



Quadrant

The Power to
Measure, Manage and Understand

Stress and Scenario Testing

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About Simon Baker

Simon Baker joined Quadrant in April 2008 after 26 years in the banking industry. He spent the last seven years as Group Programme Director of the successful Lloyds TSB Basel 2 Programme. He brings to Quadrant and its clients unique insights into this complex issue and shares some of them in this paper.

Simon considers the question of Stress and Scenario Testing in light of the publication by the UK's Financial Services Authority of Consultation Paper 08/24 on the subject in December 2008. Following the difficulties that banks have experienced as a result of the troubles in the financial markets, regulators are determined to put rules in place requiring much more robust practices in this area. This paper summarises the main requirements and comments further on good practice. It is relevant especially to readers who are in the course of preparing their Internal Capital Adequacy Assessment Process (ICAAP) document for consideration by their Board and supervisors. Many of the principles considered here will have relevance in that discussion. The challenge facing the industry is to develop a meaningful approach to stress and scenario testing that will help to guard against the misadventures that have occurred recently.

Simon would be delighted to hear from readers of this paper and would welcome the opportunity to bring his experience to bear in helping your organisation. Contact details are provided at the end of this paper.

About Quadrant

Quadrant Risk Management (International) Limited was formed in the UK in 1991 as a specialist consultancy by risk management professionals who had previously operated at Board level in financial institutions. For seventeen years Quadrant has helped Banks, Investment Managers and Building Societies in more than 20 countries to create best practice strategy and corporate governance architectures and control processes. Quadrant's client list includes three of the top five UK banking groups and many leading international financial institutions in Europe, Asia, Africa and the Far East.

1. Introduction

In July 2008, in my paper “The End of the Beginning – Embedding Risk in a Basel 2 World”, I argued that the implementation of Basel 2 in numbers of regimes around the world did not in fact mark the end of a long and tortuous journey. Rather, it was a milestone, albeit a major one, that had been achieved. Those bankers who thought that they might now turn their attention to other matters were wrong.

The difficulties in the financial markets have continued in a way that nobody predicted. Governments and monetary authorities globally have taken action to try to prevent the collapse of their financial systems.

It is apparent that the financial institutions which have managed relatively better through this period had already more successfully embedded strong governance structures within their organisations. In addition, they had managed to establish robust risk assessment processes, on which they were able to base their decision making with more confidence.

Conversely, it has become clear in the light of events that the quality of the governance and processes in many firms have been deficient. While banks have understandably therefore been criticised for their role in this global crisis, the role of the regulators has also been subject to close scrutiny.

It is unsurprising, therefore, that regulators are now exploring what actions they need to take in the current circumstances in order to create an environment where confidence may be restored. More intrusive regulation is the inevitable result of the period of extreme turbulence through which we have been living.

While, arguably, nobody could have foreseen the severity and duration of the troubles in the financial markets, it is equally true to say that many might have been better prepared had they subjected their business models to severe stress and scenario testing. Northern Rock comes readily to mind.

This paper will focus on the key areas of stress and scenario testing, on which the UK’s Financial Services Authority published a Consultation Paper (CP08/24) in December 2008.

The requirement to use stress and scenario testing is not new. Some banks have recognised the benefits of these tools in helping them to better understand the resilience of their business. This has been reinforced by regulators through the need to demonstrate the application of these approaches as part of the Internal Capital Adequacy Assessment Process (ICAAP). The outputs should be of assistance to banks in taking integrated business strategy, risk management and capital planning decisions. However, the FSA has concluded that in its experience “...for many firms stress and scenario testing is not as robust, nor as embedded in senior management decision-making, as we would like.”

It is important for firms to develop and implement meaningful tests, which will help management to take decisions which will benefit their firms and the financial system generally during severe downturns. Quadrant is well qualified to support firms in their efforts.

2. What is Stress and Scenario Testing?

Stress and scenario testing is the analytic process involved in subjecting a bank's portfolios to a series of tests in order to assess their potential vulnerability to exceptional yet plausible events. They are fundamentally tests to establish whether a bank has enough capital to absorb losses in a recession. They enable banks to obtain a better understanding of portfolio risk and make potential losses clear. Stress testing is an effective and necessary tool that complements statistical models for quantifying and monitoring risk and capital adequacy.

2.1. What should banks get out of it?

The primary driver should be for Boards to gain an enhanced understanding of the key elements affecting their business, rather than the simple fulfilment of a regulatory requirement. Banks should be better able to:

- View concentrations of risk
- Analyse the resilience of their portfolios
- Understand whether risk appetite will be observed
- Formulate effective mitigation strategies
- Understand the impact on shareholders

These are all important aspects of quite simply managing the business better.

2.2. Types of stress and scenario

Real world scenarios are sometimes better to use, since business buy-in can be more easily achieved from business leaders, who may more readily regard them as plausible. This runs the risk, however, of underestimating the impact of potential future crises. This has been the experience in the financial markets of the last year or two. Equally, scenarios are rarely exactly repeated, since controls are usually implemented to prevent recurrence.

Stress tests generally fall into the following categories:

2.2.1. Sensitivities or single factor tests

These are intended to show how portfolios react to changes in relevant economic variables (e.g. interest rate changes) or risk parameters. They can be performed rapidly and provide senior management with a "quick and dirty" idea of the impact of a change in a financial variable.

2.2.2. Scenarios

These should be designed to consider the resilience of firms and the financial system to an exceptional but plausible scenario. They assess how the selected events might impact on the relevant risk factors in a firm's portfolio. They are often devised on the instigation of senior management, who will perhaps wish to assess this in the light of recent events. The choice of a scenario is either event or portfolio driven.

An event-driven approach will identify a risk source which will cause changes in financial markets. There will then be an assessment of the extent to which risk parameters may change should such an event occur.

A portfolio-driven approach will start with an assessment of which parameter changes might result in a portfolio loss. The next step would be to assess just what kind of events might bring about these changes.

Historical scenarios rely on significant past events and are based on actual data. They therefore tend to be more fully articulated and require less judgemental input. One potential drawback is that they may be less suited to the actual risk profile of the firm and may not adequately take account of recent advances in risk taking.

Hypothetical scenarios will be based upon market events or macro-economic scenarios that have not yet taken place. In terms of their construction, they will be labour-intensive and require judgement and specialist expertise. While historic data may be used to help devise the scenario, such an approach may lack support from the business as a result of the perceived artificial nature of the exercise. Arguably, however, the more widespread and effective use of hypothetical scenarios ahead of the chaos in the financial markets may have prepared firms better to face the ensuing impacts.

Hybrid scenarios have become more commonplace. They utilise historical market moves as inputs, but do not necessarily link to a specific historical crisis. They need to strike a balance between realism and comprehensibility, such that they can gain the serious engagement of the business in considering the potential impacts and what mitigating action may be needed.

2.2.3. Contagion

This takes into account the transmission of shocks from individual exposures or portfolios across a financial services group as a whole, as well as potentially across the financial system as a whole. This is an area which financial institutions have often found difficult to assess in the past, but it is a risk which has crystallized alarmingly during the market turbulence.

2.3. Considerations in the formulation of scenarios

The design of scenarios that will prove to be useful to the business is not as straightforward as it may sometimes seem. While firms have clearly undertaken exercises as a result largely of regulatory necessity, there has been too often a reluctance to entertain scenarios which might upset the status quo. This is now quite obviously changing as a result of the extreme market conditions that have been experienced and as a consequence of supervisory insistence.

Notwithstanding this, the construction of scenarios can often ignore some potentially key elements, and a number of these are discussed below briefly:

- Time horizon – the horizon most often used is near term rather than long term. A longer time horizon may be more appropriate as some macro-economic impacts may take more than a year to filter through.
- Unexpected illiquidity – many crises are characterised by an abrupt lack of liquidity in the financial markets. This element was not adequately addressed previously, but is now a key aspect of any meaningful test.
- Lack of hedges – hedging instruments may be rendered invalid during stress events. Reliance on these in a time of crisis will probably project an over optimistic outcome.
- Aggregation – the aggregation of the effects of stress tests performed at a risk type level raises issues regarding diversification benefits.
- Correlation – levels that prevail in ordinary conditions may cease to exist under exceptional events.

Stress tests should be all-encompassing and cover primarily credit risk, market risk and operational risk. Firms should also consider changes to portfolio concentration levels, reputational impact, and the impact on the availability of liquidity sources. Quadrant is able to assist firms in the development of rigorous value-adding testing.

3. Key elements of the FSA paper

Rules and guidance on stress and scenario testing will be tightened and clarified. This section provides a short description of some of the main aspects and observations.

- A “reverse-stress test” will be introduced. This is designed to consider scenarios which may be most likely to cause banks’ business models to become unviable. This is more extreme than ever before, but should help firms to assess the inherent strength of their operations.
- While examining the potential impact of risks on the capital position, firms must adopt a holistic approach and capture other impacts, such as on the liquidity position.
- An underlying objective of the reverse stress test requirement is to try to ensure that a firm might continue long enough after risks have materialised, to either restructure its business, or allow a more orderly wind-down or transfer of business. Clearly, there have been numbers of examples recently where there has been insufficient time available for measured courses of action to be followed.
- Firms have been too optimistic in assessing the severity and impacts of adverse scenarios. In too many cases, this has been a simple desk top exercise designed to meet a regulatory requirement, which has ostensibly shown that existing capital levels were adequate.
- Capital planning generally has been poor. There needs to be a more rigorous assessment of material risks and mitigating management actions.

- Firms will be expected to review their stress and scenario testing arrangements immediately, and they should expect supervisors to provide a heightened level of challenge to them.
- Group risk will become a core Pillar 2 risk, which must be considered in the context of the ICAAP.

Essentially, the only new elements are the reverse stress test and inclusion of Group risk. As firms have developed their ICAAPs, they have had to show how they have tested their businesses under the pressure of extreme yet plausible events. The evidence from the regulators is that this has not been performed well by the majority of firms and there is an urgent need to upskill in this area.

3.1. Where have firms fallen short?

I would argue that those firms which embraced the spirit of Basel 2, rather than a compliance approach, may have been better protected from the storms that have buffeted the financial markets. The FSA has included a number of its own observations in the paper:

- Those firms with strong governance and embedded risk assessment processes have fared better than others. This again illustrates that many management teams may have interpreted Basel 2 as a compliance exercise only, since these two elements are at the heart of the new capital regime. If they were not evident before, they need to be now. Risk management needs to be recognised as a value-adding activity. Too many senior management teams have regarded it as a barrier to business.
- Stress and scenario testing generally has not kept pace with the changes in business models or the development of structured products with complex risks.
- Firms have not adequately assessed contagion risk (including effects of a primary stress scenario extending to other markets or products).
- Firms need to perform stress testing at different levels (eg firm wide, business unit, business line etc) and bring together top-down and bottom-up assessment in a coherent way. This has not generally been the case.
- Liquidity stresses in one market can spread across multiple markets. This can create strains not only on liquidity positions, but also ultimately on capital positions. This can arise from pipeline transactions which cannot be distributed as planned in conditions of decreased demand, and from off-balance sheet exposures which are re-assumed. Such eventualities have not typically been considered.
- Since firms made the implicit assumption that liquid markets would continue to exist, and contagion effects between firms and markets would not be material, their Pillar 2 stress testing was inadequate preparation for the recent market events.

- Firms have realised that their stress testing was not fit for purpose, since it was not designed for the type of extreme market event that occurred. There was too much reliance on recent historical data, and consequently the systemic nature of the crisis was not captured. Firms will need to devise a more hypothetical set of assumptions to assess how exposures may change in the light of unexpected shocks.
- Stress tests presented in ICAAPs have not yet gone so far as to significantly challenge underlying business models.

Clearly, deficiencies were evident across the market, although it is fair to say that the extreme nature of what has occurred was probably not anticipated by anybody.

3.2. Institute of International Finance (IIF) recommendations for stress testing

While the regulators may be critical of the industry generally (and perhaps of their own standards of regulation prior to the crisis), the industry has recognised that the magnitude of losses at many firms has made it evident that stress testing methodologies need to be improved. The IIF recommendations, which the FSA has supported, can be summarised as follows. Stress testing:

- Should be part of the management culture, with active senior management engagement.
- Should be consistently and comprehensively applied throughout the organisation.
- Should be used to assess a firm's risk profile in relation to its risk appetite across all business activities, risk types and exposures.
- Should include challenging scenarios, which should be designed so that the likelihood of severe events is not consistently underestimated, and the firm's ability to manage crises effectively is not overestimated.
- Should not be seen as a perfect, single-metric solution. The outputs should be taken into account in decision making, but they should be used thoughtfully and not mechanically.

Clearly there is a willingness on the part of all stakeholders to address shortcomings and to start the long and arduous task of restoring confidence to a system whose credibility has been shattered.

3.3. Reverse stress testing

Firms will be required to identify and assess the scenarios most likely to cause their current business plan to become unviable. The firm's plan should be considered to have reached this stage at the point where materialising risks cause the market to lose confidence in it. Recent experience suggests that such a point may be reached well before a firm's regulatory capital is exhausted.

- This requirement is intended to be holistic, so firms should consider liquidity risks as well as risks to their capital positions.
- There should also be an assessment of the likelihood or remoteness of such risks arising in practice.
- Firms are already expected to project their capital resources over 3-5 years and to estimate the financial resources needed to survive the impact of a cyclical downturn. Such a downturn may address a firm's predominant risks where the majority of its business is composed of non-trading book activities. However, firms are additionally expected to hold capital to withstand specified yield curve shifts where they are exposed to banking book interest rate risk, and more sudden, severe market events that may be particularly pertinent to trading book risks.
- Senior management must be effectively engaged in the process, the outputs of which should assist in the formulation of business strategy, risk tolerances, capital and liquidity planning, risk mitigation strategies and contingency planning.
- Reverse stress testing will need to be documented, and signed off by the Board. It may be reviewed by supervisors alongside the ICAAP as part of the Supervisory Review and Evaluation Process (SREP).

This represents the single most significant change to the stress testing regime, and is an area in which many firms will require the type of expertise that Quadrant is able to provide.

3.4. Pillar 1 stress testing

It is useful here to remind ourselves of the requirements related to stress testing under Pillar 1.

3.4.1. Credit risk

Stress testing is to be used routinely in the calibration and/or validation of IRB risk parameters. IRB firms must test the effects of a 1 in 25 year economic recession on their portfolios.

3.4.2. Credit risk mitigation

The various types of credit risk mitigation need to be assessed in stressed conditions.

The FSA is introducing guidance aimed at encouraging firms to reflect on the simultaneous influence of individual stresses on counterparty exposure, position and the aggregate amount of margin calls.

3.4.3. Operational risk

Firms should perform stress tests and scenario analyses appropriate to the risks to which they are, or might be, exposed.

They should determine the impact and frequency of scenarios, as well as the controls and risk mitigation they plan to use to manage the risks as well as any remedial action to be taken.

The scenario and stress testing process, including the outputs from the exercises themselves, must be comprehensively documented.

3.5. Pillar 2 stress testing

Firms should project their financial position over a 3-5 year time horizon and estimate their capital resources and financial adequacy throughout an economic or business cycle. For IRB firms, assessing the impact of an economic recession of once in 25 years severity is relevant.

When firms project available and required capital resources under the capital planning stress, the gross capital figure may be offset by the mitigation of any realistic management actions, to arrive at a net figure. The Board has to approve such actions. Regulators consider that this has been one of the most under-developed aspects of ICAAP documents and is an area where they expect to see action focussed.

Regulators expect capital planning to be an integral part of the business planning process. What is submitted to regulators should include a base case, based on the firm's expected business plan, but it should also show how the business plan would flex under adverse scenarios.

Generally, supervisors feel that the capital planning stress has, to date, been performed for regulatory purposes only and this needs to change, such that it is integrated into firms' decision-making.

3.5.1. Market risk

Firms with trading books must perform regular and comprehensive stress testing on their portfolios. There must be a documented trading strategy, with policies and procedures to monitor their strategy. This will include using stress testing to measure and manage all material sources of market risk.

The stress testing requirements are not intended to affect a firm's capital requirements directly. However the results should be considered in the Pillar 2 capital assessment. They should be conducted at the trading desk level and on a firm-wide basis.

Stresses should include instant shocks as well as longer term periods of stress. In the case of the latter, firms should consider the hedging strategies that would be used, since the cost of dynamically hedging may be significant.

3.5.2. Interest rate risk in the non-trading book

Larger firms should have the ability to measure the exposure and sensitivity of their activities, if material, to repricing risk, yield curve risk, basis risk and option risk (e.g. pipeline risk, repayment risk) as well as changes in assumptions (eg those about customer behaviour).

3.5.3. Securitisation risk

Recent events have demonstrated that securitisation cannot be relied upon as a matter of course. Many firms did not understand fully the risks associated with their securitisations and the potential firm-wide impact in stressed market conditions. Difficulties have included the closure of securitisation markets, higher funding costs, the provision of additional support to structures, the unwinding of securitisations as triggers have been met and pipeline transactions not being completed.

Where securitisation is a material source of funding, there can be an impact on credit risk, concentration risk, counterparty risk, market risk, liquidity risk and reputational risk.

When performing stress testing, firms must consider their securitisation activities and other off-balance sheet exposures and the firm-wide impact that they may cause in times of stress.

3.5.4. Pension obligation risk

In carrying out stress tests, firms must consider how an economic recession would impact on their current and potential increase in obligations towards their pension schemes. Risks such as interest rate risk or reduced investment returns may have a direct impact on a firm's financial position as well as an indirect impact resulting from an increase in the firm's pension scheme obligations.

3.5.5. Group risk

This is the risk that a firm may be adversely impacted by an event in another group entity, or an event that affects the group as a whole. Some firms have already included elements of group risk in their ICAAPs. These have included intra-group exposures, concentration risks, contagion (reputational damage, operational or financial pressures) and complex group structures.

Firms may decide to hold additional capital at the solo and/or group levels or put in place other mitigation (e.g. to counter risks arising from complex group structures).

The FSA has decided that group risk should be taken into account for Pillar 2 purposes and the stress testing aspects of risk assessment.

4. Next steps

Quadrant has a broad experience of working with firms on their approaches to stress and scenario testing. Simon would welcome the opportunity to have a dialogue with you, if you are now considering what to do next. If any of the issues raised in this paper resonate and you would like to discuss further, please do not hesitate to get in touch with Simon by email at:

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