



Bridging the gap between TSA and AMA

Learning from the IRB approach

Mark London & Ahraz Sheikh

4th December 2012

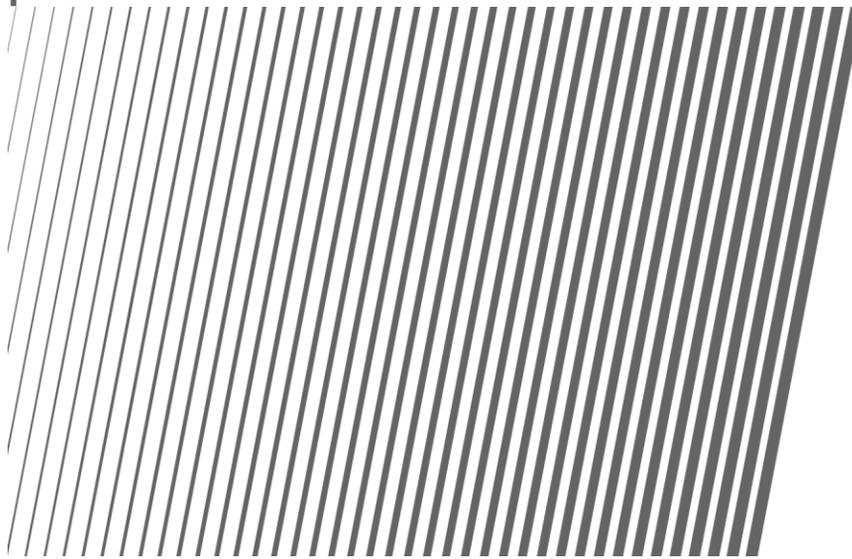


Agenda

- ▶ Current industry and regulatory trends
 - ▶ Ranges of practice
 - ▶ Regulatory trends
 - ▶ Current AMA/quantification issues

- ▶ The future of AMA
 - ▶ Analogies with IRB approach
 - ▶ Bridging the gap between standardised and AMA approaches
 - ▶ Proposed model design considerations

Stock take of current industry/regulatory position



Page 2

Op Risk Quantification – Day 1

ERNST & YOUNG
 Quality In Everything We Do

International range of practice

Europe

- ▶ Pure SBA still common though trend toward hybrid approaches
- ▶ Heavy use of ELD common for informing distribution shapes
- ▶ Typically 20-40 units of measure
- ▶ Pure LDA virtually unheard of
- ▶ Lognormal & Pareto most popular severity – composites uncommon
- ▶ Subjective selection of best fit severity, informed by GofF
- ▶ Modelling threshold ~\$10K

US

- ▶ Pure LDA most common
- ▶ Regulatory preference for ILD and highly mechanical LDA & SBA and ELD only as benchmarks
- ▶ Typically 7-15 units of measure
- ▶ More emphasis on exploratory severity modelling & use of GofF metrics
- ▶ Recent regulatory pref for lower modelling threshold ~\$1000
- ▶ Highly prescriptive severity modelling techniques (e.g., shifted vs. truncated)

Page 3

Op Risk Quantification – Day 1

ERNST & YOUNG
 Quality In Everything We Do

Regulatory guidance and trends

- ▶ **Regulators don't give detailed formal guidance for AMA; they impose their preferences through the supervisory review process as they form based on evolving industry practice**
- ▶ Dependence modelling trends – Gaussian to t-copula
- ▶ Additional scrutiny around stability and importance of fit in the tail of severity – BCBS184
- ▶ Application of EVT – increasing awareness of weaknesses
- ▶ Direct translation of scenario inputs into loss distributions – increasing awareness of sensitivity to distributional assumptions
- ▶ Application of caps – forbidden in Europe
- ▶ Acceptance of scenarios as a direct input – US vs. Europe
- ▶ Segmentation – too much or too little and pooling across risk types

US interagency guidance on AMA

- ▶ Push for lower modelling thresholds
- ▶ Theoretical allowance for triangulation style approach in which all components of AMA can drive capital; however:
- ▶ Push for ILD only 'base models' with scenarios and external data only as benchmark
 - ▶ Potentially at the cost of model stability (seeming acceptance of as 50 ILD data points as sufficient)
 - ▶ Implied discouragement of ILD and ELD 'pooling' without filtering
 - ▶ Scenario model as base model only if internal loss data are insufficient (no guidance on how much is required)
- ▶ Strong preference for truncation of severity to account for modelling threshold

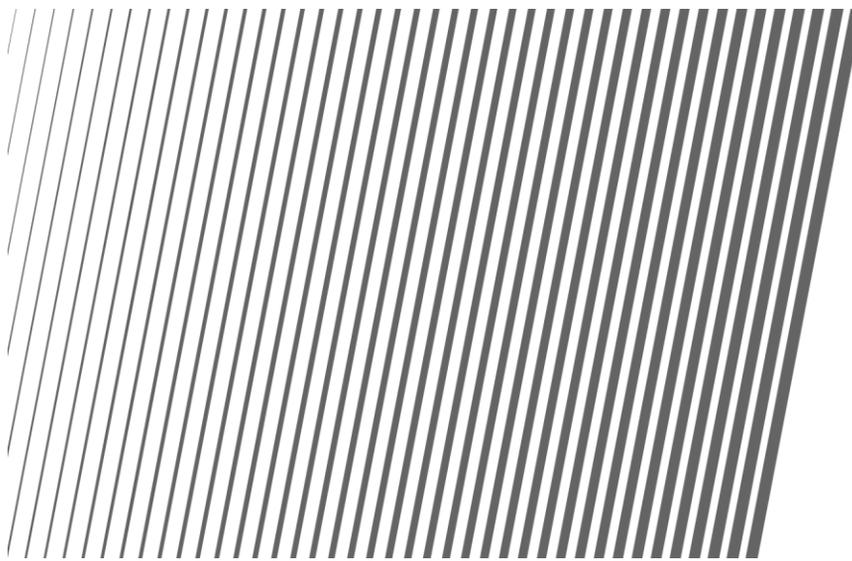
Current issues in AMA/op risk quantification

- ▶ Volatile and misunderstood model outputs
- ▶ Poor understanding of capital sensitivity to methodological assumptions
 - ▶ e.g. impact of parameter estimation error, misuse of EVT
- ▶ Too much text book math and no intuition
 - ▶ e.g. conditional vs. shifted
- ▶ Severity modelling
 - ▶ Body vs. Tail
 - ▶ Most data points in the body and few points used in the tail section – the main driver of capital
 - ▶ MLE sensitivity
 - ▶ Use of caps such as maximum probable loss (MPL)
 - ▶ Goes against the statistical basis of op risk and distorts the distributions.

Current issues in AMA/op risk quantification

- ▶ Over-engineering and ‘...wood-for-the-trees’
 - ▶ Multi-part severity distributions when only the tail matters
- ▶ Poor understanding of copulas / tail dependency
- ▶ Segmentation vs. pooling of data across risk types
 - ▶ Segmentation between risk types is required by regulation but pooling data between smaller segments may produce more accurate distributions (more data in the tails).
- ▶ Poor use of scenarios
 - ▶ Based on ‘expert judgements’ of 1/100 year events, which is near impossible to accurately predict and judge in comparison to a 1/1000 year event
- ▶ Limited meaningful backtesting and benchmarking to support model outputs

What is the future of AMA?



Page 8

Op Risk Quantification – Day 1

ERNST & YOUNG
Quality In Everything We Do

Introduction

- ▶ There are three approaches available for regulatory capital under Pillar I, Basel II: BIA, TSA and AMA
- ▶ BIA and TSA are not risk sensitive and based on size
- ▶ AMA is effectively an unrestricted economic capital model for operational risk – big gap between TSA and AMA!
- ▶ Inconsistencies in AMA for operational risk capital could undermine the intent of the Basel rules
- ▶ This is the context of more fundamental questions around the use test and the effectiveness of AMA as a risk management tool
- ▶ We believe that significant insight can be gained through a comparison with the Internal Ratings Based (IRB) approach to credit risk

Page 9

Op Risk Quantification – Day 1

ERNST & YOUNG
Quality In Everything We Do

Recap on IRB

- ▶ Probability of default (PD), loss given default (LGD) and exposure at default (EAD)
- ▶ Expected Loss:
 - ▶ $EL = PD * LGD * EAD$
- ▶ Unexpected Loss:
 - ▶ $UL = StressedPD * LGD * EAD - EL$
 - ▶ $UL = f(PD, \rho) * LGD * EAD - EL$
- ▶ Rho – asset correlation

The IRB analogy

Component	IRB	AMA
Segment	Asset class	UoFM
Likelihood	PD – probability of default	Loss event frequency
Exposure	EAD – exposure at default	Potential exposure given event
Impact	LGD – loss given default	Loss given event
Level of systemic risk	Asset/default correlation (ρ)	Severity distribution shape – how fat the tail is
Components	PD, LGD and EAD models	???
UL	ASRF model – Vasicek distribution	Bespoke loss distribution estimation
Advantages	<ul style="list-style-type: none"> ▶ Clarity around PD, LGD & EAD increases transparency and comparability between portfolios, due to common language ▶ Clear and simple UL approach, which is the same for all banks 	<ul style="list-style-type: none"> ▶ Increased freedom and innovation around modelling methodology
Limitations	<ul style="list-style-type: none"> ▶ UL formulation does not adequately capture all risk features – i.e., concentration risk and other forms of diversification 	<ul style="list-style-type: none"> ▶ No analogue of PD, LGD, EAD ▶ Lack of comparability between portfolios and banks ▶ Hidden sensitivity and hidden subjectivity in modelling choices

The usefulness of the IRB analogy

- ▶ The IRB analogy is useful because it shows that there are certain features that IRB benefits from, for which there is no corresponding AMA equivalent
 - ▶ No PD, LGD, EAD analogue with which key risk drivers can be monitored, compared and validated
 - ▶ No consistent framework for translation of inputs (ILD, ELD, scenarios and BEICF into capital at risk)
- ▶ Nobody believes the ASRF model gives an 'accurate' answer in terms of a 99.9% VaR for credit risk, but it doesn't matter
- ▶ The IRB framework has increased awareness and a intuitive measure for risk (i.e., risk weight) in the same way that PD once improved awareness around risk associated with ECAI ratings
- ▶ In order for AMA to be effective it must achieve the same

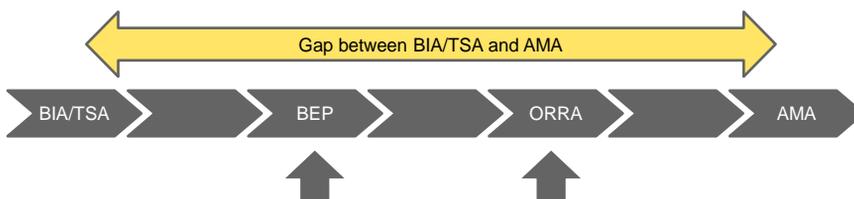
A bit of history

- ▶ The Internal Measurement Approach (IMA) is a rejected Pillar I approach candidate which might have sat in between TSA and AMA, or perhaps displaced AMA
- ▶ The idea was analogous to IRB in the sense that, $EL = \text{freq} * \text{severity} * \text{exposure}$, and $UL = \text{fn of } EL$
- ▶ Unfortunately it made some unrealistic assumptions
 - ▶ UL is defined by a stress of loss frequency only (as per IRB)
 - ▶ UL proportionate to EL
- ▶ These were serious issues which deserved redress, however, perhaps the baby was thrown out with the bath water?
- ▶ We now focus on two key aspects of the analogy

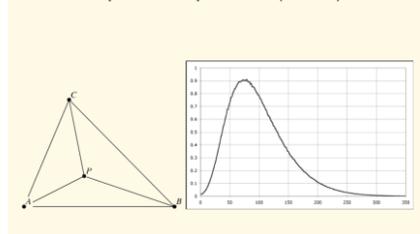
Ingredients for a successful quantification framework

- ▶ A clear separation of objective vs. subjective components
- ▶ A more risk sensitive 'standard formula' that considers more than just income, but remains robust and comparable between banks
- ▶ An adjustment to this which takes into account the factors too complex to be considered in the objective assessment
- ▶ Risk culture, awareness and training, OR infrastructure score, Governance score, etc.
- ▶ A structured approach to subjective assessment of these factor based on **universal definitions/ratings** to enable comparability across banks and more structured supervisory review

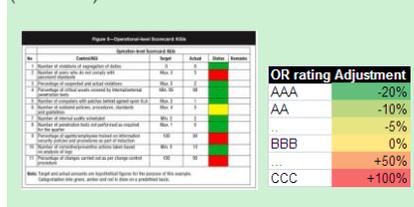
Objective – reduced the gap



Basic exposure profile (BEP)



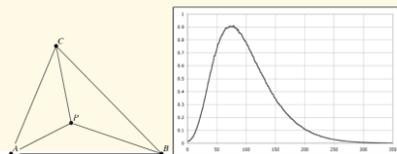
Operational risk rating adjustment (ORRA)



2 pillar approach –THE BIG IDEA

Basic exposure profile (BEP)

- ▶ Like a highly constrained LDA – mainly objective
- ▶ Loss experience
- ▶ Size – income, operating expenses, #employees
- ▶ Industry loss experience
- ▶ Mathematical assumptions



Operational risk rating adjustment (ORRA)

- ▶ Risk Management
 - ▶ Emerging risk detection score / Management action score - based on case studies
 - ▶ Control effectiveness score
 - ▶ Complexity & OR infrastructure score
 - ▶ [Discussion]
- ▶ Compliance
 - ▶ Op risk awareness / training score
 - ▶ Audit compliance score
 - ▶ [Discussion]

Figure 3 - Operational Risk Assessment Matrix

Item	Category	Weight	Actual	Score	Max Score
1.1	Number of processes of an organization of clients	10%	1	1	1
1.2	Number of clients with an annual revenue	10%	1	1	1
1.3	Number of employees	10%	1	1	1
1.4	Number of employees with relevant training	10%	1	1	1
1.5	Number of employees with relevant training (continued)	10%	1	1	1
1.6	Number of employees with relevant training (continued)	10%	1	1	1
1.7	Number of employees with relevant training (continued)	10%	1	1	1
1.8	Number of employees with relevant training (continued)	10%	1	1	1
1.9	Number of employees with relevant training (continued)	10%	1	1	1
1.10	Number of employees with relevant training (continued)	10%	1	1	1
1.11	Number of employees with relevant training (continued)	10%	1	1	1
1.12	Number of employees with relevant training (continued)	10%	1	1	1
1.13	Number of employees with relevant training (continued)	10%	1	1	1
1.14	Number of employees with relevant training (continued)	10%	1	1	1
1.15	Number of employees with relevant training (continued)	10%	1	1	1
1.16	Number of employees with relevant training (continued)	10%	1	1	1
1.17	Number of employees with relevant training (continued)	10%	1	1	1
1.18	Number of employees with relevant training (continued)	10%	1	1	1
1.19	Number of employees with relevant training (continued)	10%	1	1	1
1.20	Number of employees with relevant training (continued)	10%	1	1	1

OR rating	Adjustment
AAA	-20%
AA	-10%
A	-5%
BBB	0%
BBB-	+50%
CCC	+100%

BEP considerations

- ▶ Empirical loss data shows there is a clear and consistent relationship between risk type and tail shape which spans firms and sectors
- ▶ The nature of op risk is such that a **very bad year** is likely to be characterized by **one very large loss**, rather than combinations of medium sized losses – hence severity distribution extrapolation tailored to risk type must be built into framework
- ▶ To cater for firms with loss data challenges, there needs to be a floor based on size, but needs to be more comprehensive than just income

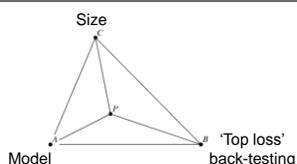
Calculation of Basic Exposure Profile (BEP)

Business line	Risk event type	Lambda	Sum Ln loss year 1 Sum Ln loss year 5	Top 5 losses
Retail banking	CPBP				
Retail banking	EDPM				

Mathematical assumptions	Value
Severity distribution	Lognormal

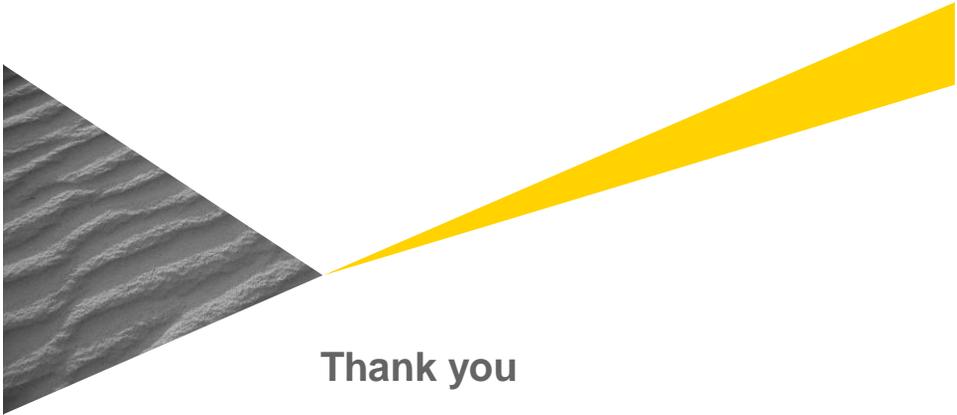
Risk event type	Tail shape (sigma)	Income coefficient	Op expenses coefficient ...
CPBP	2.4	0.15	...
EDPM	2.2	0.15	

Business line	Income	Operating expenses	Number of employees
Retail banking			
Investment banking			
Etc.			



Operational risk rating scorecard – design considerations

- ▶ Proportionality
 - ▶ Op-risk ratings must reflect the proportionality of operational risk management to the size and complexity of the firm
- ▶ Metric focus
 - ▶ Should be measurable and capture compliance, risk management effectiveness and complexity; however...
 - ▶ Should not double count risks assessed in Pillar 2; and
 - ▶ The components of the rating system must not drive metric myopia (gaming)
- ▶ Regulators must be careful not to prescribe in a granular fashion the definitive dimensions of risk management.



Thank you

