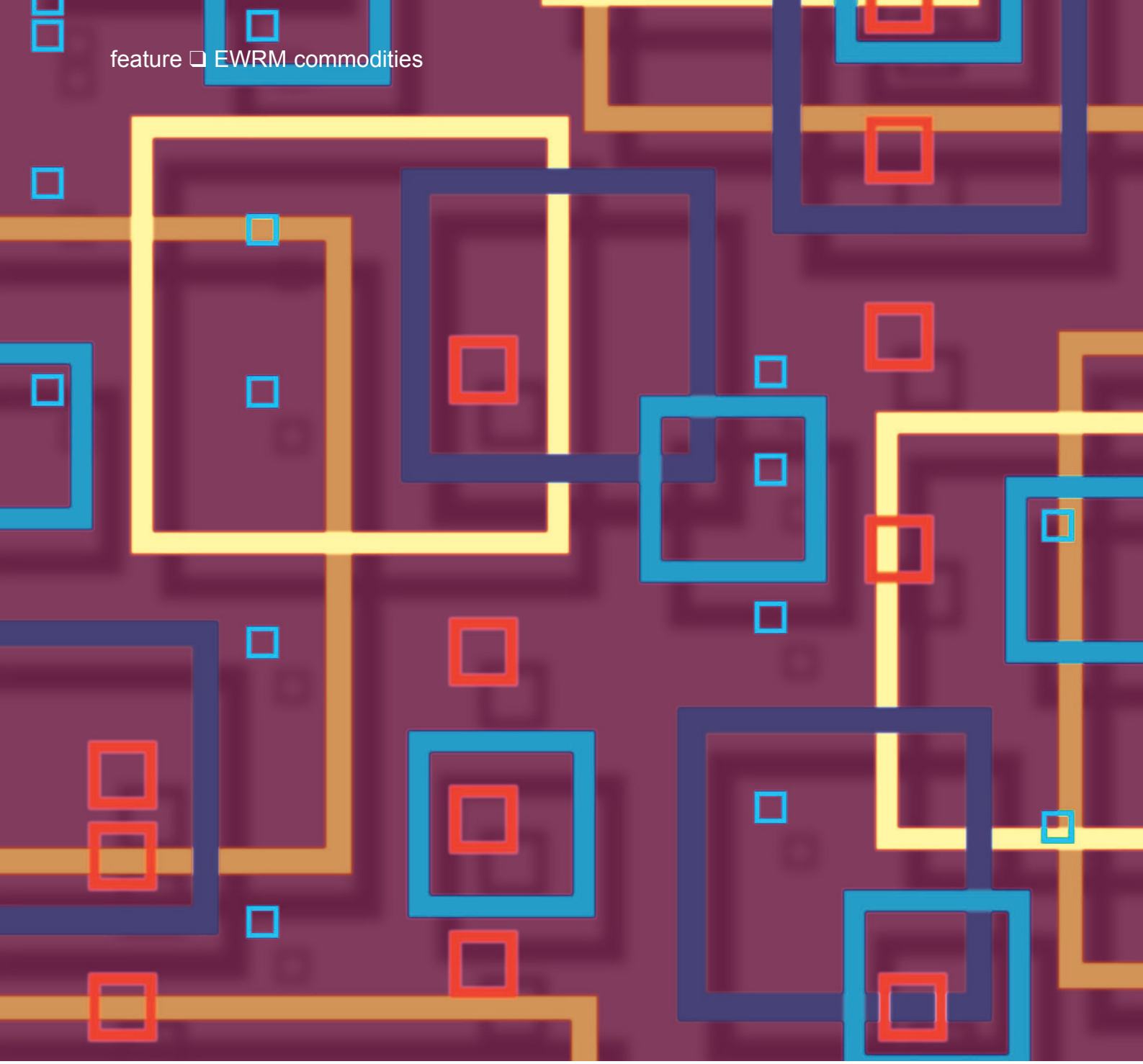


An integrated framework

Carlos Blanco*, **Kevin Dowd*** and **Robert Mark*** look at best practices in enterprise wide risk management for energy and commodity trading firms

Traditional risk management has often concerned itself with the measurement and management of risks on a class by class basis. However, this can lead to a 'silo mentality' in which different risks are handled separately. This leads to inconsistencies across the firm, lost investment opportunities, and inefficient allocation of capital. The solution to these problems is enterprise wide risk management (EWRM). An EWRM programme allows a firm to manage its risk-taking in a holistic, integrated and proactive fashion, as well as exploit economies that are not possible if risks are only managed on a piecemeal basis.

Recent years have witnessed an explosion in the methods available to measure risks, and the ability to measure risk is clearly a key component of effective risk management. However, it needs to be complemented with the right risk infrastructure and policies, and take place in the context of an integrated risk management programme.

An integrated best practice approach to risk management can bring significant benefits for the firm such as to:

- ❑ Ensure that the corporate-wide risk profile is within the range mandated by the board of directors
- ❑ Make it possible to measure and reward performance on a risk-adjusted basis
- ❑ Lead to improved credit ratings and lower borrowing costs
- ❑ Increase risk awareness throughout the firm as a whole
- ❑ Identify natural hedges arising from diversification across the firm's different activities. This helps the firm to avoid costly and suboptimal micro-hedges and facilitates macro-hedging at the firm-wide level[1].

The building blocks

An EWRM programme is usually built around three building blocks: policies, methodologies and infrastructure (see Figure 1).

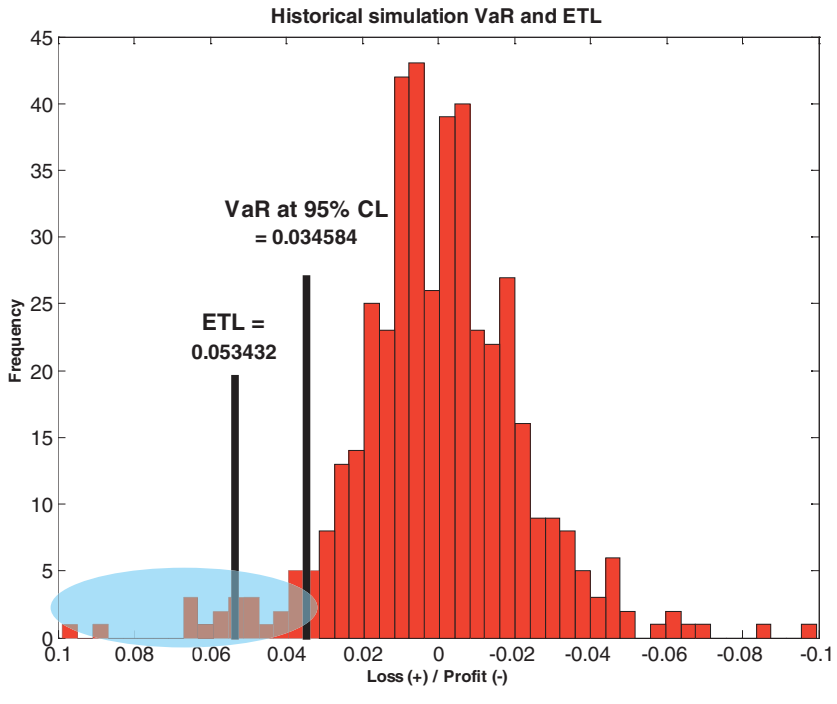
The first building block of the policy dimension rests on policies linking business strategy with the tolerance for risk. It also involves the right reporting lines and the internal and external disclosure of risk.

Business strategy and risk tolerance cannot be set independently. A firm's risk appetite should be a key component in business strategy planning sessions, and other policy decisions should be consistent with that appetite.

Figure 1
Best practice EWRM building blocks

Source: Crouhy, M, Galai, D and Mark, R, *Risk Management* (McGraw-Hill), October 2000.

Figure 2.
Value-at-Risk (VaR) and Expected Tail Loss (ETL)



Before engaging in an EWRM effort, firms should define the main objectives of the programme. For example, COSO[2] defines EWRM as "a process, effected by an entity's board of directors, management and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risks to be within its risk appetite, to provide reasonable assurance regarding the achievement of entity objectives".

A key player in all this is the chief risk officer (CRO), and effective EWRM requires a CRO with board-level responsibilities. A CRO needs to work with their C-suite partners to support an organisation's efforts to achieve approved business objectives while keeping risk-taking activities within the boundaries established by the board of directors.

The need for effective risk management and good corporate governance were also underlined by recent reforms such as Sarbanes Oxley (SOX), which have made senior corporate officers more directly accountable. An EWRM programme is not only good for the firm, but also enables senior officers of the firm to demonstrate due diligence.

Any 'best practices' corporate governance structure aligns accountability very clearly with authority. It is therefore important that the board outlines the CRO's scope of responsibility and clearly delegates appropriate authority to them. Best practice is for the CRO to be accountable for keeping the firm's risks under the levels approved by the board, and to have the power to order positions to be reduced, including the authority to close down the trading room.

Some guidelines on the role and authority of the CRO can be found in a white paper on governance and controls issued by Committee of Chief Risk Officers[3] (CCRO). The white paper outlines the responsibilities and duties of boards of directors, risk oversight committees, chief risk officers, as well as those of supporting functions such as internal audit and back office.

Another feature of best practice risk management is an organisation's ability to provide information that gives some reasonable indication of risks to senior managers, board members, and external stakeholders. Analytically rich disclosure is critical to a strong risk management process and allows managers and other stakeholders to understand the links between risk and financial returns.

The new external focus on risk governance is a particular challenge for organisations engaged in complex risk-taking such as energy and commodity trading firms. The recent loss of $550m in speculative derivatives trading activities by China Aviation Oil Singapore will also put additional pressure on firms to put in place best practices risk governance frameworks. Credit rating agencies have also increased their demands for risk disclosures. As an example, S&P has initiated a liquidity risk survey among US energy trading and marketing firms as part of their rating evaluation process[4].

Energy and commodity trading firms dedicate significant effort to articulate and disclose their business model, but surprisingly relatively little attention is given to risk disclosures. For example, risk disclosures in annual reports of energy and commodity trading firms are considerably below the standards set by financial services firms.

Second cornerstone: methodologies

Methodologies to mark to market derivatives instruments and to measure different risks are the very cornerstone of a sound risk management framework. They also play a critical role in performance measurement and risk capital allocation.

Over the last decade, value-at-risk (VaR) has become the standard measure of risk. VaR also has various relatives – such as earnings-at-risk (EaR), cash-flow-at-risk (CFaR), liquidity-at-risk (LaR), and liquidity-adjusted VaR (LVaR) – that are sometimes also used by energy trading firms to measure risk.

As part of a best practices methodologies framework, firms should also complement VaR with other measures such as expected tail loss (ETL), which provides an indication of the expected size of the loss beyond VaR. The ETL associated with VaR at the 95% confidence level (CL) is shown in Figure 2.

The importance of not relying on VaR alone was illustrated by the $80m loss suffered by Reliant in February 2003. This loss occurred on a spread position after a weekend price increase of $2.53/mmbtu for natural gas. Even though the position was within VaR limits, the VaR itself did not indicate how large losses exceeding VaR might be. So even if Reliant had a perfect risk model, the choice of VaR as risk metric would not have revealed the 'tail risk' being taken by the firm.

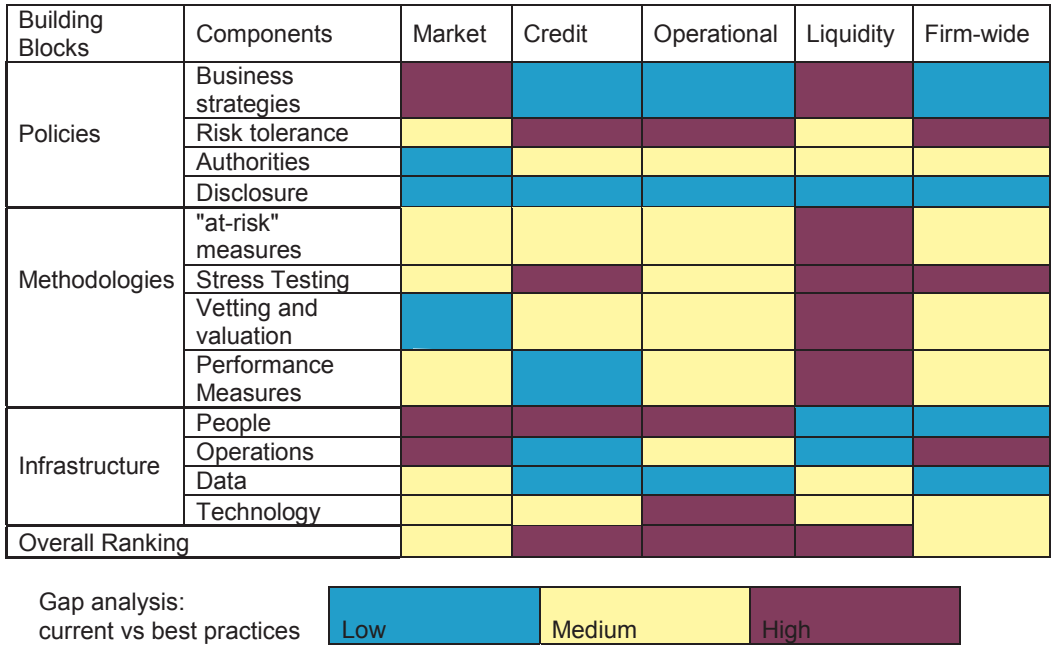
Meanwhile, stress tests are used to determine the potential losses that would occur under specific scenarios, which might be particular changes in market prices or conditions. The need for stress testing is underlined, for example, by the fact that oil prices rose nearly 75% over the last 12 months, and oil market volatilities increased considerably as a result. At a minimum, stress tests should be employed to provide an indication of the effect of 'tail events' beyond the level of confidence assumed in standard risk measurement models. Due to their significant advantages over other risk measures, many risk managers are adopting stress tests as their primary risk measurement tool, with VaR used as a complementary risk measure to indicate portfolio risk under more normal market conditions.

It is particularly important for stress tests to include catastrophic scenarios that could wipe out a substantial percentage of the firm's capital or even lead it to bankruptcy[5]. In the case of energy firms, these scenarios should also include environmental disasters as well as more conventional extreme scenarios.

A firm at the leading edge of risk management practice would have a stress test committee. The committee would proactively identify and evaluate scenarios that are important to the firm, and feed that information into capital allocation decisions.

Another important feature of best practices is to regularly assess the valuation techniques used by the firm. Pricing energy and commodity derivatives is as much art as it is science, particularly for highly illiquid markets. Valuation problems are particularly important for energy fixed assets and complex contracts with various degrees of optionality. The problems of valuing fixed assets were recently illustrated by the admission by Royal Dutch/Shell at the beginning of 2004 that they had overstated their oil reserves by four billion barrels, which delivered a devastating blow to market confidence in the firm. The valuation of options can also be highly problematic because option values depend on volatilities, which are often unknown. Understanding and validating model assumptions is therefore a key requirement of best practice.

Figure 3.
Gap analysis: current vs best practices



Due to the complexity of some of the pricing and risk models used by specialist groups within energy and commodity trading firms, periodic risk audits conducted by qualified independent risk professionals are highly recommended. A best practice organisation welcomes the transparency and feedback provided by those audits.

Energy firms should also disclose their valuation methods. For example, best practice disclosure calls for marked to market profits and losses to be isolated from marked to model ones. This helps to prevent the manipulation of earnings by 'fudging' forward curves and model parameters. The importance of this was highlighted by Enron, whose dubious valuation methods led many US energy merchants to buy power plants at grossly inflated valuations based on highly questionable long term forward curve forecasts.

Risk capital allocation is one of the key tasks performed by senior management of energy trading firms, and one of the main benefits of EWRM is that it leads to improved risk capital allocation.

Determining the economic capital[6] allocated to each activity or business unit also provides senior management with a mechanism to link risk and return, and therefore provide a risk/reward signal that can be used at different levels of the firm. An investment evaluation process based on economic capital considerations (eg, where decisions are based on a risk-adjusted return basis) encourages managers to take account of risk in all the decisions that they make. Such an approach can be implemented using risk adjusted return on capital (RAROC) ratios, which relate the return generated by a risk-taking unit to the risk taken to get that return. Among other benefits, RAROC enables management to identify the most efficient generators of revenue on a risk-adjusted basis, and to determine the required returns on projects given the risks they would entail.

Infrastructure

Besides having the right policies and using the right methodologies, it is essential that the firm has the right people in the right place with the right data to make informed decisions. There is a need for a common language to describe the multiple dimensions of risk and accommodate the complexity inherent in restructuring and repackaging risk. Best practice organisations find the right balance between maintaining their existing infrastructure while implementing change management strategies to improve efficiency and better support their core business activities.

The infrastructure components can be viewed from the different perspectives of people, operations, data and systems.

The first and most important infrastructure component is good people. Given the right environment and support, it is people who make everything else happen. EWRM starts with getting the right staff, and with training programmes to inculcate enterprise wide risk literacy and awareness.

There are many questions that can be raised about people issues in an EWRM programme. For example:

- What is the budget allocated to the overall risk management function?
- What is the level of education in risk management?
- Does the risk function include experienced former business persons?
- How many years experience does the risk management function have?
- Are the resources and budget allocated to risk management sufficient?
- Does the firm encourage the hiring and retention of qualified staff with the right compensation, stature and career paths?

Simple technology solutions developed to solve specific issues in the context of the firm's operations are considerably more effective than implementing and deploying large systems that require massive resources to implement and deploy

Some regulatory agencies also place a lot of emphasis on the qualifications and experience of key individuals in risk management functions. For example, the UK's Financial Services Authority (FSA) requires that firms using internal models to determine capital requirements have qualified risk management professionals with the quantitative skills and experience to understand those models.

Turning now to operations issues, the first requirement is that the objectives of the EWRM programme be set very clearly right at the start. The integration of risk management operations and technology should then support management to accomplish these objectives. For example, a natural gas storage asset optimisation system that does not provide traders and decision makers with accurate information on a real time basis will be relegated to become a control tool instead of being an active decision-support tool.

In many cases, simple technology solutions developed to solve specific issues in the context of the firm's operations are considerably more effective than implementing and deploying large systems that require massive resources to implement and deploy.

The firm also needs to deploy the systems to make sure that accurate data goes to the right people at the right time. Obtaining, storing and cleaning data are some of the more time intensive tasks performed by risk manager, but ensuring the integrity of data systems is a critically important part of EWRM.

Technical risk audits

Senior management and board members have a fiduciary responsibility to ensure that the risk management programme is working adequately. But how can senior managers be confident that their risk management programmes are adequate? Again, the answer is to have independent risk audits carried out. Such audits would check for weaknesses in a firm's risk management systems and raise 'red flags' when material weaknesses are found.

The need for such audits was highlighted by the recent collapses of a number of US energy merchants. Had these firms carried out such audits, they would have revealed significant problems, including irregularities in the mark to model processes used to value illiquid derivative contracts and deficiencies in the degree of independence of the firms' risk management groups. Senior mangers would then have had the opportunity to respond to these problems before they became fatal.

A good way to present the results of such an audit is through a 'gap report' – a report that evaluates the gaps between the firm's current practices and industry best practices, evaluated against the different components of an EWRM framework. An example of a gap report is given in Figure 3. A blue box indicates a narrow gap, meaning that the firm's practices are close to best practice for the category concerned. A yellow box indicates a medium gap, suggesting that the firm is significantly behind best practice, and a purple box indicates a large gap, showing that the firm is well behind best practice. In this case, our hypothetical firm has material weaknesses in a number of areas, especially in those related to the management of credit, operational and liquidity risk.

Many energy and commodity derivatives trading firms still manage their various risks in geographical or functional silos. This traditional approach is no longer adequate because it fails to take into account the linkages between risk types (eg between market and credit risk). Instead, firms need to integrate various risks and business results across different activities (eg between oil and gas trading), and manage those risks on a proactive basis. And this is what EWRM is all about.

It is ultimately the board's fiduciary responsibility to ensure that the company has an appropriate risk management programme in place. This is all part and parcel of good corporate governance and is increasingly seen as a key element of corporate due diligence. In addition, there is a growing awareness that a best practices risk management programme must also involve EWRM: indeed, EWRM is the very heart of good risk management. ❑

*__Carlos Blanco__ is md of Black Swan Risk Advisors (carlos@blackswanrisk.com), __Kevin Dowd__ is Professor of Financial Risk Management at Nottingham University Business School, and director of research at Black Swan Risk Advisors (Kevin@blackswanrisk.com) and __Robert Mark__ is the ceo of Black Diamond (bmark.blackdiamond@tmo.blackberry.net)

Footnotes

[1] An example of a natural portfolio hedge is when different units at the firm have highly correlated offsetting exposures. Analysing risks and exposures at the firm-wide level helps to identify those offsetting positions, and then identify a macro hedge against the firm's net exposure.

[2] Committee of Sponsoring Organizations of the Treadway Commission (COSO), a private industry initiative organised in 1985 by five of the key finance professional organisations in the US to sponsor a national commission on fraudulent financial reporting. COSO's emphasis on internal control has emerged as an important element of the overall risk governance exercise, particularly with the advent of SOX.

[3] CCRO. *Governance and Controls*, 19 November 2002. www.ccro.org

[4] *FOW* will discuss the S&P risk survey in a forthcoming article on liquidity risk.

[5] There are specific methodologies such as Extreme Value Theory (EVT) that have been developed to specifically measure the risks associated with extreme (low-probability, high impact) events. In other words, the goal is to utilise an appropriate pdf (probability density function) to accurately characterise, say, the distribution of the Max (Xi's) or Min (Xi's).

[6] Economic capital is defined as the risk capital a company is required to hold to support the risk of unexpected loss in the value of its physical and financial portfolio.