Systemic Risk Exposures

A 10-by-10-by-10 Approach

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This is a proposal to consider the collection and analysis of stresses among systemic financial institutions. The "10-by-10-by-10" labeling suggests the general approach. Under this approach to systemic risk measurement, a regulator would collect and analyze information concerning the exposures of N significant entities to M defined stress tests. For each stress test, an entity would report its gain or loss, in total, and with respect to its contractual positions with each of the K entities for which the exposure, for that scenario, is among the K greatest in magnitude relative to all counterparties. Those counterparties would be identified, stress by stress.

The headline version takes each of N, M, and K to be 10. In practice, however, the set of N reporting institutions is likely to be similar to the set of financial institutions that have been identified by a regulator as systemically important, for example in the sense of the Dodd-Frank Act or the set of globally important financial institutions that have been identified by the Financial Stability Board. Thus, the number of reporting financial institutions is likely to be somewhat larger than 10, but less than a full order of magnitude larger. The number of counterparties for each stress and the number of stresses should not be large, in my opinion, and perhaps 10 is a reasonable place to start until the approach is better understood and agreed upon internationally.

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Under this proposal, once revised and implemented, the reporting entities would provide the required measures periodically, perhaps quarterly, to a designated systemic-risk regulator who would analyze the reports from the viewpoint of monitoring the exposure of the financial system to systemically important stresses. The joint exposure of the system to particular stress tests and particular entities (or chains of entities) could as a result be clarified. New systemically important entities might emerge from the analysis, because the M entities to whom a reporting entity has its largest exposures, for a given stress scenario, need not be among the original N reporting entities, but could become indentified as systemically important as a result of the analysis. Summary information could be publicly disclosed, for example in the form of histograms or summary statistics, while protecting the proprietary interests of reporting entities to an extent that makes a reasonable tradeoff with the public interest in systemic risk reduction. Public knowledge that some unidentified major financial institutions are significantly exposed to certain types of financial stresses may also lead endogenously to a lowering of those stresses through pricing and portfolio adjustments. One must be cautious, however, creating additional uncertainty through this reporting. Rather, the objective is to alert regulators and the public to potential sources of financial instability before they reach dangerous levels.

The volume of data to be reported by each entity and to be analyzed by a systemic-risk regulator is intended to be modest. The security of the data is clearly a concern, and this should figure carefully into the design of the reporting system. It should be possible, if desired, to use encryption methods to ensure that even a regulator is unable to fully disaggregate the raw data. The cost of reporting should be mitigated by using risk measurement principles that conform whenever possible to best practice in the financial industry.[1] In order to mitigate period-end "window dressing," the reported stresses could be the within-period averages.

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[1] J.P. Morgan's 10Q disclosure for June 2010 states: "The Firm conducts economic-value stress tests using multiple scenarios that assume credit spreads widen significantly, equity prices decline and significant changes in interest rates across the major currencies. Other scenarios focus on the risks predominant in individual business segments and include scenarios that focus on the potential for adverse movements in complex portfolios. Scenarios were updated more frequently in 2009 and, in some cases, redefined to reflect the significant market volatility which began in late 2008. Along with VaR, stress testing is important in measuring and controlling risk. Stress testing enhances the understanding of the Firm's risk profile and loss potential, and stress losses are monitored against limits. Stress testing is also utilized in one-off approvals and cross-business risk measurement, as well as an input to economic capital allocation. Stress-test results, trends and explanations based on current market risk positions are reported to the Firm's senior management and to the lines of business to help them better measure and manage risks and to understand event risk-sensitive positions." SEC Financial Reporting Release 48 and International Financial Reporting Standard 7 mandate disclosure of value-at-risk or sensitivities to various market stresses. IFRS7 requires sensitivities to interest rates, currencies, and "other price risk" (for example, that from equities and commodities), including the impact on profits and on firm equity for "reasonably possible" changes in the relevant variable (Section 40). The New York Fed, through its supervisory monitoring program, collects information from reporting banks on the sensitivities to key risk factors of the market values of their trading and held-to-maturity assets that are marked to market.

A fuller development of this proposal would suggest criteria for the selection of the stress scenarios, as well as the definitions of the exposure measurements. For discussion purposes, illustrative examples of the K stress scenarios could include:

1. The default of a single entity.
2. A 4% simultaneous change in all credit yield spreads.
3. A 4% shift of the U.S.-dollar yield curve.
4. A 25% change in the value of the dollar relative to a basket of major currencies.
5. A 25% change in the value of the Euro relative to a basket of major currencies.
6. A 25% change in a major real estate index.
7. A 50% simultaneous change in the prices of all energy-related commodities.
8. A 50% change in a global equities index.

These examples are intended to suggest scenarios that are not necessarily covered by delta-based hedging and conjectured to have potential systemic importance. The sizes of the defined stresses should therefore capture movements that are extreme but plausible. The asset classes covered by the scenarios should be broad enough to incorporate likely increases in cross-asset return correlations in crisis settings.

A shortcoming of this approach is that the total sensitivity of a financial entity to some relatively broadly defined risk factor may be moderate while at the same time the entity has dangerously large long and short exposures within the broadly specified risk class. For example, the 2006 failure of the hedge fund Amaranth Advisors LLC was caused by approximately $6.5 billion in losses on roughly equally sized long and short positions in natural gas futures contracts for two different delivery months, March and April 2007, respectively. Similarly, the significant losses of certain "quant equity" hedge funds in August 2007 stemmed from long and short equity positions that left these funds relatively unexposed to a shift in the overall level of major stock indices. The general concern that the defined risk factors may be too broad to capture some important exposures is mitigated by the likelihood that dangerous exposures to relative movements within a well chosen broad risk factor are likely to be maintained by a relatively small set of investors. In any case, nothing rules out the selection of long-short or cross-market stresses if they are believed to be among the most systemic shocks to the financial system.

Example 1, the default of a single entity, covers losses associated with the failure of an issuer, borrower, or OTC counterparty, combining all exposures (including holdings of debt, equity, securities lending, and derivatives). The associated M counterparties for this stress would therefore be those whose defaults would lead to the greatest loss to the reporting institutions. These M entities could often include sovereigns and financial utilities, such as central clearing parties. The U.K. Financial Services Authority already conducts a regular survey of the exposures to hedge funds (only) of U.K. banks, finding in July 2010 that the maximum potential credit exposure (which includes the effect of 10-day 99% value at risk) of any one bank to any one hedge fund was approximately $600m.

A significant amount of work may be needed to refine the definitions of exposure measures, especially on the basis of distinctions between gross and net losses in each stress scenario. For example, a given scenario loss could be measured:

1. On a mark-to-market basis, assuming no collateral and allowing for netting only within legally enforceable master netting agreements. In this case, the measured gain or loss would effectively assume that any potentially offsetting gains or losses cannot be realized, except where clearly required by master netting agreements, and would be measured before offsetting reductions allowed by collateralization.
2. On a net mark-to-market basis, after the use of collateral and legally enforceable netting.
3. On a cash-flow basis, within a prescribed time period, such as 30 days. Special care is required here regarding timing and gross-versus-net flows.

There is a reasonable case for reporting on the basis of all three of the above principles, subject to refinements of the definitions. Notwithstanding the ability of an entity to offset gains against losses or to apply collateral, gross-exposure measures may assist regulators in understanding the magnitudes of linkages of various types in the financial system, and also to consider the potential impact of asset fire sales (including sales of collateral). The objective is to capture systemic linkages, whether or not they expose the reporting financial institution to significant losses. Hence, the "largest" counterparties are selected on the basis of the absolute magnitude of the gain or loss, and not on the basis of the loss to the reporting institution.

The Federal Reserve System currently collects information on the sensitivities of the portfolios of banks to specified risk factors. The comments of Fed Governor Daniel Tarullo in February 2010 suggest ongoing efforts in this direction, and the need to further study systemic linkages.

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