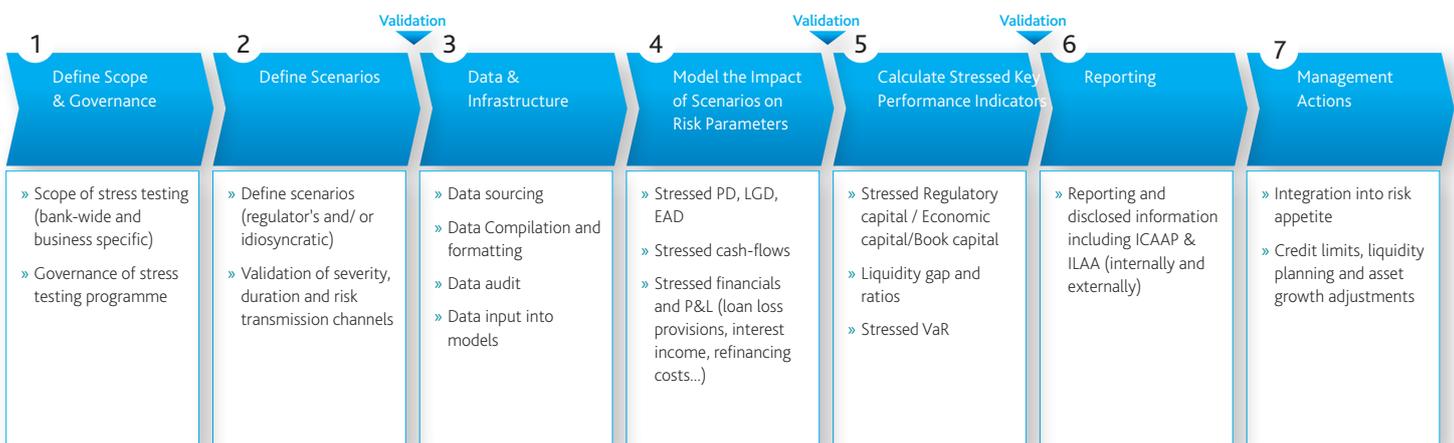


Common Pitfalls in Stress Testing

Dr. Christian Thun

Since the early days of Basel II, rarely has a topic dominated the discussion about risk management practices in the way stress testing does now. Banks around the world have devoted considerable time and resources to comply with the new regulatory guidelines and to establish internal frameworks so that they can perform stress tests for different types of risk, asset classes, and business lines.

The following graph displays a best practice stress testing process and its key activities.



At the beginning of every meaningful stress test, financial institutions need to decide what they need to stress, how they will conduct the test, who will be in charge of the work, and what they want to achieve with the results. A stress test has to meet business objectives, such as setting trade limits or capital allocations, or defining the organization's risk appetite, which can differ from regulatory requirements.

Still, many banks are having problems even with this initial step. To decide what needs to be stressed, banks often align their efforts with regulatory requirements or market best practices, rather than deriving them from an internal business and risk analysis perspective.

An obstacle to such an integrated, bank wide perspective is often the organizational setup that evolved over the last decade. Banks aligned their risk management functions with the key risk categories according to Basel II leading to a silo organisation in risk management focusing separately on credit, market, operational, concentration, and liquidity risk. Such a set-up has made efficient bank-wide or cross-risk stress testing as well as its planning and coordination unnecessarily difficult.

Looking at the methods for stress testing that evolved over the years it can be noticed that two main methods to stress test are common by now: sensitivity tests and scenario analyses. Sensitivity tests assume that only one risk factor, such as a shift in the yield curve, changes significantly. Sensitivity tests are rather simple in nature and relatively straightforward to implement, but lack plausibility because they do not take into account interdependencies between risk factors. As a result, the scenario analysis has become common practice to stress different risk categories. Scenario analysis examines the impact on a risk factor, such as probability of default, resulting from simultaneous changes in macroeconomic variables, such as inflation or GDP, allowing for a more realistic assessment of risk.

Common Pitfalls in Stress Testing

The most common pitfall is the design of meaningful scenarios that are severe but plausible at the same time. Depending on the scenario, the results of the stress test may significantly misrepresent the risks to which a bank is actually exposed to, because the scenario may not be severe enough or plausible, or because it does not address important aspects. The unforeseen problems at Franco-Belgian bank Dexia in October 2011 after it had passed the stress test of the European Banking Authority three months earlier and the sudden problems of Ireland's banks in November 2010 after they had passed the EU stress test just four months earlier are both good illustrations of this kind of misrepresentation.

The biggest obstacles in scenario design are the lack of sufficient data and the inability of a human test designer to create a variety of scenarios that do not just stress the obvious and ignore the potential effect of unforeseen events.

Developing a stress scenario to estimate the potential impact of catastrophic but low-likelihood events to a bank's portfolio is difficult even for experienced risk managers. Despite a risk manager's efforts, this kind of thought experiment is prone to two major pitfalls: ignoring plausible scenarios and considering implausible ones. Human creativity is influenced by experience, which leads risk managers to ignore plausible stress scenarios simply because they have not occurred yet. If a risk manager's imagination is geared towards implausible scenarios – for example, an asteroid hitting the earth – the key purpose of the stress test, to enable better decision making, is jeopardised. What kinds of useful options will the management of a bank derive from the alarming results of a highly implausible stress scenario? How should it approach reverse stress testing that asks for the kinds of plausible circumstances that could make a bank's business model unviable? Interestingly, given the myriad factors that could make a bank's business unviable, senior management and risk managers tend to consider a big idiosyncratic shock, rather than more likely scenarios, in their reverse stress testing.

The most immediate challenge many banks face, however, is a lack of data. In particular, information from periods of severe stress is rare – information that would form the basis for a scenario as well as help discern the linkage between macroeconomic variables and risk drivers. Given the interdependencies between macroeconomic variables such as GDP, unemployment, inflation, and oil prices, having sufficient data available to understand and properly model behaviour under stress is critical. A lack of sufficient data will eventually lead to a weak and unstable linkage between any scenario and relevant risk factors, yielding an outcome that may set values at implausible levels. Given that the focus of stress testing is on the tails of the distribution, a lack of data will limit the usefulness of the stress test. If additional data are not available and assumptions have to be made, those responsible for the scenario design or stress test should run the test using different assumptions to better grasp the potential margins of error.

Even institutions that have enough granular information face data quality problems resulting from insufficient internal IT architecture, inconsistent data and processes, and non-accountability of those responsible for input or audit of the information quality. Another increasingly important aspect is speed. If the results of a stress test should be relevant for a business decision, they will need to be available within days, if not hours, after the process has started. Today though it is not uncommon that weeks can pass before the results of a stress test are available to senior management. In today's dynamic and volatile markets to be in a position to consider contingency plans for the business only after several weeks have passed is at the very least a competitive disadvantage.

Linking a scenario with drivers of credit risk such as Expected Default Frequency (EDF) or Loss Given Default (LGD) and subsequently the economic capital required to protect a loan portfolio from unexpected losses is another area of common pitfalls. The behaviour of risk drivers such as EDF or LGD under stress is usually modelled assuming non-linear relationships but proper parameterisation of the linkage function may suffer from a lack of data or intuition. Similarly the calculation of economic capital under stress will only yield meaningful results if the bank is able to understand the dynamics of asset correlations during periods of economic stress. Often banks rely on changes in equity correlations as a proxy to capture these dynamics simply because data are readily available for these and they are easier to measure. However, empirical evidence has shown that equity correlations tend to be too low for financial firms, and for utilities and low-credit-quality firms as well. These deviations will lead to significant underestimation of the amount of required economic capital during stress periods.

All efforts to create a meaningful stress test will be useless if one key aspect is left out: communication. And not just external communication in form of regulatory prescribed formats but foremost internal communication. The stress test has to be suitable for story-telling. It has to be understood by risk managers as well as senior management, and has to illustrate and quantify the vulnerabilities of an organization's current business model, as well as the transmission mechanism from scenario assumptions to potential portfolio impact.

Ultimately, the results of a stress test will affect the decision-making process. Stress test results need to be benchmarked against the risk appetite of an organization and lead to a critical review of its current risk profile. Senior management has to prepare plans for early intervention, such as raising funds, suspending dividends to shareholders, limiting or even eliminating certain business activities, requiring more frequent reporting, replacing responsible managers – even closing a business line if it can no longer continue in a viable fashion. Senior management's engagement at this point is critical to endorsing any necessary action plans. Unfortunately, incorporating into a company's strategic business planning the results of a hypothetical stress test scenario that may never materialize is a challenge on its own.

Although much has been achieved in the last three to four years and the banks' stress test frameworks are very different from their pre-crisis versions, risk managers still face and must address numerous challenges and pitfalls before they can turn stress testing into the powerful instrument it can be.

About The Author

Dr. Christian Thun is a Senior Director responsible for the strategic positioning of Moody's Analytics in Europe, the Middle East, and Africa. Over the years, he has held several roles in Moody's Analytics, in product development; sales; and strategic planning and consulting services, both of which he headed and on which he worked with numerous financial institutions on Basel II, risk management and portfolio advisory projects and in the process became an internationally known expert on credit risk management.

Before joining Moody's in 2002 Dr. Thun was a team leader for the German risk consulting firm Baetge & Partner (an Oliver, Wyman affiliate). He also worked in the investment banking and corporate credit division of Dresdner Bank in Frankfurt and London. He holds a Ph.D. in Finance and has been a lecturer at the universities of Augsburg (Germany) and St. Gallen (Switzerland).

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