may be gaps in the information needed to make these adjustments, sometimes due to lack of disclosure by a data vendor or consortium. In addition, work remains to be done before some of the technical challenges to scaling and other adjustments are resolved. These issues are not insignificant as a bank's inappropriate use of external data could have a material impact on the outcome of its capital calculation. Some banks are reluctant to join data consortia due to confidentiality concerns.

Range of practice

Banks gather external loss data by one or more of the following means: (i) building and maintaining an in-house database by gathering relevant information from public sources such as newspapers, magazines and trade journals; (ii) participating in industry data consortia; and, (iii) purchasing external data from vendors. Consortium data appear to cover a wider range of events than vendor data.

While many banks have access to vendor or consortium data that includes data from their respective countries, this is not universally the case. As a result, some banks would have to gather such external data themselves if it is considered of sufficient importance.

Many banks use external data to inform their scenario process and for risk management purposes such as validation. Some banks use external data as a direct input to a risk quantification model.



FSA, Japan guideline on External Data
(interim translation)

6) External loss data includes operational risk loss amounts, data concerning the scale of operations affected by loss events, data concerning the causes and status of loss occurrence as well as other data required to determine the appropriateness of referencing such loss data. Further, the conditions and methodology employed when using external loss data to calculate operational risk charges, as well as procedures to determine the conditions and methodology, are systematically prescribed and periodically verified.

OSFI guideline on External Data

External data

674. A bank's operational risk measurement system must use relevant external data (either public data and/or pooled industry data), especially when there is reason to believe that the bank is exposed to infrequent, yet potentially severe, losses. These external data should include data on actual loss amounts, information on the scale of business operations where the event occurred, information on the causes and circumstances of the loss events, or other information that would help in assessing the relevance of the loss event for other banks. A bank must have a systematic process for determining the situations for which external data must be used and the methodologies used to incorporate the data (e.g. scaling, qualitative adjustments, or informing the development of improved scenario analysis). The conditions and practices for external data use must be regularly reviewed, documented, and subject to periodic independent review.

UKFSA BIPRU on External Data

- 6.5.22 R (1) This rule sets out the quantitative standards that a firm's operational risk
- (2) A firm's operational risk measurement system must use relevant external data, especially when there is reason to believe that the firm is exposed to infrequent, yet potentially severe, losses. A firm must have a systematic process for determining the situations for which external data should be used and the methodologies used to incorporate the data in its measurement system. The conditions and practices for external data use should be regularly reviewed, documented and subject to periodic independent review.

SFBC guideline on External Data

E. External loss data (Art. 95 para 2 CAO)		
674	A bank's operational risk measurement system must use relevant external loss data. This should ensure the consideration of infrequent, yet potentially severe loss events. Publicly available and/or pooled industry loss data can serve as sources for this relevant information.	82
674	The external loss data must include data on actual loss amounts, information on the scale of business operations where the event occurred, information on the causes and circumstances of the loss events, and information allowing assessing the relevance of the loss event for the own bank.	83
674	A bank must have a systematic and documented process for the use of external loss data. This particularly includes a clear methodology for the incorporation of the data into the AMA (e.g. scaling, qualitative adjustments, or influence on scenario analysis). The conditions and practices for external loss data use must be regularly reviewed, and be subject to periodic internal and external audit.	84



Reference Information

CEBS guideline on External Data

537. Annex X, Part 3, Paragraph 19 of the CRD states that the institution's operational risk measurement system shall use relevant external data, especially when there is reason to believe that the institution is exposed to infrequent, yet potentially severe losses.
538. Consortia initiatives, which are generally set up by institutions, collect data above low thresholds, usually very close to the thresholds established internally by those institutions.
539. Institutions that participate in consortia initiatives should provide data which are classified in a homogeneous manner and contain information which is comprehensive and reliable. Information obtained from consortia initiatives which have the above-mentioned characteristics can be considered an appropriate external data source for capital calculation purposes, particularly when institutions have limited internal loss data, e.g. on new businesses.
540. Where external data from consortia are insufficient for obtaining information on severe tail events, especially on their causes, public sources could provide useful additional information.
541. Particular care must be taken when an institution uses only public data to ensure that they are appropriate, unbiased, and relevant to the institution's businesses and operational risk profile.
542. Differences in the size of institutions or other institution-specific factors should be taken into account when incorporating external data in the measurement system, for example by making assumptions as to which external loss events are considered relevant and on the degree the data should be scaled or otherwise adjusted.

APRA guideline on External Data

46. Relevant **external loss data** must be incorporated into an ADI's operational risk measurement system. An ADI must have in place a systematic and robust process for collecting, assessing and incorporating external loss data into the ADI's operational risk measurement system.
47. The use of external loss data should include the consideration of infrequent yet potentially severe operational risk loss events.
48. External loss data should include data on the loss amount and loss event category, information on any recoveries to the extent that these are known, the nature and scale of the operation where the event occurred and any other available information that would assist in assessing the relevance of the loss event to the ADI.
49. An ADI must have a systematic process for determining the situations for which external loss data are used and the methodologies used to incorporate the data. The collection and application of external loss data must be regularly reviewed, documented and subject to periodic independent review.



6.3 External Data

Relevant external data must be considered in the measurement system. This includes data on loss events from loss databases of third party vendors, consortia and association databases and other publications.

External data are especially relevant for the measurement of risk events with potentially high losses and for the development of scenarios. For the latter, data sets containing a precise description of the losses are required. This is often not the case for anonymized consortium data sets.

Some of the banks are members of the data consortia ORX (Operational Risk data eXchange association), VÖB (Association of German Public Sector Banks), BVI (Bundesverband Investment and Asset Management e.V.) or Gold (Global Operational Risk Loss Database). The quality of the external data sets and its homogenous allocation to event categories and business lines is very important for the quality of the measurement system and for model validation. This is especially true for loss data from data consortia. Therefore it is necessary, that not only within banks, but also within data consortia, the quality of the data sets is guaranteed through adequate processes.

6.3.1 Choice of external data sources

Some banks have already made concrete choices on external data sets and created relevant concepts, e.g. how external data should be used in the model. One third of the banks has at least made a decision on the data sources and outlined concepts on how to use external data.

Some banks have not yet made a decision on the use of external data, some are awaiting the creation of a solution from their respective banking association. External data is gained from publications, via public providers and the participation in data consortia. Public data sources used include OpVantage, Fitch First and SAS Global Data. External data providers extract information mostly from public sources and usually only collect data exceeding a high threshold, e.g. one million USD. The thresholds of data consortia are usually much lower.

Almost half of the participating banks is involved in the exchange of loss data via the data consortia ORX, VÖB, Gold or BVI. The thresholds are much lower than with public external data providers. Almost all banks get external data from more than one source and use the data sets for different purposes within the model. It was not always possible to determine if the amount of external loss data is sufficient to adequately capture potentially severe loss events.

When choosing external data providers, the business activities should be considered. For example, banks with world wide business activities should select data providers with world wide loss data and similar business and geographical focuses. For banks which are active only in Germany, the participation in a national data consortium may be sufficient.

For banks which get external data exclusively from data consortia, a lack of low frequency / high severity losses might be problematic when modelling the tails of the loss distribution.

To adjust the external data sets to internal standards, adequate scaling mechanisms should be installed.

6.3.2 Scaling methods

No homogenous use of scaling methods is established so far. A scaling of external data to adjust it to the individual institution seems necessary whenever banks are incorporating data from other banks that differ in terms of size, business activities and complexity.

Sometimes, external data is entered into the model without scaling. This is adequate if losses have occurred in similar size, business activity and complexity. Partially, the loss severities are scaled due to expert estimates or gross income, headcount or total assets.

Some banks assess the relevance of external data sets before scaling and exclude data sets irrelevant to their business activities. Few banks consider all external data sets as relevant. Most banks have not yet made precise commitments on this subject.

6.3.3 Independent validation of the use of external data

If external data is used, banks have determined an independent function for validating the conditions and processes concerning the use of external data. Usually, this is internal audit, sometimes this is delegated to a trustee of the data consortium. In principle the latter is only possible for consortium data, not for public data.

6.3.4 Purpose of external data

The following purposes for external data use are stated by a third of the participating banks:

Use of external data within the model: External data is used by the majority for the modelling of sparsely filled risk cells and for the modelling of high impact areas (tails). Partially, these data sets are used for an adjustment of the internal loss distribution or for the validation of the results of scenario analyses.

Use of external data in scenario generation: The majority of the banks use external data for this purpose.

Use of external data for validation: Partly external data is used for this purpose.

Use of external data for other purposes: Partly external data is used as information sources for OpRisk management and for benchmarking within the business lines.

6.3.5 Data sets for external events

The submitted data must contain all regulatory required and other significant information on OpRisk losses (e.g. date of occurrence, date of capturing, gross loss, net loss, insurance payment). If the creation of the data sets and the processing of external data will meet the regulatory requirements can only be judged in the overall context of the model. Aside from the amount and the structure of the data, a homogenous understanding of the recorded values is essential.

The following conclusions can be drawn:

A consistent definition of OpRisk terms is currently not always provided in practice.

The loss definition may vary across different data sources.

The consistent collection practice for losses (e. g. description of a loss event incl. cause) is not always given.

The consistent categorisation by event categories and business lines leaves room for improvement.

The economisation of the data sets provided by data consortia leads to a lack of important information.



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Thank you !