Common Challenges and Pitfalls in Stress Testing of Banks

Highlights

» Stress testing has been one of major challenges in risk management during the course of the years following the financial crisis of 2008/09. Banks around the world have invested a lot of time and resources to comply with tightened regulatory requirements.

» While a range of practices to address the stress testing needs have evolved over the last years banks still face a number of challenges and pitfalls along the way. The primary stress testing related challenges entail the ability to generate severe but plausible scenarios and translating them accurately into risk measures such as Stressed Expected Default Frequencies, Stressed Loss Given Default measures or Stressed Economic Capital.

» Further major obstacles along the way are the lack of data and/or the inability to get to it fast. While especially larger organizations have sufficient data being able to aggregate it on an enterprise-level and to respond quickly to a volatile business environment represent major challenges even for the more advanced banks.

» The most important challenge though is the communication between the risk and business management. Being able to convey stress scenarios that “tell a story” will enable business managers to use the results in a meaningful way for their strategic business decisions.

» The paper has been prepared for risk managers as well as business managers alike. It represents the summary of discussions with more than 50 leading banks as well as regulators around the topic of stress testing. Leveraging a widely used seven-step process in stress testing it is meant to highlight some of the common challenges and pitfalls that banks have encountered during the process of embedding more robust stress testing frameworks.
Rarely has a topic dominated the discussion about risk management practices in the way stress testing does now. It took prominence after the fall of Lehman Brothers, and led to a series of new regulations around the world. Most recently the stress tests by the European Banking Authority (EBA) and introduction of the Comprehensive Capital Analysis and Review (CCAR) for US banks holdings with total consolidated assets of $50 billion or more, and the supervisory guidance regarding stress-testing practices at banking organizations with total consolidated assets of more than $10 billion.

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. To successfully embed such a framework for stress testing banks need to establish an enterprise wide process that encompasses multiple steps involving a variety of employees, departments and data sources. The management of such a process is challenging and its complex nature makes it prone to pitfalls and errors. This article is meant to describe some of these challenges and pitfalls and offer ways to deal with them.

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

**Defining Scope, Roles and Responsibilities is the First Step in Every Stress Testing Process**

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. To meet these objectives, stress tests can take place for the whole of an organization or simply to measure a specific risk type, such as concentration risk in a loan portfolio or in a business line, such as operations in Asia.

However, many banks are already challenged even with this initial step. To decide what needs to be stressed, banks often align their efforts with regulatory guidance or market best practices, rather than deriving them from an internal business and risk analysis perspective. We will discuss how a bank can conduct a stress test later in this article, but who will be in charge and what do to with the results can often be a challenge. In most cases, the risk management division conducts the stress test.

The organisational framework that evolved over the last decade often represents an obstacle to an integrated, bank-wide perspective. Under this approach, banks aligned their risk management functions with the key risk categories according to Basel II leading to a silo organisation in risk management that focuses separately on credit, market, operational,
concentration, and liquidity risk. This framework has rendered the efficient bank-wide or cross-risk stress testing as well as its planning and coordination unnecessarily difficult. To overcome this obstacle, banks often responded by creating special units such as ‘risk integration teams’ or ‘stress test committees’ to mitigate operational frictions. However, this approach to remediating organisational obstacles only works if the new unit has sufficient resources and the internal authority. Otherwise, the bank is just adding another layer to its existing organisation.

**Designing Severe But Plausible Stress Scenarios is the Key Challenge in Every Stress Test**

At many institutions, stress testing started in the mid-1990s as a way to measure the exposure to market risk in portfolios and only recently expanded into other risk categories. As a result, the methods for measuring and stressing market risk are more advanced than those for measuring and stressing operational risk, which leads to the problem of how to approach a stress test in a consistent way for different risk types.

Two main stress test methods have evolved over recent years: sensitivity tests or 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 with other risk factors. As a result, the more complex scenario analysis has become common practice. 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.

The most common stress-testing challenge is the design of meaningful scenarios that are severe but also plausible. Regulators require that banks design scenarios that are severe but plausible at the same time. As the design process is often rather art than science i.e. subjective in nature; depending on the scenario, the results of the stress test could misrepresent the risks to which a bank is actually exposed, 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 inadequacy. This issue immediately raises the following questions: ‘How severe is severe?’ and ‘What is still plausible?’

Different approaches have been discussed in the academic literature, Breuer & Csiszar (2010), Breuer, Jandačka, Rheinberger & Summer (2009), and Stein (2011, but the biggest obstacles are a lack of sufficient data and the inability of a test designer to create a variety of scenarios that do not just stress the obvious and ignoring the potential effect of unforeseen events. This bias in stress test design is caused by peer pressure, group thinking or is simply the consequence of short human memory, given the considerable length of the benign economic cycle before the current financial crisis.

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, who are often restricted by their own past experience which can make them prone to two major pitfalls: ignoring plausible scenarios and considering implausible ones. Relying on past experience could lead risk managers to ignore plausible stress scenarios simply because they have not occurred yet. A fact that has been known for a very long time (Kahnemann & Tversky 1972). 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. Planners must be very critical when considering the current and potential future economic situation if they are to derive useful scenarios for stress testing.

Utilizing Data and Getting to it Fast
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 is, 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. In the current operating environment of banks in either Europe or the US, there could be a prolonged period of several weeks before the results of a stress test are made 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. Financial institutions will eventually have to invest in their IT infrastructure if they are to be able to use the stress test results for proper and timely decision making.

Scenarios Need to be Translated into Stressed Risk Drivers Accurately
With regard to severity and plausibility, another challenge is that of linking a scenario with drivers of credit risk such as Expected Default Frequency (EDF) or Loss Given Default (LGD). The behaviour of risk drivers such as EDF or LGD under stress is usually modelled assuming non-linear relationships. Some common techniques are time-series analysis, panel data regressions, or structural models (Sorge 2004 or Howard 2009). Again, although the approach may be straightforward, proper parameterisation of the linkage function may suffer from a lack of data or intuition. The following graph displays the non-linear reaction of a potential one-year EDF for the American firm Adobe Systems in a baseline scenario (BL) and four stress scenarios with different severities: S1, stronger-than-baseline growth; S2, weaker-than-baseline growth; S3, much-weaker-than baseline growth; and S4, complete collapse. The S1 and S2 scenarios led to only minor deviations of the EDF from the baseline forecast. In the two more severe scenarios, the EDF is either double (S3) or triple (S4) the baseline forecast.
The ability to link stress scenarios with the default risk of individual borrowers and exposure information in a loan portfolio allows a bank to estimate stressed key performance indicators such as the amount of economic capital it will need to cover unexpected losses under different stress assumptions. 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 could lead to significant underestimation of the amount of required economic capital during stress periods.

**Ultimately Stress Tests Must Be Suitable To Make Strategic Business Decisions**

All efforts to create a meaningful stress test will be ineffective if one key aspect is omitted: communication – both external communication (in form of regulatory prescribed formats) and internal communication. The addressees for external communication are the regulators and shareholders. This kind of communication usually follows standards prescribed by a third party, such as the Federal Deposit Insurance Corporation, which will require the communication of banks’ stress test results to the regulator as well as subsequently to the public. Internally, 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, appointing more 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. However, incorporating the results of a hypothetical stress test scenario that may never materialize into a company’s strategic business planning is, in itself, a challenge.

Although much has been achieved in the past three to four years, and the banks’ stress test frameworks are very different from the versions that existed prior to the 2008-09 global financial crisis, risk managers still face – and must address – numerous challenges and pitfalls before they can turn stress testing into the powerful instrument it can be.
References


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