

Inquire Research Project

Measuring Systemic Risk in the Finance and Insurance Sectors

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The Financial Crisis of 2007--2008 has created renewed interest in systemic risk, a concept originally intended to describe bank runs and currency crises, but which now applies to any broad-based breakdown in the financial system. Systemic risk can be realized as a series of correlated defaults among financial institutions, occurring over a short time span and triggering a withdrawal of liquidity and widespread loss of confidence in the financial system as a whole. The events of 2007--2009 have demonstrated that panic and runs can affect non-bank entities as well, such as money market funds, insurance companies, hedge funds, government-sponsored enterprises, and broker/dealers. Therefore, the starting point for regulatory reform is to develop formal measures of systemic risk, measures that capture the linkages and vulnerabilities of the entire financial system---not just those of the banking industry---and with which we can monitor and regulate the overall level of risk to the system and its interconnectedness to the real economy.

In this paper, we propose five measures of systemic risk in the finance and insurance sectors based on the statistical properties of aggregate asset returns of hedge funds and value-weighted index returns for publicly traded brokerage firms, insurance companies, and banks. By using asset-weighted hedge-fund return indexes and value-weighted return indexes of publicly traded banks, brokerage firms, and insurance companies, we are focusing on the largest entities in each of these four industries. While smaller institutions can contribute to systemic risk as well, such risks should be most easily observed in the largest entities by definition. In the absence of direct information concerning the leverage of and linkages among these financial institutions, much of which is currently proprietary and not available to any single regulator, statistical relationships can yield valuable indirect information about the build-up of systemic risk. Moreover, even if regulatory reforms eventually require systemically important entities to divulge such information to regulators, the forward-looking nature of equity markets and the

dynamics of the hedge fund industry suggest that an econometric approach may still provide more immediate and actionable measures of systemic risk.

Given the complexity of the global financial system, it is unrealistic to expect that a single measure is sufficient, hence we construct measures based on: (1) correlations; (2) return illiquidity; (3) principal components; (4) regime-switching models; and (5) Granger causality tests. The motivation for these measures is to capture the kind of systemic events that created so much market dislocation in August 1998, August 2007, and the Financial Crisis of 2007--2008.

The theoretical underpinnings and institutional mechanisms by which correlation, illiquidity, and sudden changes in regime combine to produce systemic risk are now well understood. Because many financial institutions make use of leverage, their positions are often considerably larger than the amount of collateral posted to support those positions. Leverage has the effect of a magnifying glass, expanding small profit opportunities into larger ones, but also expanding small losses into larger losses. And when unexpected adverse market conditions reduce the value of that collateral, such events often trigger forced liquidations of large positions over short periods of time to reduce leverage, which can lead to systemic events as we have witnessed over the past two years. In particular, the more illiquid the positions, the larger the price impact of forced liquidations, leading to a series of insolvencies and defaults and, ultimately, increased unemployment and recession as financial institutions deleverage. Of course, the likelihood of a major dislocation also depends on the degree of correlation among the holdings of financial institutions, how sensitive they are to changes in market prices and economic conditions (and the directionality, if any, of those sensitivities, i.e., causality), how concentrated the risks are among those financial institutions, and how closely connected those institutions are with each other and the rest of the economy. We hope to capture the impact of these factors with the five measures we propose in this paper.

Our choice to focus on hedge funds, banks, brokers, and insurance companies is not random, but motivated by the extensive business ties between them, many of which have emerged only in the last decade. For example, insurance companies had little to do with hedge funds until recently. However, as they began to move more aggressively into insuring financial products and offering new investment services, insurers created new business units that competed directly with banks, hedge funds, and broker/dealers. Similarly, the banking industry

has been transformed over the last 10 years, not only with the repeal of the Glass-Steagall Act in 1999, but also because financial innovations like securitization have blurred the distinction between loans, bank deposits, securities, and trading strategies. The types of business relationships between these sectors have also changed, with banks and insurers providing credit to hedge funds but also competing against them through their own proprietary trading desks, and hedge funds using insurers to provide principal protection on their funds while simultaneously competing with them by offering capital-market intermediated insurance such as catastrophe-linked bonds.

Not surprisingly, our empirical findings show that all four sectors have become highly interrelated and less liquid over the past decade, increasing the level of systemic risk in the finance and insurance industries. However, our regime-switching estimates and causality tests point to an asymmetry in the connections: banks seem to have more significant impact---in terms of Granger causality---on hedge funds, insurers, and brokers than vice versa. These patterns are even more striking in light of the fact that our analysis is based on monthly returns data. In a framework where all markets clear and past information is fully impounded in current prices, we should not be able to detect causality on a monthly timescale. This suggests that the “shadow banking industry” may not be as much of a concern for systemic risk as the “shadow hedge fund system”, i.e., banks that may be taking on risks more appropriate for hedge funds. Another potential interpretation of our results is that banks are more regulated than other financial institutions and are therefore more subject to value-at-risk rules through capital requirements (Basel II and Solvency II). Accordingly, their behavior may generate endogenous feedback loops that can generate perverse spillover effects to other financial institutions.