



BANCA D'ITALIA  
EUROSISTEMA

3rd EBA Policy Research Workshop on  
"How to measure the riskiness of banks"

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*Discussion on the paper  
"Evidence, Estimates and Extreme Values from  
Austria"  
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## General comments

The analysis provides additional insights on the behaviour of operational risk, especially from a cross-section and a severity distribution perspective, based on a rich loss database of more than 42,000 observations. In particular, the following results confirm past and more recent studies on the matter:

### Cross-Section analysis

1. The **Mean loss** has a weak relationship with the bank's size, of course where the size of the banks does not change too much.
2. Among the financial indicators, the **Net Interest Income** is a good proxy of the total loss amount (it is ranked 2nd after **Own funds requirements op risk**), as measured by the Kendall's tau rank correlation coefficient.

### Severity distribution

3. There is significant variation in the riskiness of the Business Lines (BLs) at the 99.9% regulatory percentile for both the empirical estimates and the employed distributions. This phenomenon, although assessed on the severity side only and not related to the BLs income, is further confirmation of the inadequacy of the current TSA coefficients structure.
4. Banks are better able to categorize events into Event Types rather than into Business Lines.

Points 2 to 4 are consistent with the BCBS document on the review of the BIA/TSA, currently in consultation (<https://www.bis.org/publ/bcbs291.pdf>): "The use of the Net basis (i.e. income – expenses) is crucial to enable the "interest" component to capture a bank's operational risk" (pag. 43). "The Committee's analysis showed that the required range of estimated betas under the TSA was much wider than that envisaged by the current framework. Also the ranking of the riskiness of business lines implied by the current framework appear to be flawed" (pag. 11).



# Suggested improvements and area of further work

## Cross Section analysis

1. It would be important **to perform regression analyses in order to corroborate or refute the results** in Table 4, in particular on the relationship between Total Loss Amount and some financial indicators. Indeed the BCBS study revealed, among others, that: i) the assumption that operational risk exposure increases linearly in proportion to revenue is invalid; ii) a new indicator, called Business Indicator, performs a very good job; iii) current BIA/TSA/ASA frameworks are poorly calibrated and hence do not correctly estimate the op risk capital requirements of a wide spectrum of banks; and iv) AMA capital charges are often benchmarked against this under-calibrated capital requirement.
2. In performing these further analyses, particular relevance should be given to **non-linear relationships and relevant accuracy measures** (e.g. from  $R^2$ /Adjusted  $R^2$  to Akaike and Bayesian Information Criteria, AIC/BIC).

## Parametric Distribution

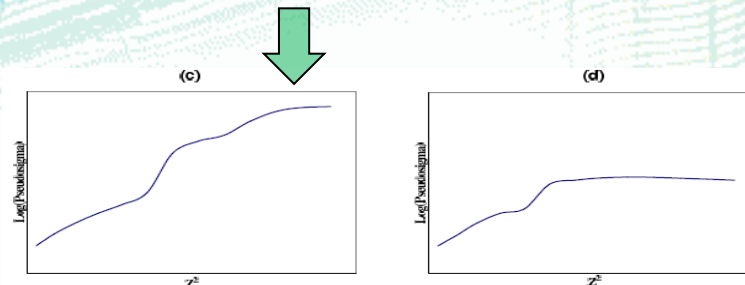
3. It would be important **to include also the “other” Business Line** in the analysis. Banks usually include in this BL (the so-called “Corporate item” BL in the CRR) the losses which are not clearly assignable to the Basel Accord BLs and that refer to the whole organization. Not infrequently these losses are the most severe.

# Suggested improvements and area of further work

## Generalised Pareto Distribution

4. The **criterion for the selection of the body-tail threshold** should be enhanced, since in most cases the threshold of the GPD was lower than the mean. The consequence is that in some BLs (i.e. P&S) and ETs (e.g. EP&WS, DPA, BD&SF) there is no extrapolation beyond the empirical percentile even at high confidence levels such as 99.9% and 99.95. Consider for example to apply the Zhou method, which was found effective during validations and reviews of AMA models (Zhou C., Wu C., Liu H., Liu F. (2007), A New Method to Choose the Threshold in the POT Model).
5. The **use of the MLE is problematic** in case of the GPD (it can be the main driver of the unstable results obtained when changing thresholds). Consider for example to apply PWM or penalised/constrained/weighted MLE.
6. More in general, the **recourse to the GPD should be carefully assessed** against the rate of convergence of the tail in each BL and ET. Consider for example to apply the “ln (pseudo-sigma) plot” proposed by Dutta & Perry to assess the tail behaviour.

Ln(p-sigma) plots for two institutions (Dutta & Perry paper)



Where data have unsystematic tail behaviour or have two adjacent losses that are of disproportionately different in magnitude, the  $\ln(p\text{-sigma})$  plot flattens at higher percentile level

Where data exhibit more tail smoothing, the  $\ln(p\text{-sigma})$  plot flattens at lower percentile level

# Suggested improvements and area of further work

## Cross Validation

7. It should be clarified how the **log-likelihood of the g-and-h distribution has been obtained** (g-and-h density function unknown/difficult to handle).
8. In case of the **Champernowne approach**, it should be clarified which **density function has been considered for the calculation of the log-likelihood (the one in the first or in the fourth step)**. However, if based on the first one, the observations of the training set would not conceptually correspond to the ones of the validation set; if based on the fourth step it is difficult to get the density function after double transformations and Kernel fit.
9. If the proposed Cross Validation is found not applicable for conceptual and/or empirical challenges, consider to apply alternative approaches to assess the quality of the fit of the proposed distributions, such as graphical (e.g. q-q plot) or numerical (e.g. bootstrapping).



*Thanks for your attention*

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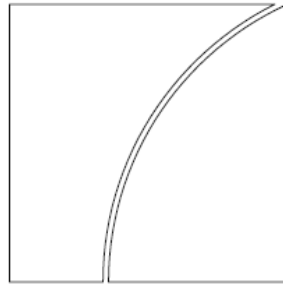
# Basel Committee on Banking Supervision

## Consultative Document

### Operational risk – Revisions to the simpler approaches

Issued for comment by 6 January 2015

October 2014



BANK FOR INTERNATIONAL SETTLEMENTS

