



A Unified Scene

The Rise Of Enterprise Stress Testing

The interconnectivity of today's financial markets are simply too complex to examine risks in isolation. Enterprise stress testing allows financial institutions to view risk holistically, especially where it matters most – under stress scenarios.

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“MOST FRAMEWORKS ARE CONSTRUCTED FROM A GRANULAR LEVEL AND WORK THEIR WAY UP, OR THEY BEGIN FROM A STRATEGIC LEVEL AND WORK THEIR WAY DOWN. ENTERPRISE STRESS TESTING REQUIRES BOTH.”

During the financial crisis, market risk became credit risk, which became liquidity risk and in particular funding risks, which in turn became systemic risk. For example, as market risk reduced the value of collateral posted, additional collateral was called by counterparties to mitigate credit risk. As many counterparties were scrambling to post more collateral at the same time, liquidity risk raised its ugly head, creating a systemic issue. As the relationship between risks becomes better understood, the industry is responding with new measures and approaches that will better capture the interconnected nature of risk.

One such approach is enterprise stress testing, which allows financial institutions to view risk holistically, especially when it matters most – under stress scenarios. In a recent co-authored paper presented at a conference in Cambridge, Paul Fisher, Executive Director for Markets at the Bank of England observed:

Extreme stress tests have served a crucial purpose after the crisis to re-establish confidence in banks, and might usefully play a wider role in more aspects of ongoing bank oversight... a properly designed stress testing framework could provide a basis for balanced discussion around future risk concentrations and systemic vulnerabilities.

Supervisors are developing recommendations for institutions to create frameworks for enterprise stress testing. By operating

at a firm-wide level, enterprise stress testing will be better suited to identifying the linkages among risk types. These insights can be used to better exploit the trade off between risk and return, support better supervision, and minimize the potential for systemic failures.

Most frameworks have a starting point: they are constructed from a granular level and work their way up, or they begin from a strategic level and work their way down. Enterprise stress testing requires both. And the catalyst to create such a framework is beginning outside of institutions, where support for a more holistic approach to stress testing has taken place.

THE ARRIVAL OF STRUCTURED PRODUCTS

Technology and financial innovation have enabled another important contribution to the growth in market dynamics: the creation and propagation of structured products. Structured products are flexible derivative instruments, specifically designed to help investors enhance performance or reduce risks of a portfolio. Structured products combine an underlying asset and an option, and their relationship can be thought of as a new home and its accessories.

In this example, the home represents the underlying asset, which can be a stock, index, fund or commodity. The accessories, such as granite countertops, walk-in showers, and high-end appliances symbolize the structure of the product, which can be a call, a put or a more exotic option. Just as there are limitless choices when it comes to decorating a home, there are also infinite



options that can be tied to an underlying asset, or even multiple assets.

To quantify the expected returns and risk estimates of structured products, they must be taken into a future where their characteristics can be modeled as scenario dependent payoffs that are potentially very asymmetric. From these models, an asset allocation objective should be set with a range of constraints, representing a range of payoffs that aren't known today but can only be realized under future scenarios. MPT does not support these types of structured products, which had yet to be created when Markowitz's theory first appeared. Nor is MPT designed to support the increased regularity with which investors are reexamining their risk appetites.

A CONSENSUS FOR CHANGE

An agreement is forming at the supervisory level that risk can no longer be measured one silo at a time or only at the product level. The interconnectivity of today's financial markets are simply too complex to examine risks in isolation. It therefore makes sense to explore alternative measures that go beyond product or silo level.

In their 2009 working paper, "Findings on the interaction of market and credit risk," the Basel Committee on Banking Supervision noted:

Studies suggest that banks' exposures to market risk and credit risk vary with liquidity conditions in the market, and liquidity conditions in turn are also determined by perceptions of market and credit risk. This suggests that

banks and regulators need to think about a framework that better integrates all three types of risk.

Most of the new stress testing requirements originating from US Agencies and the European Central Bank are calling on institutions to translate macroeconomic scenarios into the risk factor space, and then stress test across risk types. These macro economic scenarios may incorporate financial and non-financial risk factors from an enterprise risk perspective.

These principles indicate that regulators are moving towards a more "intrusive" engagement model within the industry, placing greater emphasis on comprehensive stress tests and use test requirements. This outlook is designed to ensure that the information captured can be used in a meaningful way to stave off the potential for liquidity risk and systemic risk.

DIMENSIONS OF RISK

When the definitions of risk are left to individual business units, it opens the door to double counting – the likelihood that risk will be counted multiple times, in multiple ways. Imagine you want to have a stress test on liquidity, where the goal is to understand the impact of a change of three-month US Treasury rates. The impact on your liquidity buffer and the impact on the cash flow profile are clearly visible. But how does this same scenario affect credit risk capital and /or market risk capital?

Liquidity and capital are both funds, yet they have different natures. Some may

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be readily available, while some may be absorbing loss. If one funding aspect has a negative impact on the bank's buffer, and another funding aspect has a positive impact on its capital, that's essential information for a bank to know. Liquidity, which is measured in funds, can also be measured in opportunity cost. This cost would only be reflected in the bottom line of the balance sheet and P&L statements, information that cannot be correctly interpreted if risk is measured by silos.

From a technological perspective, it's much simpler to segregate and aggregate. But from a business perspective, segregation opens the door to risk of duplication and mismanagement as it will not capture potential diversification and concentration effects. In reality, financial institutions trade a "product" with a "counterparty". To properly analyze the synergies and break the silo perspective, a broader view of risk is required.

Market, credit, and liquidity risks are really three dimensions of the same phenomenon and cannot be managed in isolation. If you develop the capability to manage these three elements in a multi-dimensional way, then you have set the framework for a true enterprise risk system.

TOP TO BOTTOM, BOTTOM TO TOP

The approach that all regulators are now advancing is a framework that includes versions of both bottom-up and top-down stress testing. By integrating all relevant risk components into an enterprise framework, financial institutions can create strategies that better adhere to real world business applications and optimize along its risk-return profile.

In addition to developing this framework, banking institutions will need to evolve beyond traditional risk measurement reports and synchronize their senior management processes with the risk control activities occurring at lower levels and within various business units.

COMPONENTS OF TOP DOWN / BOTTOM UP STRESS TESTING

Bottom up: Bottom up testing is where the lowest level financial risk factors are tested first and then used to facilitate testing of higher level components, until the

“THE BOTTOM UP / TOP DOWN FRAMEWORK FOR ENTERPRISE STRESS TESTING WILL ENABLE FINANCIAL INSTITUTIONS TO ARRIVE AT A MORE ACCURATE PRICING OF RISK AND SUPPORT GREATER STABILITY IN THE BANKING SYSTEM.”

enterprise-wide level of the institution is being reached. A dichotomy exists when stress tests are run through silos. ALM, liquidity, and market risk focuses on the “product”, while counterparty, credit and economic capital focus on the “counterparty”. Integrating these risk factors cannot be done solely through bottom up stress testing.

Top down: The top down approach enables a synchronized view of financial and non-financial risk factor stress testing. Top down can be used in support of risk appetite, enterprise wide reverse stress testing, living wills, forecasting, and strategic and financial planning. Stress testing begins at an enterprise-wide level and then the effects can be analyzed at the individual legal entities, business lines, and portfolio levels of the institution.

Scenarios: Scenarios must be defined jointly across the organization, both from a top down and a bottom up perspective, in order to capture the critical trade-off between financial and non-financial risk factors.

The end of the bottom up approach, taking interdependencies into account up to the highest levels of aggregation, is the start of top down. The top down approach should itself reflect the same interdependencies estimated through the bottom up method. Therefore, when only financial risk factors are being considered, the top down and bottom up numbers must be the same.

The top down approach can then be used to enrich bottom up results with non-financial risk factors such as competitive dimensions and strategic financial planning. However, standardizing analytics acquired from a top down level is extremely complex, especially for large organizations.

Jointly defined scenarios ensure the analysis conducted at the top down can be transferred to the bottom up in a coherent and consistent fashion. Integrated risk considerations, which have been gathered at top down level, must be communicated in a dependable manner to the various legal entities and business units down to at least portfolio level. These considerations should be shared as scenarios and

risk factors which are, whenever possible, the same, jointly defined, and used in both top down and bottom up framework. A shared understanding of scenarios helps suppress the appearance of model risk, thus avoiding unintended actions in terms of hedging or risk taking.

Collaborative: Any framework can only be successful with the participation and input of the people who use it. A collaboration of different senior experts within the organization such as risk and finance department, business experts, treasury, strategy planners, cost control, internal auditors and should be managed and supervised by the CRO and CFO.

Disclosures: Disclosure should be provided regarding how interactions between stress assumptions and the instruments to which they apply are factored in the definition of stress coefficients. For instance, if there is an assumption of rating downgrade on a certain class of marketable instruments, this assumption should also be reflected in the haircut applicable to that class of instruments. Disclosures can help prevent underestimated potential exposures in stress times and misdirected mitigation actions.





MIS (management information systems): The best practice for designing a unified risk technology architecture is to ensure that finance and risk technologies are sufficiently allied with the needs of the business. Alignment of finance with risk measures, consolidation of fragmented risk, finance and treasury applications will finally allow banks to look at risk and return holistically. This includes a robust data infrastructure that can capture the essence of all risk silos as well as return data, consistent risk models, and calculation engines. Smart Business Intelligence provides multiple views of risk and return to various stakeholders within the bank. For example, a trader might be interested only in the RAROC for his desk whereas the CRO and CEO might be interested in the top of the house impact.

WORKING IN REVERSE

The importance of stress testing is obvious in all major regulations. In general, all comments to date urge institutions to use the results of more holistic stress testing results to promote risk identification and control, improve capital and liquidity management, and ultimately balance sheet and enterprise risk management.

However, some specific requirements need additional attention.

Stress tests, particularly based on the proposed guidance by the US agencies, may lead to additional capital for firms, restricting their ability to manage capital effectively. If these stress testing guidelines are implemented with higher capital requirements than their equivalents elsewhere in the world, it could lead to regulatory arbitrage, disfavoring US institutions who must set aside the additional capital.

But like reverse stress tests themselves, regulators and supervisors are working backwards from a desired and worthwhile goal: to propose frameworks for banks that will be better suited to capturing the integration of risk, its relationship to the institution on a holistic level, and to the broader financial system.

The US Agencies, Basel, and the FSA are all in agreement that reverse stress testing should be a key component of a firm's stress testing framework. Yet most banking institutions do not have a framework for reverse stress tests implemented at present. It may take a period of several years before a proper structure can be constructed and integrated with the firm's overall stress testing framework.

FUNCTION OF STATE

In physics, a state function, or a function of state, describes a property of a system that depends only on its current state.

Financial institutions must be prepared to deal with the unexpected. When an institution's state is affected or threatened by unforeseen events, the most important lesson to be learned is that the proper risk identifiers were not in place. Contingency plans and early warning indicators should be established, to offset the possibility that certain risks will not be overlooked in the future.

Supervisors, regulators and banks now share a common understanding that not all failure events are generated by a lack of capital, and not all failure events are generated from inside the firm. Successful risk frameworks will not be those that seek to isolate those risks, or address the problems of yesterday. The bottom up/top down

framework for enterprise stress testing as recommended by supervisors, and the components outlined in this article, are the first steps for financial institutions to arrive at a more accurate pricing of risk and support greater stability in the banking system. ◀

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