Driving Business Value Through Stress Testing

Improving banks’ confidence in business planning and forecasting

March 2016
Executive Summary
A new scope for stress testing

With the continuous evolution of new regulatory requirements, volatility in financial and commodity markets and structural shifts in the economy (e.g. ageing population and technology disruptions), the landscape for financial institutions is increasingly unpredictable.

Banks are leveraging traditional methods of stress testing to answer crucial risk management questions such as forecasting losses and capital adequacy under stressed conditions. However, banks are not utilizing the full potential of stress testing to shape their business and product strategy.

In most banks, globally, business planning continues to be a bottom-up exercise done at a business unit level. Such exercise falls short of accuracy for the following reasons:

- Forecasting is performed through assuming a static economic environment over the forecast horizon.
- Forecasting does not consider the impact that business units within the group can have on each other.
- Forecasting is executed without an in depth understanding of interactions between external factors (macroeconomic, political, and social) and the balance sheet fundamentals.
- Individual business units use different scenarios to generate forecasting, which leads to inconsistency.

Through the adoption of enhanced stress testing approaches, the impact of sudden macro-economic shifts on your business can be better estimated. Imagine knowing the quantum of impact of GDP on your net interest margin or the quantum of impact of external market shocks on your funding cost. This information would be quite powerful in guiding strategic decisions like:

- Developing a product and investment strategy that is sensitive to changing macroeconomic conditions, industry dynamics and country dynamics.
- Setting coherent strategic objectives and risk appetite targets.
- Developing a stable funding strategy.
- What are the early warning indicators that should trigger contingency plans and countermeasures?
- How to stabilize asset quality and growth under adverse external conditions?

In this paper, we will look at ways in which stress testing can be enhanced to help improve the management of risk and raise the level of confidence in business planning and forecasting.
Evolution of Stress Testing Practices

Stress testing has been around for more than two decades, and its maturity has evolved across two distinct phases:

1. Pre-financial crisis (up to 2009)

Clearly, stress testing was not effective in forecasting the financial crisis. Why was this?

**Deficiencies in pre-financial crisis stress testing**

- **Siloed approach**: Most banks did not have an integrated enterprise wide stress testing framework that spanned all material risks. Risk management was siloed, with disparate IT and data.
- **Narrow focus**: Stress testing was still primarily focused on a single factor i.e. Capital adequacy driven by market and credit risk.
- **Insufficient data**: There was limited data to model severe scenarios.
- **Micro prudential**: Supervisory stress testing has remained a micro prudential (i.e. focus on individual banks) rather than a macro prudential tool (i.e. focus on financial system as a whole).
- **Subjectivity**: Regulators took a principle based approach to stress testing, through Basel Pillar II.
- **Lack of awareness**: Lack of recognition of how interconnected the financial system was.

The Global Financial Crisis was a wakeup call for the banks and the regulators to implement a framework that would enable them to do a more robust forward looking assessment of risk. The US Federal Reserve and European Banking Authority put in place a prescriptive stress testing approach (Comprehensive Capital Analysis and Review (CCAR) and EU-wide stress testing respectively) to examine and strengthen the solvency levels of banks. These frameworks brought more rigor and consistency to the scenario development and stress testing methodology. **Table 1, 2** and **Figure 1** illustrates the impact of supervisory stress testing.

**Deficiencies in post-financial crisis stress testing**

- Stress testing is still largely focused on solvency. Some regulators (e.g. Bank of Canada, Netherlands Bank) however do incorporate liquidity and funding stress as well.
- Organizational structure at most banks is not set up to conduct integrated stress testing or integrated risk management.
- Weak internal controls and documentation protocols lead to redundant effort and incoherent results.
- Banks still have duplicate stress testing processes and infrastructure for different purposes, i.e. supervisory stress tests, Pillar II, Recovery Resolution Planning etc.

Despite the proactive regulatory effort, stress testing still has the opportunity to further evolve to better address some of these deficiencies.
How has supervisory stress testing helped?

CCAR and EU-wide stress testing has had substantial impact in uncovering the excessive risks in the balance sheet of banks and putting them on a path to a healthier balance sheet. The post-financial crisis stress testing measures have, to a degree:

- Improved the resilience of banks and restored investor confidence in the banking system.
- Revealed systemic information about how macroeconomic factors and market shocks affect the health of the bank's balance sheet.
- Enhanced disclosures increased the transparency of risk management and capital planning process to supervisors.
- Informed regulatory actions (both micro prudential and macro prudential).
- Identified key weaknesses or gaps in the banks’ risk management framework in terms of:
  - Governance and internal controls
  - Methodology and assumptions
  - Model risk management
  - Deficiencies in management overlay
  - Deficiencies in capital policy

### Table 1: Positive impact of Federal Reserve stress testing on US banking system over a period of 3 years

<table>
<thead>
<tr>
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<th>CCAR 2013</th>
<th>CCAR 2014</th>
<th>CCAR 2015</th>
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<tbody>
<tr>
<td>Failure rate</td>
<td>2 out of 18 bank holding companies (BHCs) failed for capital shortfall</td>
<td>1 out of 30 BHCs failed for capital shortfall</td>
<td>No capital shortfall. 2 out of 30 BHCs failed for qualitative reasons.</td>
</tr>
<tr>
<td>Average minimum common equity tier 1 (CET1) ratio</td>
<td><strong>6.6%</strong></td>
<td><strong>7.5%</strong></td>
<td><strong>8.7%</strong></td>
</tr>
<tr>
<td>Key findings</td>
<td>Weaknesses in the risk measurement and capital planning process.</td>
<td>Weaknesses in governance, internal controls, management reports (MIS), estimation of stressed revenues, losses.</td>
<td>Weaknesses in governance, controls, MIS, estimation of stressed revenues, losses.</td>
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### Table 2: Positive impact of EBA stress testing on European banking systems over a period of 3 years

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<tbody>
<tr>
<td>Failure rate</td>
<td>7 out of 91 banks failed (7.7% failure rate)</td>
<td>20 out of 90 banks failed (22% failure rate)</td>
<td>24 out of 123 banks failed (19.5% failure rate)</td>
</tr>
<tr>
<td>Average stressed CET1 ratio (or Tier 1 in 2010)</td>
<td><strong>9.2%</strong></td>
<td><strong>7.4%</strong></td>
<td><strong>8.5%</strong></td>
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<tr>
<td>Key findings</td>
<td>Tier 1 shortfall of EUR$3.5 billion</td>
<td>CET1 shortfall of EUR$2.5 billion</td>
<td>CET1 shortfall EUR$9.5 billion</td>
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</table>

### Figure 1: Overall capital reduction estimated under stressed scenarios

Sources: US Federal reserve CCAR Results publication; European Banking Authority’s EU-Wide Stress Testing Results publication.
Six quick wins to capture the value of stress testing

“The industry and regulators alike are increasingly recognizing that stress testing is more than just a compliance exercise. In order to get more value out of stress testing, banks need to get the implementation right.”

- Craig Davis, Partner, Asia Pacific Head of Financial Risk Management, KPMG in Singapore

While increasing number of regulators in Asia are adopting stress testing as a part of their supervisory framework, it is more than just a regulatory compliance exercise. KPMG’s benchmarking analysis on stress testing practices in Asia revealed that most banks use it for their capital planning purposes and few banks are using it to establish their risk appetite as well.

A well designed and well implemented stress testing framework can add value to a bank in a host of different ways. Below are some emerging trends that we believe banks will embrace:

1. **Strategic planning**: A combination of stress testing and sensitivity analysis can be used to scientifically measure the interactions between the balance sheet fundamentals and exogenous factors (macroeconomic factor, industry dynamics, political and social dynamics). This information will be powerful in guiding the bank’s strategic objectives, product strategy and investment strategy.

2. **Funding strategy and contingency planning**: Funding strategy and contingency liquidity plans will be better informed and sharper by stress testing the relationship between capital, funding cost and liquidity. The Basel committee had recently published a paper on stress testing where they emphasized the need to model this relationship. They cite that funding costs decrease by a range of 26 to 100 basis points (bp) for every 100bp increase in capital levels. **Figure 2** on the right illustrates how to simulate this inter-relationship.

3. **Equity risk**: Crucial investment decisions can be guided through stress testing, which provides an understanding of the impact of adverse scenarios on minority investments.

4. **Incorporate interbank contagion effects**: While an individual bank may be within its risk limits, it is still not immune from catching a “Financial Cold” or worse – thanks to the inter-connectedness of our financial system. Such a contagion effect can be a black swan event where banks have little time to react. Hence banks need to stress test the impact of contagion from its large banking counterparties or other financial institutions that are designated as high impact firms.

5. **Feedback banks’ responses to adverse scenarios**: In the event of breach of any of the risk limits (capital adequacy ratio, leverage ratio, LCR, exposure limits, or concentration limits), banks invariably take action in the form of deleveraging, asset fire sale, raising capital, new funding, cut down lending etc. These balance sheet changes could be captured iteratively in the stress testing time window, hence forecasting a ‘real-world’ outcome.

6. **Enhance operational risk**: While there is no conclusive evidence on whether external macroeconomic factors influence operational risk losses, stress testing can still be used to determine the idiosyncratic factors which can be a root cause to these losses. Consequently, internal controls can be enhanced.
Figure 2: An illustration of solvency-liquidity interlink and interbank contagion effect

Series of events leading to stress

Global & regional effects
- Credit shocks due to excess credit in the economy
- Market shocks due to market factors volatility (FX rate, interest rate, etc.)
- Structural economic changes in host country or major economy

Domestic macroeconomic & market fundamentals
- Fiscal/monetary policy changes
- Political/social events

Idiosyncratic events
- Structural economic changes in host country or major economy

First round impact

- Assets/collateral volatility
- Default
- Credit losses/trading losses
- Capital Adequacy Ratio
- Leverage Ratio

Second round impact

- Increased funding cost
- Decreased access to wholesale funding
- Increased margin calls
- Default on liquidity commitment
- Asset fire sales
- Decreased CAR
- Loss
- Interbank market commitment freeze
- Interbank contagion
Driving business value through stress testing

Stress testing is a complex activity which requires pulling together knowledge, competencies and infrastructure across the organization. In order to ensure it is not just a “check-in-the-box” compliance activity and it works effectively as a business navigation and risk management tool, banks need to get the following six elements of stress testing right (Figure 3).

“Integrated stress testing is a very challenging exercise. But, as long as banks find the right balance between complexity and transparency, the benefits far outweigh the effort.”

- Nanda Thiruvengadam, Director, KPMG in Singapore

Strategies to take full advantage of stress testing

Stress testing can be a useful tool to serve the agenda of multiple stakeholders:

- Regulators already use it to manage financial stability of institutions and broader financial system.
- CFO and CRO at banks use it for capital planning. They also need to use it for recovery and resolution planning, defining stressed limits and other internal controls.
- Board and senior management can use it to define the bank’s risk appetite and strategic objectives conditioned on adverse scenarios.
- Business heads can use it for defining their business and product strategy. They can also use it as an early warning system.
### Figure 3: Recommended approach to the six elements of stress testing

<table>
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<th>Objective/Purpose</th>
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<tr>
<td><strong>Governance</strong></td>
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<tr>
<td>- Conducting stress testing only as a regulatory exercise under supervisory stress testing framework and/or ICAAP.</td>
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<td>- Neither strategic plans nor risk appetite establish Key Performance Metrics (KPM) and Key Risk Metrics (KRM) for stressed conditions.</td>
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<td>- While senior management at many banks are involved in stress testing, governance weakens when it comes down to middle management. This leads to weakness in models.</td>
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<td>- Having redundant stress testing frameworks owned by different parts of the organization for different purposes, i.e., supervisory stress test, ICAAP, RRP etc. leads to inconsistency and inefficiency.</td>
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<td>- Most banks still find it challenging to synergize across multiple regulatory stress testing calendars.</td>
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<td>- Establish Group Wide Stress Testing (GWST) function that cuts across risk type and business units.</td>
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<td>- GWST establishes consistent stress testing methodology and procedures and oversight protocols across the firm.</td>
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<td>- Business units in foreign countries should have its own satellite stress testing team to support local requirements.</td>
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<td><strong>Methodology</strong></td>
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<td>- Most banks do not stress the Pillar II risks like concentration risk and strategic risk.</td>
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<td>- A mix of top-down approach and bottom-up approach for different portfolios make integration a challenge.</td>
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<td>- Stress testing not done at a sufficiently granular level to factor in a sector dynamics.</td>
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<td>- Stress testing based on static balance sheet.</td>
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<td>- Stress testing based on dynamic balance sheet.</td>
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<tr>
<td>- Leveraging stress testing framework to develop an early warning system.</td>
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<tr>
<td>- Stress testing based on dynamic balance sheet.</td>
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<tr>
<td>- Capturing interlink between solvency and liquidity.</td>
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<td>- Model contagion effect from other group entities.</td>
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<td>- Estimate the impact of solvency levels on funding cost. This can drive the funding strategy.</td>
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<td>- Plan to incorporate model risk buffer. Under adverse conditions, models tend to be less accurate due to increased volatility in inputs.</td>
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<td>- Most importantly, stress testing models should involve both quantitative analysis and business judgment.</td>
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<td><strong>Scenario Definition</strong></td>
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<td>- Many banks just assume adverse values for the macroeconomic factors without defining the economic, political, policy or social events that could trigger these adverse conditions.</td>
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<td>- While more weight should be given to local economic trends, ignoring global economic trends would amount to tunnel vision.</td>
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<td>- Coherent scenarios which reflect risks emerging from a range of events including social, political, economic and market conditions.</td>
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<td>- Customize scenarios to be coherent with any portfolio concentrations (large exposure, industry concentration, market concentration, and product concentration).</td>
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<td>- Incorporate large counterparty shocks to evaluate the impact of concentration.</td>
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<td>- Critical challenge of scenarios from senior management, economists and business heads is crucial.</td>
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<td><strong>Infrastructure</strong></td>
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<td>- Many Tier 2 banks do not start collecting historical data until there is a regulatory driver.</td>
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<td>- Many banks use manual desktop systems and templates for stress testing given it requires crunching data from across business lines and risk types. This leads to data quality, governance and scalability issues.</td>
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<td>- Weak documentation practices is the most common pain point in large and small banks alike.</td>
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<tr>
<td>- Tier 2 banks should invest early in capturing relevant historical data. But, data is also cost. So banks need to be very smart in figuring out what data they need.</td>
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<td>- Banks need to move towards building integrated risk data. It makes it easier to understand asset correlations, improves consistency of forecasts and minimizes manual processes. BCBS 239 is also pushing banks in this direction.</td>
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<td>- Document models, methodologies, process, results, assumptions etc. It is critical to build strong technical writing capabilities and documentation protocols.</td>
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<td><strong>Reporting</strong></td>
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<tr>
<td>- Stressed forecasts are reported only as a part of annual capital plan and ICAAP.</td>
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<td>- Stressed forecasts and performance against stressed limits are reported in periodic management reports.</td>
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<td>- On-demand reporting for business unit heads as macroeconomic and sector specific events happen.</td>
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<td>- Breach of stressed capital limits should be reported.</td>
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<td>- Report when any capitals surplus is forecasted.</td>
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<tr>
<td>- Report any signs of deteriorating underwriting conditions during the expansion phase of credit cycle.</td>
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Undoubtedly stress testing is a powerful tool to see through the haze in an uncertain environment. The value derived from painting a more accurate picture of the impact of potential macro-economic shifts or black swan events, cannot be underestimated. It gives both the risk takers and risk managers in banks more confidence in their long term decision-making and for senior management, it buttresses the necessity of risk management by magnifying the potential loopholes in the business model.

While a growing number of regulators are starting to use stress testing as a part of their banking system supervision, now is an opportunity for banks to embrace its full potential for risk management and business navigation. Banks need to not look at stress testing as a regulatory box ticking exercise, but as a step towards enhancing long term sustainability. While expanding the utility of stress testing, banks need to make sure they get the six elements of stress testing correct from the get go.

KPMG member firms can help banks maximize the potential of their stress testing procedures by:

- Determining objectives and business case for stress testing.
- Designing and implementing an integrated stress testing framework to measure stressed earnings, provisions, capital and liquidity.
- Defining scenarios and macroeconomic modelling.
- Developing stress testing models across credit, market, operational, liquidity, IRRBB, concentration and strategic risks.
- Designing and implementing a sensitivity analysis framework.
- Designing and implementing an early warning framework.
- Providing quality assurance on supervisory and internal stress testing.

Considering the growing relevance of stress testing exercises, we have developed the KPMG stress testing tool which can support banks in the adoption of a sound and comprehensive stress testing approach.
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