What Happened to the Quants in August 2007?

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The authors hypothesize that an unwind by one or more large quantitative long–short equity market-neutral hedge funds triggered massive losses on 6–9 August 2007 that then led to sales by funds with similar strategies. The process ran its course, and the market rebounded on 10 August. The initial unwind was probably caused by forces outside the long–short equity sector, indicating that systemic risk in the hedge fund industry may have increased in recent years.

The authors simulate the performance of a long–short equity contrarian strategy to explain unprecedented losses by quantitative long–short equity market-neutral hedge funds during the week of 6 August 2007. The hypothesis is that one or more quantitative equity market-neutral funds engaged in a sudden, large, and rapid liquidation or "unwinding" of its position on 7 August 2007. The price effect caused other equity funds to deleverage on 8 and 9 August. By Friday, 10 August, the process had run its course and the market experienced a substantial reversal.

The simulated contrarian strategy, similar to statistical arbitrage, holds long positions in securities that underperformed the market the previous day and short positions in securities that outperformed the market the previous day. Because of the large number of securities, high turnover, and short holding periods, funds that apply this type of strategy must use quantitative methods and advanced technological tools.

CRSP data used to run the model include daily observations on all U.S. common stocks with prices above $5 and below $2,000 for the 1994 through 2007 period. Statistics for the entire period show the strategy to be profitable, especially in smaller deciles, but average daily returns exhibit a substantial long-term decline. Sharpe ratios are very

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high. For the five weeks from 30 July to 31 August 2007, the strategy shows a cumulative three-day loss of 7.6 standard deviations on 7, 8, and 9 August and a reversal of 11.4 standard deviations on 10 August. The results are consistent with available information about the performance of quantitative equity market-neutral funds during this period. An unusual aspect is the absence of market turmoil in other market segments.

The August 1998 Long-Term Capital Management crisis led to extreme losses for fixed-income arbitrage hedge funds, but the demand for liquidity did not have a discernible effect on the long–short equity market-neutral funds. In contrast, the August 2007 liquidity demand caused a fire-sale liquidation by long–short equity market-neutral funds. It is possible that the 1998 liquidation did not spill over because fewer funds traded in both fixed-income arbitrage and long–short equity or the amount of capital in long–short equity strategies was too small for the unwinding to cause a major dislocation.

Data from the TASS database show exponential growth in the number and assets per fund of long–short equity funds between 1994 and 2007. Rapid growth occurred also in active extension strategies, such as 130–30 funds. Hedge fund returns suggest that managers may have offset the long-term decline in average daily returns with higher leverage. The contrarian strategy would have required four times its 1998 leverage to have the same level of returns in 2007. With this leverage, the cumulative losses of a fund following the contrarian strategy would have been 25 percent of its beginning assets during 7 to 9 August.

Results of the leveraged contrarian model support the unwinding hypothesis. Only a sudden liquidation would cause a drop of the magnitude of 7 August, and stability of the major indices indicates that equity market-neutral funds were being liquidated. The timing of losses is consistent with the discovery of credit-related losses that triggered the unwind and spilled over into portfolios using the same factors. Losses in middle deciles are consistent with a statistical arbitrage unwind. The rebound on 10 August supports the view that the unwind was the result of a sudden liquidation instead of a change in fundamentals. The unwind and deleveraging may have been complete by then, or new investors may have entered the market to bring about the reversal.

The growth in numbers, assets, and leverage of long–short equity funds during the past decade indicates a decrease in their liquidity. Data from the TASS database show that aggregate autocorrelation of long–short equity hedge and equity market neutral funds has increased since 2000. The recent increase in absolute correlations among Credit Suisse/Tremont hedge fund indices means that different types of funds are connected more closely than in the past. Together these factors confirm that systemic risk in the hedge fund industry has increased in recent years.

The authors conclude that the August 2007 event is significant because problems in one financial sector may now spill over into an unrelated sector. The close movement of funds in the long–short equity strategies indicates the existence of common factors in that sector. Regulatory implications follow from the event because it shows that hedge funds now impose important externalities on the economy.

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