

Measuring operational risk

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The financial services industry is striving to develop a sound methodology to quantify operational risk to complement the more established methodologies already being used for market and credit risk. But scepticism abounds and many doubt whether it can be done.

Others argue that even if it can be done, it may not be worth the effort. The authors, both of whom work in PricewaterhouseCooper risk management consulting practice, describe some of the current methods in use, and why they believe their firm's new actuarial based application, called OpVaR, is a significant step-forward.

WHAT IS OPERATIONAL RISK?

The debate on measurement is affected immediately by the absence of a common definition for operational risk itself. What should we be trying to measure? Some banks use a narrow definition of operational risk, focusing on the risks associated with processing transactions. Others define operational risk as all risks outside of market and credit risk. As well as the risks associated with human error, technology failure, inadequate controls and external events, this wider definition also includes strategic and business risks, such as failing to react to competitor actions and changing economic conditions.

THE COMMERCIAL RATIONALE

The definition issue becomes important when considering the key industry driver for measuring operational risk (having comprehensive risk-adjusted performance measurement and capital allocation processes). Senior management has increasingly recognised that these processes are fundamentally flawed if only market and credit risk is being measured. This is particularly important for organisations with asset management, corporate finance and other businesses where the majority of risks (which can be substantial) are not market or credit related. Having designed sophisticated economic value-at-risk models for market and credit risk, the natural extension is to capture the remaining ones (operational risk in its broadest sense). The challenge was therefore set.

However, the commercial benefit of being able to measure operational risk goes beyond capital allocation.

For example:

- *To create awareness of significant risk issues and exposures;*
- *To undertake cost-benefit analysis of investment in controls, and appraise the risks associated with new business activities; and*
- *To establish optional risk financing arrangements given the type and levels of exposure that the organisation has.*

METHODOLOGY DEVELOPMENT

From the start, the task of measuring operational risk has been difficult. The wide range of specific risks involved, their varying impact and time horizon, identifying causal factors and coming to grips with reputational damage to name but a few. Perhaps above all, data on operational losses is sparse. Most institutions simply do not have

comprehensive internal loss data that can be analysed and modelled, and fewer still have external data to measure exposure to the types of losses they have not yet incurred.

A number of top-down measurement methodologies have been developed and implemented by banks to generate operational risk capital figures. These include expense based approaches, peer or surrogate comparison and other proxies. The advantage of such approaches is that they are relatively easy to implement, enabling operational risk capital to be considered in decision making. They can be understood by line management and can be designed to induce desired behavioural change, by incorporating risk related factors under the control of business units. For example, a common input is audit report ratings (obtain a better audit rating and the capital charge reduces). Additionally, such models do not require comprehensive loss data.

However, the limitations of these approaches are readily understood. Their credibility and relevance are open to challenge - for example, capital calculated as a percentage of expenses can misrepresent low cost high risk businesses and the effect of over-aggressive cost reduction programmes. They also provide little practical information to line management on their exposure to individual risk types. In addition, their lack of a statistical basis makes aggregation with market and credit risk questionable.

Other approaches are used, such as earnings volatility (particularly for business related risks) and variants of the Capital Asset Pricing Model. Their top-down nature also limits the extent to which they give detailed information on specific exposures and direct value to line management. In view of

these drawbacks, a number of banks have taken a different route with actuarial based models.

ACTUARIAL METHODOLOGIES

Actuarial science has long been used by the insurance industry to model low frequency, high severity events. This approach can be applied to the problem of measuring operational risk capital. By gathering data on individual loss events, it is possible to build frequency and severity distributions for homogeneous types of risk. Monte-Carlo simulation can then be used to calculate operational risk capital figures to a statistical level of confidence.

This is appealing for several reasons, including:

Large and unexpected operational losses are by definition low frequency, high severity events, precisely the type being measured by such an approach;

The detailed information allows management to see their exposure to different types of risk - not just a single overall figure. Trends can be observed over time, including whether the frequency or impact of different types of risk event is increasing or decreasing;

The statistical confidence level is consistent with market and credit VaR concepts; and the reporting and analysis of losses raises management awareness, and leads to the implementation of enhanced controls.

There are challenges for an institution that wishes to follow such an actuarial route. The most critical is obtaining a statistically valid population of relevant loss data to enable distributions to be developed for modelling. Additionally, the specific approach adopted needs to:

- *Have a consistent, well-defined basis for categorising different risk types;*
- *Reflect the state of the existing control environment within business units and provide a transparent way for motivating staff to improve the management of risks;*
- *Calculate risk capital figures for individual business units as well as the firm as a whole,*

in a way which takes into account the specific characteristics of the units involved; and

- *Refine any external loss data used, recognising that its relevance will vary by, for example, type and size of institution.*

In order to gain the maximum benefit from investing in a methodology of this nature, and in particular overcome business scepticism over the value gained, it is critically important that the processes developed to support the model provide value to line management in their own right. For example, risk indicators used to reflect the state of current controls need to be designed so that they form a robust, value-adding line management process for day-to-day use.

Interest in actuarial based approaches has been increasing, with several institutions now using this methodology concept. In response to demands from leading financial services clients, projects undertaken in this area, and our commitment to be at the forefront of industry thought leadership, PricewaterhouseCoopers has developed an actuarial based model, called OpVaR. We believe it enhances significantly the ability of institutions to address the challenges described above and implement a tailored capital allocation methodology in their organisation.

THE OpVaR MODEL

OpVaR is designed around a loss database containing over 4,000 events, representing approximately \$200 billion of losses. The database is updated continually by the firm's operational risk management consulting practice. Clients can therefore augment available internal data with this external data. This is particularly appealing where internal loss data is not readily available initially, and allows figures to be calculated at a very early stage for discussion and inclusion in decision making processes.

Data is categorised by underlying cause of loss; for example, fraud, mismanagement, unauthorised trading etc. This provides a comprehensive structure for reflecting exposures outside of market and credit risk. Sophisticated actuarial techniques are

used to scale and normalise external data and to build relevant distributions for different types of loss, by individual business unit.

A key aspect of OpVaR is its link to the wider operational risk management framework. The model reflects the relevance of different risks to individual units and the quality of internal controls. Risk self-assessment, indicators or other operational processes can be used for these inputs. This ensures that a consistent framework is developed, and that the model draws on processes that add real value to line management. It also provides a means for inducing desired behavioural change.

Finally, OpVaR is intended to have wider application than solely operational risk capital measurement. As well as the potential for calculating capital figures by risk type and business unit, OpVaR has been designed to support investment decision appraisal, and, by incorporating existing information on risk financing arrangements, the optimisation of risk financing strategies.

Operational risk measurement theory and practice remains at an embryonic stage. As further investment and intellectual input takes place, we will see increasing innovation, development and discussion. The commercial rationale will ensure this is the case. The benefits of actuarial concepts may well lead to their becoming an accepted part of operational risk measurement. OpVaR is a model that addresses existing challenges with these concepts and enables senior management to implement operational risk measurement in a pragmatic, reflective and value-adding manner.

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