

# Basle II Operational Risk Proposals

## A Critical Review

by

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## PLAN

- Basle II on operational risk (Op Risk)
- Framework for Op-Risk capital charges
- Six desiderata and how they are met:
  - Clear definition of op risk losses
  - Capital for risks (not expected losses)
  - Choice of appropriate time scale
  - Consistency of capital charges across risks
  - Proper Integration of risks
  - A place for quality of controls and risk mitigation
- Conclusions

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## THE REGULATOR COMETH

- Financial institutions, like any other businesses, are subject to operational risks and take preventive measures (e.g. recovery plans) or cover (e.g. key person insurance)
- Their business, more than many others, is built on trust and reputation; they are particularly sensitive to (and will try to hide) the “wrong” kind of risks such as internal or external fraud
- In the mid 90s, following Barings and a few other debacles, regulators have taken a keen interest in op risk and have become a driving force pushing for better controls

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## BASLE II TIME TABLE - SO FAR

- Jun 99 - **First consultative paper** on Basle II
- Mar 00 - End of CP1 consultation period
- Jan 01 - **CP2 proposal** (540 p) and CAD3
- Jun 01 - End of CP2 consultation period  
Postponement to 05, CP3 announced
- Sep 01 - **‘Working Paper’ (CP2.5)** on op risk
- Oct 01 - Results of Quantitative Impact Study
- Nov 01 - End of CP2.5 consultation period
- Dec 01 - **‘Sound Practices’**

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## BASLE II TIME TABLE - NOW

- Apr? 02 - **CP3 on Basle II** and CAD3
- Jun? 02 - End CP3 consultation period
- End 02 - **Final version Basle II**, EC adopts Amendments to Cap Adq. framework
- 03 - 04 - National rules, adaptation of banking supervision, bank internal systems
- Jan 05 - Implementation of Basle II among G-10 and CAD3 within EU. US regulators to decide
- 2007(?) - Review of op risk capital floor

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## BASLE II INNOVATIONS

- Market Risk measurement largely unchanged, except for minor extensions to Banking Book
- **Big changes to Credit Risks** with
  - Internal ratings
  - Some portfolio effects
  - More flexibility for credit risk mitigation
- **Operational Risks introduced** as separate category with its own capital charge
- Widening of scope to financial holdings

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## OP-RISK DEFINITION

*“The risk of loss resulting from inadequate or failed internal processes, people and systems or from external events”*

Remarks:

1. Not a catch all
2. Only ‘measurable’ risks
3. Risks not already attributed to credit or market

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## WHAT'S IN / OUT?

- **IN**
  - Fraud, theft, unauthorised activities
  - Transaction and other human errors
  - Legal, regulatory and compliance failures
  - Systems failures
  - Acts of god
- **OUT**
  - Business risks (strategic)
  - Reputational risk

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## EVOLUTION OF RISK PERCEPTION



Questions:

- 1) Are there overlaps?
- 2) How different are Op-Risks from Insurable Risks?

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## WHY THE SUDDEN INTEREST ?

- Recent scandals, debacles and disasters?
  - BCCI (93), NASDAQ (94), Barings, Daiwa (95)
  - Sumitomo, Bankers Trust, Kidder Peabody (96)
  - Nomura Sec, Morgan Grenfell, Natwest (97)
  - LTCM (98), Chase (99)
  - The Equitable (00) The Indep. Assurance (01)
  - Terrorism (01), AIB (02)
- Offset for potential reduction in MRR and CRR?
  - More risk sensitive CRR (and MRR) could reduce current level of capital requirements.

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## REGULATORY CONTROL TOOLS



Integrated in the three 'pillars':

- Capital Charge (ORR)
- Supervision
- Market discipline (Public disclosure)

Therefore qualitative as well as quantitative controls  
Challenge: Can ORR be made **risk sensitive**?

## THREE STAGES TO ORR



'Continuum approach' to making capital charges progressively more risk sensitive

1. Basic indicator
2. Standardised business lines
3. Advanced measurement Approaches  
Including Internal Measurement Approach (IMA),  
Loss Distribution Approach (LDA), Scorecards  
Aimed at flexibility as opposed to 'one size fits all'

## STAGE 1: BASIC INDICATOR

Simple but onerous method that may be adopted by non-Basle financial institutions immediately (no qualitative qualifying criteria)

$$\text{ORR} = \text{Alpha} * (\text{Basic Indicator})$$

where 'Basic Indicator' will be a measure of business volume. **Gross income** is the favoured indicator

Basle II aims at allocating about 12% of current capital requirements to Op-Risk and estimates that 'alpha' should be in the **17-20%** of (yearly) gross income

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## BASIC INDICATOR - COMMENTS

- Calibration is based on meager data (41 respondents to first QIS said they allocated about 15% of their economic capital to op risk)
- Relationship to gross income is tenuous. Alphas from respondents were widely dispersed.
- Why a linear model? What if gross income is negative? Likely to disadvantage large institutions
- Top-down calibration may need to be revised if Basle II does not provide reductions in other capital charges

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## BIA - LIKELY EFFECTS

- Will increase capital charges for businesses that have low MRR and CRR but significant gross income (e.g., asset management, custody) compared to businesses that have already large capital requirements but relatively low gross income
- Does not provide any incentive for better op risk management
- Encourages self insurance and discourages risk mitigation (not recognised)
- Gross income as exposure indicator may have perverse effects (e.g. cutting down operations expenses)

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## STAGE 2: STANDARD APPROACH

Entry level for large banks, subject to regulator being satisfied that certain qualitative and quantitative standards are met, but no need to collect operational loss data

$ORR = \text{Sum of (beta x Volume Indicator)}$

- 'volume indicator' may be defined by business line, but gross income still looks the favoured indicator
- Betas are multipliers set by regulator

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## BUSINESS LINES DEFINITIONS

8 business lines and exposure indicators are proposed:

### *Investment Banking:*

- Corporate Finance Gross income
- Trading & Sales Gross income or VaR

### *Banking:*

- Retail Banking Annual average assets
- Commercial Banking Gross income
- Payment and Settlement Annual throughput
- Agency services & custody Gross income

### *Others:*

- Asset Management Assets under management
- Retail Brokerage Gross income

## BUSINESS LINES CALIBRATION

Provisionally, **gross income** selected as the sole indicator. But initial calibration of betas (only 14 to 25 respondents by business line for first QIS) show **betas 'in a range around alpha'**, i.e., no clear differentiation by business line

- Corporate Finance 6 – 36 %
- Trading & Sales 12 – 39 %
- Retail Banking 9 – 17 %
- Commercial Banking 9 – 21 %
- Payment and Settlement 10 – 25 %
- Agency services & custody 10 – 22 %
- Asset Management 10 – 20 %
- Retail Brokerage 8 – 21 %

## STANDARD APPROACH - COMMENTS



- So far, **no clear differentiation** by business line (the betas are unlikely to be set by Basle before end 2002)
- No indication that op risk capital requirements would be lower under stage 2 than under stage 1, so regulators will have to **impose** stage 2 on some banks
- Not based on any internal experience. Does not reflect own business risk and quality of controls
- Summing up capital charges across business lines is falsely safe

## SA - LIKELY EFFECTS



- Still unresolved calibration problems of a 'top-down' approach; still onerous
- Linear model unwarranted as with basic approach; likely bias against large institutions
- Summation of charges across business lines ignores diversification and therefore provides incentives for **specialisation** of activities (a source of volatility)
- Discourages better risk control and risk mitigation

## STAGE 3: ADVANCE MEASURES

- In CP2.5 Basle opens up research for 'Advance Measurement Approaches'. Banks are invited to propose their **own methods**, subject to approval by the regulator
- As opposed to stages 1 and 2, AMAs will have to be supported by **internal empirical evidence** on op risk losses (possibly supplemented by industry wide databases). AMAs are '**bottom-up**' approaches.
- Three approaches have already been described:
  - **Internal measurement approach (IMA)**
  - **Loss distribution (LDA)**
  - **Scorecards** and other qualitative adjustment methods

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## STAGE 3: INTERNAL MEASURES

Subject to banks proving accuracy of their loss data (Loss data bases and evaluation systems to be approved by the regulator) and minimum of three year experience:

$$\text{ORR} = \text{Sum of } (\text{gamma} \times \text{EL})$$

where the internally estimated expected loss, EL, is

$$\text{EL} = \text{EI} \times \text{PE} \times \text{LGE}$$

for each predefined combination of business line and type of loss

EI = Exposure Indicator

PE = Probability of loss event

LGE = Expected loss given loss event

Gamma = multiplier set by regulator based on industry wide data ?

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## STAGE 3: INTERNAL MEASURES

Seven loss types have been defined for each of the Standard Approach 8 business lines:

- Internal fraud
- External fraud
- Employment practices and workplace safety
- Client, products and business practices
- Damage to physical assets
- Business disruption and system failures
- Execution, delivery and process management

Industry wide data bases are being built (e.g. Op-Vantage) to collect and categorise data into each of the 8x7 cells of IMA, subject to some materiality level (\$1m)

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## STAGE 3: IMA - COMMENTS

- Basle II could, in principle, make **allowances for risk mitigation and transfer** (insurance) but traditional insurance contracts may not qualify
- Basle II ready to accept lower capital requirements under Stage 3 than under Stage 2 but with a **floor at 75% of Stage 2**. It is not yet clear how gammas will be assessed to achieve this constraint
- Basle II could recognise **non-linear models and dependencies** (or lack of it) among loss categories provided there is 'empirical' evidence to support alternative models

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## STAGE 3: LOSS DISTRIBUTION

- In previous stages, the regulator sets the capital charge at a multiple of a **volume indicator** or of an **expected loss**
- Basle II hints at the further, more remote possibility, that sophisticated banks could estimate directly their operational loss distribution (LDA) and therefore estimate the '**tail loss**' (99.9% over 1 year) for which a capital buffer would be required
- Loss distributions would have to be assessed **empirically for each of the 56 loss categories**. Charges would be summed up but some lack of correlation might be recognised

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## STAGE 3: LDA - COMMENTS

- Same comments as for IMA with regard to use of **external data** (perhaps with some filtering/calibration), **risk mitigation** and **floor** on capital charges compared to Stage2.
- It is not clear whether tail losses would be measured **relative** to the expected loss or on an **absolute** loss scale nor how to interpret the time scale
- The 99.9% confidence level over a year can only be indicative as the capital charges are bound to be between 75% and 100% of Stage 2

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## LIKELY EFFECTS OF AMAs

- Many banks may **not find sufficient rewards** for moving towards an advanced measurement approach, especially if risk mitigation techniques are not easily recognised
- When the data are in, level of capital required by bottom up approaches may be **difficult to reconcile** with that of top down approaches
- Summation of capital charges across 56 largely independent loss categories is difficult to justify. It will unfortunately **detract attention** away from the more important and towards the less significant risks

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## OR MEASUREMENTS REVISITED

- So, current proposals have many shortcomings and undesirable effects
- But it is still early days and Basle wants the financial industry to think more about op risks and make suggestions on how to manage them best
- We suggest desirable features for an op risk measurement method and examine whether current proposals have these features or would need to be modified to acquire them

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## SIX DESIDERATA

1. Clear **definition** of what constitutes a loss
2. Capital charges for **unexpected losses** only
3. **Explicit time scale** for risk measurements
4. **Consistency** of capital charges across risks
5. Proper **integration** of risks
6. Recognition of **risk mitigation** techniques and **quality of management**

These desiderata are explained next. A discussion on how they could be met follows

## 1. LOSS DEFINITION

**What constitutes an op-risk loss?** An apparently trivial question in extreme cases (Nick Leeson, 9/11,...) but a gray area in general; the proposed definition needs further specifications.

Possible criteria to recognise or losses:

- **Unexpected** and not covered by expected profits (to distinguish from a normal cost)
- **No double counting** with credit or market risk causes or effects
- **Materiality level** (min and max?)

**Clear categorisation** is even more difficult but crucial for the development of internal and industry wide databases

## 2. CAPITAL FOR RISK

### **Capital Charges for unexpected losses only**

A goal of the regulators is to ensure the stability of the financial systems by relating capital requirements to risks

Conversely, there should be no provisions for risks (except, perhaps, for prudence within accruals accounting)

### **Expected losses should be marked-to-market (MtM) or accounted for by setting provisions**

There should be no capital requirements for expected losses as these should already be taken into account in the valuation of the relevant activity or put into reserves

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## 3. TIME SCALE

- **Risks and capital charges** should be estimated over the minimum period necessary to reduce the risks or to replenish the capital
  - Most risk can be curtailed over time
    - some in minutes (market risks in highly liquid markets)
    - some in days (most market risks, some credit risks)
    - some not until maturity of a trade
  - Capital can be replenished in a few months
- **Expected losses** should be estimated over a period consistent with the reporting procedures: the maturity of a trade in the case of MtM, annually or up trade maturity for accruals accounting

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## 4. CONSISTENCY OF CHARGES

- Minimum capital requirements are set to **ensure a very high credit quality** for banking institutions
- The first minimum capital requirement was set (1988 Cooke ratio) **to be met by most major banks**, without reference to a maximum probability of default
- Further methodological refinements introduced a reference to a **probability of loss threshold**: for market VAR the capital requirement is 3x the the loss level that has less than 1% probability of being exceeded over 10 trading days
- **Risk tolerance should not vary** from one type of risk to another

## 5. INTEGRATION OF RISKS

- Expected losses are always additive, uncertainties rarely are
- Despite that, capital charges are often defined as additive (except within VaR and credit portfolio models)
- Whatever the complexity of a business, there are only a few **dominant risks**. It is more important to understand these risks and their interactions than to worry about the residual noise

## 6. RISK MITIGATION

- For market and credit risks, the regulator now accepts the effects of risk mitigation (correlation within VaR, partial credit protection,...)
- For the unwanted op-risks, it is even more crucial to consider risk reduction tools and quality of management (insurance, quality control ...)
- Note: market and credit risks are willingly taken in the hope of achieving higher returns; op-risks are not linked to higher returns but can be reduced at some cost. The **same risk/ reward trade-off** is faced in both cases

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## HOW TO MEET THE DESIDERATA

The next series of slides reviews and illustrates how the 6 desiderata might be met. They show that there is a need for much **greater clarity** in definitions and methods and that there is danger not to recognise the most important risks by adopting **too simplistic models** such as:

- Risks proportional to expected losses
- Additivity of capital charges across risk categories

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## (1) LOSS DEFINITION

### 1. Loss or Normal Cost? - An Accounting issue

Notwithstanding prudence, it would not be natural to dissociate the costs and risks of carrying out an activity from its corresponding revenues when assessing the capital required to conduct this activity safely.

That is done under MtM accounting. But most activities subject to op risks are accounted for on an accrual basis.

Under accrual accounting (e.g. IAS37) provisions should be made for **unavoidable losses** not covered by expected profits but **not for future operating losses in general**, especially if the probability of occurrence of such losses is small.

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## (1) LOSS DEFINITION

### Normal Costs vs Losses (Cont'd)

A consensus view must be reached – for example:

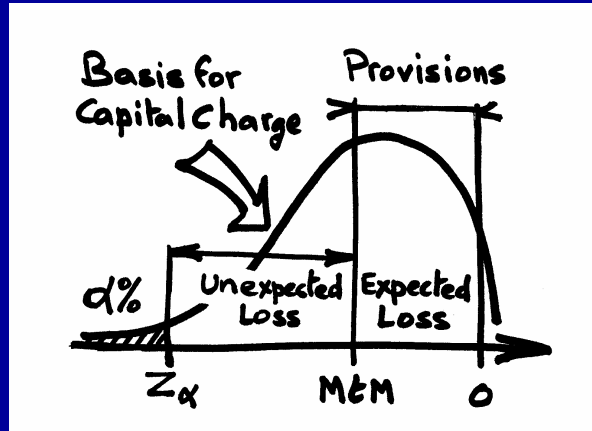
- Under MtM accounting, only the **variability** of op losses should be taken into account to determine capital charges
- Under accrual accounting, losses covered by the provision policy should be ignored. Of the other op risk losses, only **exceptional losses** (losses that would lead to an unexpectedly low return) should be taken into account **including their expected value**

All losses subject to **materiality** (min and max?) and **op risk relevance** considerations

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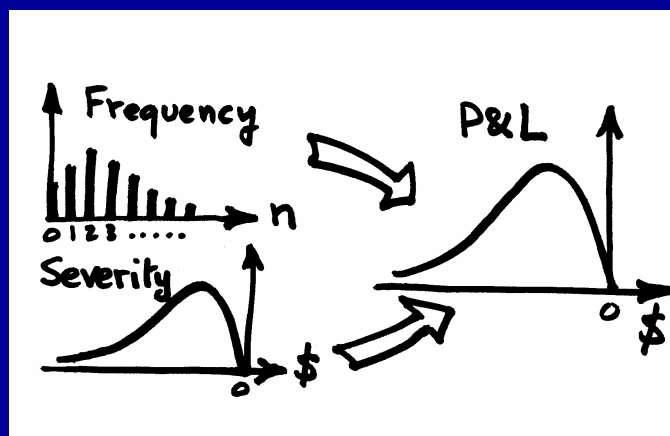
## (2) CAPITAL FOR RISK ONLY



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## (2) P&L DISTRIBUTION



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## (2) EXAMPLE A

- Settlement/ Transaction errors
  - N = 25,000 transactions per year
  - p = 4% probability of error
  - L = Severity \$1000
- Resulting loss distribution (s.t. later corrections)
  - Expected loss:  $N p L = \$ 1,000,000$
  - Std Deviation:  $(N p)^{1/2} L = \$ 32,000$

The loss distribution is a very tight binomial dbn

## (2) EXAMPLE B

- Investment Banking/ Unauthorised Deals
  - N = 50 deals per year
  - p = 0.5% probability of unauthorised deal
  - L = Severity \$ 4 million
- Resulting loss distribution (s.t. later corrections)
  - Expected loss:  $N p L = \$ 1,000,000$
  - Std Deviation:  $(N p)^{1/2} L = \$ 2,000,000$

The loss distribution is a very skewed binomial  
(p0 = 0.7783, p1 = 0.1955, p2 = 0.0241, p3+ = 0.0021)

## (2) COMMENTS ON EXAMPLES

- The binomial model as presented is simplistic
- Some refinements can be made to increase realism:
  - Severity of loss distribution
  - Random number of transactions/ deals
  - Corrections for time scale
- Nonetheless, some results are clear:
  - **Expected losses** are proportional to **volume**
  - **Unexpected losses** are proportional to the **square root of expected losses** (or volume)

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## (2) VOLUME INDICATORS

- **Volume indicators** as determinant of capital charges **are improper** for two reasons:
  - 1) The proportionality constants (betas or gammas) will have to vary widely. In example B they would have to be 63 times greater than in example A to achieve the same degree of confidence
  - 2) The proportionality constants would have to be changed when volume varies (assuming that it is the number of events that varies and not their severity)
- A square root of volume could be more appropriate, although it is difficult to achieve any consistency without assessing directly the loss distribution

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## (3) TIME SCALE

### Expected losses

In the absence of clear guidelines, we make the following suggestions:

The time scale to assess expected losses should be **consistent with the reporting method and the type of risk**:

- On-going operations reported on accrual basis:
  - All losses that could ensue from existing situation and from operations expected to be carried out over the next 3 months (?)
- Transactions Marked-to-market:
  - final maturity of all booked transactions

## (3) TIME SCALE

### Expected Losses - Illustrations

- Example A - Accruals:
  - Errors identified/resolved within a few days
  - $EL = (1/4) \times \$1m \text{ p.a.} = \$0.25m \text{ (instead of } \$1m)$
- Example B - Mark-to-Market:
  - Loss event any time during 5y average life, probability of loss per year = 0.001
  - $EL = .001 \times (5+4+3+2+1) \times 50 \times \$4m = \$3m \text{ (instead of } \$1m)$

## (3) TIME SCALE

### Unexpected losses

In the absence of clear guidelines, we make the following suggestions:

The time scale to assess unexpected losses should be the time scale **consistent with the elimination of risk** or the **replenishment of capital**

- for on-going short term business, 3 months (?)
- for MtM transactions, the **effective** transaction maturity, that is, the average time it would take to eliminate the risk

## (3) TIME SCALE

### Unexpected Losses - Illustrations

- Example A - Settlement / transaction error:  
On-going business, 3 months  
 $StD = \$32,000 \times (1/4)^{1/2} = \$16,000$  (instead of \$32,000)
- Example B - Investment Banking/ unauthorised deals  
Assuming effective transaction life of 3 months  
 $StD = ((.001/4) \times 5 \times 50)^{1/2} \times \$4m = \$1m$  (instead of \$2m)  
Note that now the ratio of unexpected loss to expected loss is (1/3) instead of (2/1). The time scale is critical!



## (4) CONSISTENCY OF CHARGES

- The scaling of MRR is now **clearly stated**, about 3 times the 1% loss level over 10 trading days, or about 7x the 10-trading day standard deviation (StD) of the loss distribution
- The scaling of CRR is **only implicitly** and not rigorously defined: 8% of exposure for a BBB risk with a default probability of 1.5% p.a. and a recovery rate of 33%, is only about 1 yearly std, about 5x 10-day std and many more std for a diversified portfolio, if no portfolio effects are take into account
- The scaling of ORR is **dubious** since it relates to a measure of volume or expected loss (stages 1 to 3) and not to a measure of uncertainty (except in stage 4)

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## (4) CONSISTENCY OF CHARGES

- If ORR is defined on the basis of a loss distribution, the same level of confidence should be ensured as with MRR and CRR, that is,

Capital charge = 3x the 1% loss level  
or about  $3 \times 2.33 \text{ StD} = 7 \times \text{StD}$

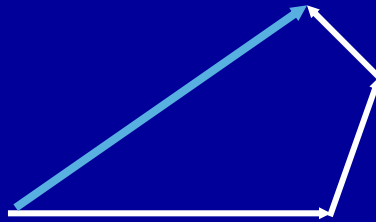
- Taking examples A and B individually:
  - $\text{ORR}(A) = 7 \times \$16,000 = \$112,000$
  - $\text{ORR}(B) = 7 \times \$1\text{m} = \$7\text{m}$

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## (5) INTEGRATION OF RISKS

- Often a single major risk dominates
- A few secondary risks may be important, especially if positively correlated to the first
- Other risks may be just noise



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## (5) INTEGRATION OF RISKS

### Among Operational Risks

- All individually assessed loss distributions for various business lines/ risk types ('cells') **could** be compounded with the proper dependency assumptions (copulas?). But the task seems enormous compared to potential gains in accuracy
- Better to identify the **few main** Op-Risk 'cells' and examine if there are strong correlations or not
- Leaving aside extreme cases of low frequency, high impact losses, calculate the total variance due to all other Op-Risks

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## (5) INTEGRATION OF RISKS

### Among Operational Risks - Illustration

- If a single firm has lines of business/risk types A and B, they could be assumed to have low correlation, hence:

$$\text{ORR}(A+B)^2 = (.112^2) + (7^2) = 49.0125$$

$$\text{ORR}(A+B) = \$7.001\text{m}$$

- The total ORR is **insignificantly** different from the ORR due to activity B alone. Far better to ignore A and concentrate on the assessment of B

## (5) INTEGRATION OF RISKS

### Among ORR, MRR, CRR and Other risks

- VaR measures or, more generally, risk distributions, are not yet comprehensive: they do not embrace credit, market and operational risks together
- Instead capital charges are assessed separately and simply added as if all these risks were perfectly correlated, which is generally far from true
- If ORR represents approximately 12% of (MRR+CRR) it would be fair to say that working on a sounder integration of MRR and CRR would be more important than setting an ORR

## (5) INTEGRATION OF RISKS

### Global Integration of Risks – An Illustration

- Assume a firm would have a sum total of capital charges of \$100m distributed as follows:
  - MRR = \$30m
  - CRR = \$60m
  - ORR = \$10m (11% marginally)
- If these risks are relatively independent, the total capital charge should be about **\$67.8m** of which ORR would contribute less than **\$0.74m (or 1.1% marginally)**. In other words, at the proposed level ORR should play only a very minor role

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## (5) INTEGRATION OF RISKS

### Illustration Cont'd

- Other uncertainties such as business risks (which are not in Basle II) could be more important
- For example, assume that business line B brings on average one deal per week (instead of exactly 50 p.a.) with an average value of \$2m but an uncertainty (std) of \$2m  
The StD of revenues would be (assuming a Poisson process):  
$$\text{Std Dev} = (2 \times 50)^{1/2} \times \$2\text{m} = \$20\text{m}$$
- The lower percentile level would be about \$47m down from the MtM value, ie, of the same order of magnitude as the total capital requirements

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## (6) RISK CONTROL / MITIGATION

- Perhaps more than any other risks, Op-Risks can be controlled with **quality management**
- **Traditional risk managers** have used insurance for years, comparing the cost of preventive measures to the cost of insurance
- **Quality control** is a wider art that has made great strides in Japan first. It has been found on many occasions that high quality ('total quality', '6 sigmas', etc,...) has a negative net cost, ie, improves profitability
- Quality control, insurance and other means of reducing op risks (outsourcing, op risk securitisation) need to be **recognised** by regulation (more in next section)

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## CONCLUSIONS

Many forces drive risk measurement and control:

- **External**
  - Customers / employees
  - Competition
  - New products / higher volatilities
  - Risk management industry
- **Internal**
  - Optimal allocation of resources
  - Survival
- **Regulatory**
  - Solvency / customer protection
  - Fair competition
  - Control of systemic risk

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## CONCLUSIONS (Cont'd)

- Many Op-Risks have traditionally been considered by risk managers but the scope should be **expanded**
- It is commendable that regulators should provide **incentives** to improve **management** of Op-Risks
- But, if capital charges are to be introduced at a level of about **12%** of other capital charges, they are **not** really **critical** compared to:
  - improving the estimation and the **integration of credit and market risks**
  - including some measure of **business risks**

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## CONCLUSIONS (Cont'd)

- Among Op-Risks, it is likely that just **a few will have a dominant effect**. Attention should be concentrated on these, their definition, measurement and interactions
- The proposed framework setting a capital charge proportional to **volume or expected losses** is **inadequate**. A loss distribution is required
- **Capital charges have a limited role to play**. They are useless for extreme low frequency, large impact Op-Risk events. These can only be addressed by better controls or, perhaps, risk transfer (insurance)

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