

BING
LIANG

Associate professor of finance,
Isenberg School of Management,
University of Massachusetts



ANALYZING FUND ADEQUACY

Looking at capital funding levels can help assess hedge fund risk.

An important issue in the hedge fund industry is the risk profile of hedge funds. The collapse of Long-Term Capital Management LP, a well-known hedge fund, highlighted the need for more academic and practitioner studies in the area of hedge fund risk exposure and capital adequacy. By doing an extensive study on a large hedge fund database, we address the following primary questions: how risky are hedge funds, in general? To what extent are they adequately capitalized? What are the time-series patterns in the levels of capitalization in the hedge fund industry? How is fund capitalization related to the various fund characteristics?

We propose a Value-at-risk (VaR) approach, since VaR not only measures the maximum amount of assets a fund can lose in a certain time period with a certain probability, but can also be used to measure the equity capital needed to cover those losses. We analyze the VaR for each fund, its distribution across all funds, and compute a VaR-based estimate of required equity capital for each fund. This required equity is then compared to the actual fund equity to determine how many hedge funds are under-capitalized. We study fund risk and capitalization not only on a static basis but also on a dynamic basis in order to examine its time series variation. We analyze the determinants of fund capitalization by comparing under-capitalized funds with healthy funds, and by comparing small funds with large funds.

We find that a majority of hedge funds (96.3% of the live funds and 89.1% dead funds) are adequately capitalized as of March 2003. The 3.7% of live funds that are under-capitalized are mostly small funds, with median net assets of about \$66 million, that together constitute only about 1.2% of the total net assets in our sample. Cross-sectionally, the variability in fund capitalization is related to size, investment style, age and management fee. In particular, the convertible arbi-

trage and market neutral funds are better capitalized than the emerging markets, long/short equity, and managed futures funds.

Our study shows that VaR-based measures are superior to traditional risk measures like standard deviation of returns and leverage ratios in capturing hedge fund risk. VaR is effective in capturing the underlying risk trends in hedge fund returns that lead to a fund's death. This is evidenced by a significant upward trend in VaR for dead funds starting two years before their death, while no such trend is observed for live funds. These results have fundamental implications for risk-adjusted performance measurement in the hedge fund industry.

We conduct extensive backtesting of our VaR estimation approach, and find that our VaR estimates based on extreme value theory (EVT) are able to forecast extreme returns in hedge funds fairly accurately. Monte Carlo simulation experiments show that our results are robust to time horizon issues, the safety multiplier of three for required capital is adequate, and the estimated EVT VaRs converge to the true VaRs.

More importantly, due to dynamic trading strategies and changing market conditions, hedge fund risk and capitalization show significant time variation. Market conditions appear to play a big role in affecting the capital adequacy of hedge funds over time—they often go above and below the threshold of adequate capital. We document a sharp drop in the level of fund capitalization just after the Russian debt crisis in 1998. Similarly, there is a significant increase in the fraction of under-capitalized funds over time.

These findings may indicate a possible regime switch for the hedge fund industry, or an increase in systemic risk after the fall of 1998, which has important implications to investors, fund managers, and financial regulators. ■