Observations on the differences between operational risk regulatory and economic capital

The preparation to comply with the New Basel Capital Accord and the introduction of advanced measurement approach (AMA) methodologies is causing many financial institutions to ask whether there exist any synergies with establishing an operational risk measurement methodology for economic capital? Can the same measurement methodology be used for regulatory capital modelling as well as for economic capital modelling and can the same outcome be applied for both capital regimes? The answer in short: it depends, given a number of critical considerations.

While preparing to comply with The New Basel Capital Accord and introducing measurement methodologies to meet the requirements of the advanced measurement approach (AMA), questions arise for many financial institutions as to whether there exist any synergies with establishing an operational risk measurement methodology for economic capital? Can the same measurement methodology be used for regulatory capital modelling as well as for economic capital modelling and can the same outcome be applied for both capital regimes? The answer in short: it depends, given a number of critical considerations.

This article will highlight some of the key issues when attempting to converge regulatory and economic capital models for operational risk.

Economic capital versus regulatory capital

To start with, it is pivotal to realise the different purposes between regulatory and economic capital.

To better understand the relative profits (or losses) of a financial institution, it is necessary to consider the capital it is consuming. That capital is referred to as economic capital.

Economic capital is defined as the amount of capital that a business line or transaction requires in order to cover eventual unexpected losses and still remain solvent over a certain time horizon (usually one 1year) and with a level of certainty (such as 95%).

The amount of economic capital that a financial institution should hold is therefore directly related to the amount of risk that it faces. A financial institution that experiences volatile revenues, expenses, or losses/claims needs to set aside significant capital, even if it is quite profitable on average. The amount of capital that an organisation needs is also dependent on its desired safety level (or target credit rating).

Whereas economic capital serves as a managerial tool, to help evaluate, on a risk-adjusted basis, the performance of a business line and allocating risk budget, regulatory capital functions as a third party's control instrument to ensure the soundness of the financial system through monitoring financial institution's minimum capital ratio.

Given the different functions of economic and regulatory capital, the calculation methodologies might also differ. For instance, the regulatory basic indicator and standardised approach are based on the assumptions that the size of a financial institution holds a linear relationship with its level of risk, that the average gross income services as a size proxy and that the alpha or betas are imposed as exogenous multiplying factors. However, as no empirical evidence exists that have proven the linear relationship between a financial institution's size and its risk levels, using the basic indicator or standardised approach will, due to its lack of risk sensitivity, not be compatible as economic capital models. The most sophisticated regulatory model, AMA, offers very few constraints in terms of modelling requirements. Can AMA be used for economic capital purposes? There are some key issues that need to be reconciled to ensure convergence between the regulatory AMA capital methodology and an economic capital methodology.

Fig 1. Overview - key issues

Key issues	Regulatory capital AMA	Economic capital
Definition	The risk of loss resulting from inadequate or failed internal processes, people and systems or from external events. Including legal risk, but excluding reputational & strategic risk.	In most cases, the regulatory definition of operational risk is synonymous with most financial institution's internally accepted definition of operational risk. Strategic and reputational risks are established as separate risk classes.
Input data	Internal loss data Relevant external loss data Scenario analysis Factors reflecting the business environment and internal control systems.	A blend of data is required to correctly reflect the financial institution's current operational risk exposures. Given the AMA approach's few constraints on the usage of data, the data requirements for the AMA methodology and an economic capital methodology largely coincide.
Correlation	Correlation not allowed between risk classes. Correlation constraints 'within' operational risk class (needs to be empirically proved).	Correlation allowed both 'within' operational risk and between risk classes, e.g. credit, market and operational risk.
Mitigants	The recognition of insurance mitigation will be limited to 20% of the total operational risk capital charge, given a number of criteria. Also, only insurance allowed as a mitigant.	Full deduction of mitigants, including other types than insurance, is possible.
Confidence interval	The regulators require a 99.9% confidence interval.	Normally the confidence interval is linked with a perceived rating target, i.e. 99.97% reflects an AA rating.
Regulatory multiplier	Regulatory multiplier under Pillar II most likely, reflecting the situations for the market risk capital charge.	Not applicable for economic capital
Expected vs unexpected loss	Supervisors will require financial institutions to calculate its AMA regulatory capital requirement as the sum of expected loss and unexpected loss, unless the financial institution can demonstrate that it is adequately capturing expected loss in its internal business practices.	Should only cover unexpected loss, as expected loss is already budgeted for.
Indirect vs direct loss	Should only cover direct loss.	Indirect loss, such as loss of income due to system downtime, can sometimes have a larger financial magnitude than the direct loss itself. Hence, it is important to recognise its impact. In some cases, indirect loss is estimated in a separate risk class: business volume, whereas in other cases it is integrated within the operational risk class.
8% rule and floor	The operational risk capital charge (AMA) can in aggregation with the regulatory credit and market risk capital not fall under 90% of the 8%% capital ratio rule for the first year following implementation and not under 80% in the second year.	No link to a minimum capital ratio floor.

Definition

To avoid definitional issues and complications, many financial institutions simply adopt the Basel definition of operational risk as their internally accepted definition. However, in some jurisdictions, the local regulators have introduced a slightly different definition than Basel. That leads to problems for multinational financial institutions when reconciling regulatory definitions with different scopes and when determining the extent of the operational risk capital estimate.

Strategic risk is normally established as a separate risk class and is defined as the sum of all other risks (adjusted for any diversification effects) for a particular new product launch or expansion to a new geographical area, etc. The establishment of a new market or product can involve explicit credit risk, market risk and operational risk associated only to the specific strategy.

Reputational risk is due to the estimation difficulties, normally both excluded from the operational risk definition but also from the economic capital framework itself, however reputational loss manifested as indirect financial impact can be included as part of the business volume risk class.

Input data

The emphasis of AMA is to use data that in a realistic way will reflect the financial institution's current risk and control environment. The data requirements includes:

- Internal loss data
- Relevant external loss data
- Scenario analysis
- Factors reflecting the business environment and internal control systems.

As AMA provides few requirements on the exact use of data, but allows a very flexible approach, conversion of input data to economic capital modelling will normally cause few problems. To ensure a realistic measurement methodology, both for regulatory and economic capital, the appropriate selection and structuring of different data types is critical.

The key aspect for operational risk measurement is ensuring that the right type of data is captured to enhance and calibrate the model performance. It is not necessary to accumulate long series of historical data, but rather to extract data that highlights and replicates the existing risk and control environment. After a financial institution suffers a severe loss, a typical pattern follows: controls are improved and processes are reviewed to ensure that a similar type of loss will not occur again. Therefore, including older loss data as part of the modelling might not realistically reflect the financial institution's true operational risk exposure as the control environment might have changed. The judgement-override possibility allows financial institutions to exclude internal historical losses and associated risk indicators and control scores (also within the five-year time span) no longer deemed relevant, such as the exclusion of historical data due to cheque fraud, as that has become an obsolete product.

The use of relevant external losses is another key data AMA requirement. However, the way external data is used requires some reflection. Blending external loss data with internal loss data for loss-distribution modelling is questionable for a number of reasons, the most important being how to evaluate the external loss's validity and compatibility with internal losses. Given that the information provided for external losses is normally quite scarce, assessing applicability becomes almost impossible. As external loss data will not reflect the actual control and risk environment at the financial institution, combinations with key risk indicators' and control scores is meaningless. Also, external loss data cannot be used for back-testing and validation of the operational risk capital number, as the loss experiences at other financial institutions bears no relationship with the in-house risk and control environment.

External loss data can, however, serve a useful purpose as part of the scenario analysis, especially in helping to design realistic scenarios. As for some loss-event types, internal loss data points are too scarce for loss-distribution modelling, and scenario estimates provide an alternative by which to arrive at a capital number. Hence information about loss events at other banks can, in conjunction with expert judgement, provide realistic input for meaningful scenarios.

To conclude, the few requirements given regarding data usage under the AMA regime facilitates the convergence between regulatory and economic capital.

Correlation

Full correlation is allowed for economic capital, whereas for regulatory capital, a financial institution is only allowed to use internally determined correlations between operational risk loss types and business lines, provided they can be demonstrated to a high degree of confidence.

Another important difference is that correlations are not allowed between different risk classes, i.e. credit, market and operational risk, under the regulatory capital framework. This can lead to deviations between the overall regulatory and economic capital charge, as including correlation both within the operational risk class and between the different risk classes provides a significant lower capital charge.

Mitigants

The AMA only recognises insurance as an allowed deductible and the insurance mitigation will be limited to 20% of the total operational risk capital charge. In addition, only certain types of insurance policies and insurers are allowed.

For economic capital, full deduction of insurance policies' coverage against the capital charge is possible as part of the capital assessment, as is the inclusion of other types of deductibles.

The deviating view on allowed deductibles for the regulatory capital framework versus an economic capital framework can create considerable differences in the capital estimates. From an economic capital point of view, not including existing mitigants would forfeit the basic concept that the amount of economic capital a financial institution should hold is directly related to the net amount of risk it faces. Also, from a risk culture point of view, not including risk-reducing or transferring measures does not encourage the right type of behaviour among business managers to manage and optimise their risk exposures.

Assessment of the effectiveness of operational risk mitigants needs to follow a structured path; i.e. how effective that reduction will be, and the financial benefit of having it in place versus the cost of its implementation. For certain risk types, such as credit and market risk, this type of risk reduction activity is quite straightforward (thanks to standardised financial instruments) and the cost/benefit relationship can be fairly accurately calculated. Unfortunately, for operational risk, this process is not as distinct. As operational risk is a very heterogeneous risk type, any risk-reducing activity often needs to be uniquely tailored to cater to special needs due to complex business activities and process structures.

For operational risk, there are basically four different categories of mitigants that can be utilised:

1. Controls – checks & balances

Investing in improving controls or establishing new controls where previously non-existent, should, all other things being equal, be rewarded in a lowered operational risk capital

charge. To make sure that the capital charge properly reflects improved controls, each key control needs to be linked with a metric (such as a key risk indicator or control score) that can capture any changes in the associated risk and control environment and reflect the change in the capital charge.

2. Insurance

Insurance is the only regulatory-approved mitigant and also the easiest of which to estimate the capital effect. Its value is limited to reducing the severity of the loss and cannot normally assist in preventing operational risk losses from happening, e.g. frequency reduction. The coverage of the insurance policy is normally calculated deducting the premiums paid and adjusted for any haircuts.

3. Awareness – education & training

Probably the most efficient mitigant in terms of cost of investment versus benefit, but also the hardest to assess the capital reduction effect of. One potential way to estimate its effectiveness in reducing risk levels is by studying changes in the frequency of losses caused by human errors..

4. Business continuity management (BCM)

Some operational risk losses are events like IT-system breakdowns, fires and other types of disasters. The existence of BCM components such as recovery sites and IT back-up systems aims to reduce and mitigate the severity of these types of losses.

Investments in BCM could alter not only the severity assessment but also the frequency of losses occurring. For instance, improved security measures could reduce the risk of a terrorist or hacker attack. Lowering the probability of a loss will reduce the economic capital set aside for the specific loss-event category.

Confidence interval

Under the New Basel Capital Accord, the regulatory capital has to be estimated on a 99.9% confidence interval. For economic capital, the set confidence is often linked with the perceived risk appetite of the financial institution and it is usually set with a view to meet a credit rating target; for example, 99.97% reflects an AA rating.

The absolute value of the capital amount will differ between regulatory capital and economic capital, if different confidence intervals are used, however, it will require no adjustments of the overall methodology other than shifting the cut-off point on the loss distribution.

Regulatory multiplier

For regulatory market risk capital, an additional multiplier (normally between three and four) is added to the value-at-risk number calculated by way of internal modelling. Although nothing explicit has been announced for the operational risk capital charge, it is likely that at least some local regulators will, under Pillar II, introduce a regulatory multiplier to serve as an add-on to the initially calculated operational risk capital charge.

This regulatory capital multiplier is something that carries no relationship with a risk-sensitive capital model and can only been perceived as a regulatory overhead in contrast to the economic capital calculation.

Expected versus unexpected loss

From a statistical point of view, a loss distribution for capital estimation can be separated into different loss categories:

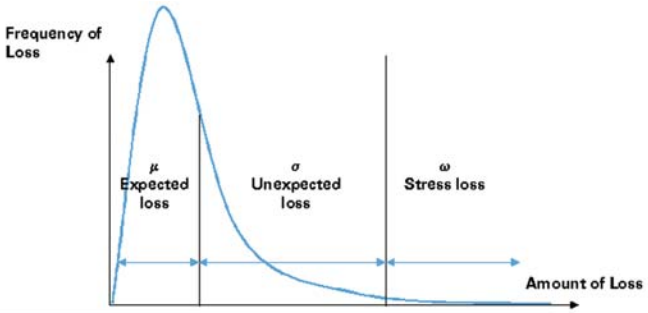
Expected loss is the average anticipated loss for a risk class through time. This loss amount should be budgeted for and can be viewed as the cost of doing business.

Unexpected loss is the variance of expected loss over time, up to a particular confidence level and is the amount of loss that is catered for by economic capital.

Stress loss – as the capital estimation only covers losses up to a certain confidence, potential losses beyond that cut-off point need be estimated, and are usually determined through pre-defined scenarios based on historical events.

In this context, economic capital covers only unexpected loss, as expected loss should already be accounted for. However,

Fig 2. Overview of statistical loss types



Description of exposure type	Expected cost of exposure of risk	Acceptable exposure to possibility to loss	Exposure to extreme events
Risk Measurement Methodology	Average expected loss	Value at Risk Methodology	Stress loss scenario analysis
Risk Control Action	Charged to P/L	Controlled by use of VaR limits	Protection provided by stress loss limits

regulatory capital must cover both expected and unexpected loss unless appropriate budgeting for expected losses can be demonstrated by the financial institution.

Hence, if expected loss cannot be excluded from the regulatory capital charge, one can expect a significantly different outcome compared to economic capital, even if the same measurement methodology is used. If accepting the regulatory capital estimate as an economic capital estimate, the assessment of expected loss needs to be backed out to arrive at a theoretically correct capital charge.

Indirect versus direct loss

Indirect loss, such as loss of income due to system downtime, can sometimes have a larger financial consequence than the direct loss itself. Subsequently, it is important to recognise its impact. As the regulatory measurement methodology only covers direct loss, any indirect consequences will never be included as part of the overall regulatory capital regime. Not

estimating indirect financial impacts for the economic capital framework can lead significant underestimation of the financial institution's capital cushion. There are basically two ways to treat indirect loss in an economic capital regime:

- Expand the scope of the economic capital operational risk definition, which would impose considerable difficulties when converging with regulatory capital or,
- Include indirect loss as part of a separate risk class, business volume, which from a theoretical point of view would be more appealing but which can incur complications when linking the indirect impact to its risk cause.

8-percent rule and floor

The regulatory capital amount calculated under AMA is not likely to equal the actual regulatory capital for operational risk that needs to be set aside. The operational risk capital charge can, in aggregation with the regulatory credit and market risk capital, not fall under 90% of the 8% capital ratio rule for the first year following implementation and not under 80% in the second year.

This means that even if the same amount is estimated for economic and regulatory capital, extra regulatory capital might need to be added to meet the floor set by the regulators, not necessarily (all of which may be) allocated to the operational risk charge.

Strategies for reconciling regulatory and economic capital

Establishing strategies on how to reconcile economic and regulatory capital models is a worthwhile exercise as there exists considerable overlaps and extensive leverage its possible.

If regulatory capital exceeds economic capital, the exceeding capital is treated as a regulatory overhead and allocated out to the specific business lines in accordance with already-established scalars. Any prospective regulatory multiplier and/or floor linked to the 8% rule that would introduce additional capital would be allocated out to the various business lines as per the above rule.

If the economic capital exceeds regulatory capital, no adjustments need to be made as economic capital serves as the basis for risk-adjusted performance measurement calculations and risk budgeting.

However, serious considerations exist for how to treat correlation, deduction of mitigants, indirect loss and expected loss. Clearly, the current AMA methodology does not fully support risk-sensitive treatment of these issues and to directly implement AMA as an economic capital model would be to accept quite severe constraints, which questions the validity and usefulness of the methodology and, indeed, the whole economic capital framework. As a starting point, the AMA methodology can serve as a base for an economic capital methodology, where additional modules or assumptions are added, although as this review highlights, it will involve careful planning.

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