

# END SCORE

CAN HEDGE FUND OPERATIONAL RISK BE QUANTIFIED?  
A SCORING MODEL DESCRIBED IN A GRAHAM AND DODD  
AWARD-WINNING ARTICLE ESTIMATES THE UNOBSERVABLE

STORY BY:  
SUSAN TRAMMELL, CFA

DEPICTED BY:  
KELLY ALDER

YOU'LL NEVER  
GET AWAY WITH THIS,  
HEDGE.

LEAPING LEVERAGE!  
HOW CAN WE  
STOP HIM NOW?

SO YOU THOUGHT DESTROYING  
MY ORBITAL DESTABILIZER RAY  
WOULD PUT AN END TO THE THREAT.  
LITTLE DID YOU KNOW THAT  
OPERATIONAL RISK POSED AN  
EVEN GREATER THREAT THAN  
FINANCIAL RISK. BY PULLING  
THIS LEVER, I CAN TAKE DOWN  
THE WHOLE SYSTEM.

AFTER THWARTING THE PLANS  
OF DR. HEDGE TO USE HIS  
ORBITAL DESTABILIZER RAY  
TO PLUNGE THE WORLD INTO  
GLOBAL FINANCIAL CHAOS,  
EQUILIBRIUM MAN AND  
REGULATOR BOY DISCOVERED  
TOO LATE THAT THEIR EVIL  
NEMESIS HAD A TRICK UP  
HIS SLEEVE. NOW THEY CAN  
ONLY WATCH HELPLESSLY  
AS HE TRIES TO LAUNCH A  
NEW ATTACK ON HEDGE  
FUNDS FROM HIS UNDERSEA  
COMMAND CENTER.

**H**edge fund blowups and their financial consequences grab headlines, but the media is often mum on the underlying causes when back-office issues are chiefly to blame. Yet an influential Capco Group study found that an astounding 50 percent of hedge fund failures could be attributed to operational issues.<sup>1</sup>

Known for taking complex bets that often involve illiquid securities, hedge funds are subject to only modest regulatory oversight and can operate with little transparency for their many moving parts. Portfolio valuations and performance reporting generated with false and misleading information, misappropriation of funds, and unauthorized trading topped Capco's list of operational issues among terminated hedge funds. Those hazards are only the tip of the iceberg. Lapses may lurk in the execution of sophisticated trading strategies, the method of pricing fund positions, accounting and auditing procedures, risk management techniques, legal and regulatory compliance, staff turnover, and technology limitations, to name but a few.

The likelihood of poor subsequent performance increases with exposure to operational risk, which has been shown to be a better predictor of fund failure than financial risk. But even prudent investors—the ones who perform in-depth due diligence before committing capital to a hedge fund—might not dig deeper than investment performance.

“The fact that so many investors are willing to accept ‘trust me’ as the full extent and measure of their operational due diligence suggested the importance of studying this issue in greater detail,” says Stephen Brown, NYU Stern School of Business profes-

sor and co-author of the 2009 Graham and Dodd award-winning article “Estimating Operational Risk for Hedge Funds: The  $\omega$ -Score.”<sup>2</sup>

“When it comes to looking at institutions’ involvement with hedge funds today,” Brown continues, “all the common-sense due diligence seems to have gone out the window. Hedge funds are given a pass on the normal due diligence that any long-only manager would be expected to provide. I can understand the need to keep information about strategy and positions confidential, but it puzzles me that people are willing to take a trust-me attitude that they wouldn’t take with anyone else.”

#### Gauging the Danger

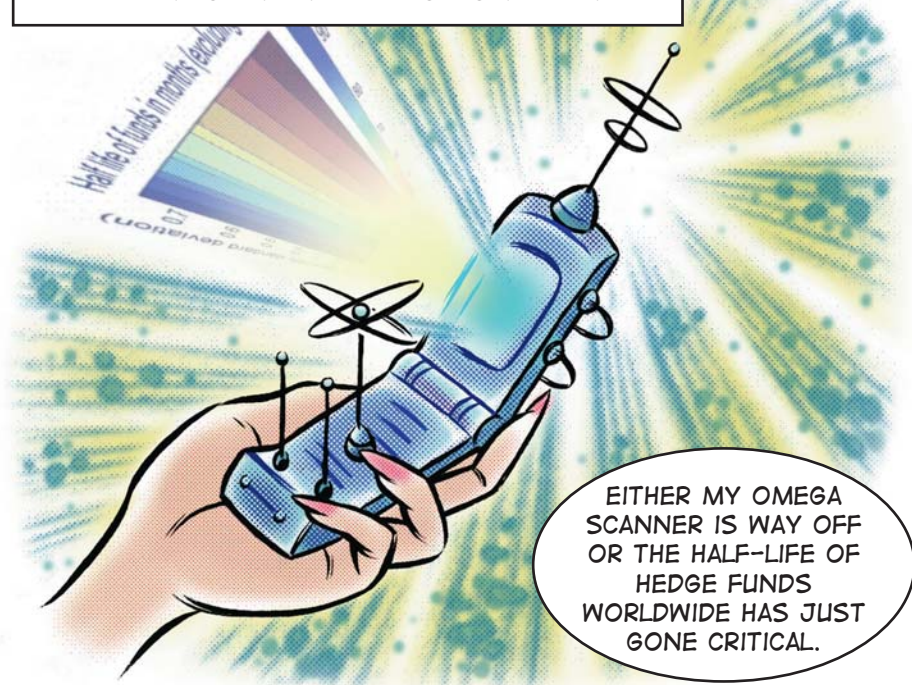
Brown, in conjunction with fellow academics William Goetzmann, Bing Liang, and Christopher Schwarz, set out to develop a methodology for estimating a firm’s operational-risk exposure. The construct would produce one value, which the authors called the  $\omega$ -score, or omega score,

which would help investors assess non-financial factors that could lead to hedge fund failure. The measure would have to be derived from publicly available information so that any sophisticated investor with the requisite quantitative skills could implement it. The score was not intended to substitute for operational due diligence but rather to be another tool in the investigative process.

“The approach we talk about in our paper is very similar to something that is done in epidemiology,” Brown explains. “You have the vectors of disease, and then you have environmental exposures—you smoke, other risky behavior. You try to correlate the environmental practice with the vectors of disease to come up with an index, or a score, of how dangerous a particular environment is.”

To develop the  $\omega$ -score, the researchers needed to establish relationships between two sets of variables: potentially *unobservable* operational risk factors and *observable*

MEANWHILE, A MILD-MANNERED PROFESSOR OF FINANCE IS ALERTED TO A SINISTER THREAT.



1 “Understanding and Mitigating Operational Risk in Hedge Fund Investments,” Capital Markets Company (March 2003).

2 Stephen Brown, William Goetzmann, Bing Liang, and Christopher Schwarz, *Financial Analysts Journal* (January/February 2009).

hedge fund characteristics that have been related to fund death by prior research. Using a statistical tool called canonical correlation analysis, the researchers weighted the variables in each set until the linear combinations yielded the maximum correlation between the two sets. The exercise produced a single value, or score, that could signal unknown operational risk derived from easily accessible data in the sample dataset. Once the  $\omega$ -score had been successfully back-tested, it was applied to funds not used to construct the omega measure to see if the relationships would hold up. The results were validated.

“The idea is to reduce a complicated, multidimensional problem into a simple statistic that any fund of hedge funds can employ,” says Brown, who is also an investor in a management company that runs hedge funds in Asia and his native Australia. “I wish I were wealthy enough to be a qualified investor in a fund,” he adds. “Unfortunately, I am an impecunious professor.”

### Getting Started

The researchers’ starting point was Form ADV, a filing that all registered investment advisers that met certain parameters were required for a brief period to submit to the U.S. Securities and Exchange Commission by 1 February 2006. Item 11 of the form is of particular interest because it identifies any problems of the fund’s management or its related advisory affiliates. These include criminal, civil, and regulatory issues. If a firm answers yes to any question in Item 11, it is required to expand on the problem in an addendum. Form ADV also collects the names of direct and indirect owners of the firm, executive officers, control persons, other business locations of the firm, and the limited partnerships in which the investment adviser participates.

The researchers focused on approximately 20 variables from the



Forms ADV. The next step was to define funds as problem or nonproblem funds depending on whether the adviser had answered yes to any question in Item 11. Thus, issues of legal and regulatory compliance provided a simple and measurable proxy for operational risk.

The third step was to focus on the relationship between the Form ADV variables and the performance statistics and characteristics of problem versus nonproblem funds. From more than 20,000 Forms ADV, the researchers were able to match 879 management firms with 2,299, or 57 percent, of the more than 4,000 live funds in the Lipper TASS hedge fund database. Of these 879 management firms, 126 (approximately one in seven) answered yes to at least one question in Item 11. These firms represented 368 funds among the hedge fund sample dataset.

Using publicly available information from the TASS database, the researchers found that the problem funds had not performed as well as the nonproblem funds. The mean return and Sharpe ratio were both significantly lower and so were the incentive-fee level and the percentage using a high-water mark, perhaps

indicating that problem funds were of lower quality than nonproblem funds. The research suggested that there is a significant positive interaction between operational risk and financial risk.

Next, the Form ADV variables were classified as potentially posing internal, external, or ownership/capital-structure conflicts of interest. The analysis of Form ADV variables demonstrated that funds with more conflict-of-interest issues, concentrated ownership, and lower leverage ratios tend to have higher past operational risk, which suggested that such risk may also extend to future behavior.

### Estimating an Operational-Risk Measure

The challenge was now to construct an operational-risk score for funds whose managers did not file Form ADV. In previous research, Brown et al. had identified *observable* TASS variables shown to be associated with the probability of fund failure. Other characteristic data from TASS relating to fund quality were also included. Using canonical correlation analysis, they estimated a linear combination of these variables in such a way that

the resulting variable maximally correlated with a variable similarly constructed from a weighted set of Form ADV variables (such as conflicts of interest and ownership structure). Such variables, unless a firm had filed Form ADV, would be potentially *unobservable*.

Significant, informative relationships between fund failure and certain operational factors were observed.

### Final Steps

The statistical results suggested that a fund's  $\omega$ -score functioned as an indirect measure of operational risk, with the risk of failure increasing with a rise in score. After controlling for market risk and style differences, fund returns were regressed on the  $\omega$ -score for hedge funds in the TASS database from 1994 to 2005. The results of the backtest suggested that operational risk is negatively related to fund returns, with a negative  $\omega$ -score coefficient observed for returns in 10 of the 12 years and an average negative  $\omega$ -score coefficient observed over the entire 12-year period.

Finally, the researchers wanted to see whether the  $\omega$ -score could deliver a prognosis of the survivability of

funds not in the sample, as measured by the time to liquidation. If the relationships could hold up out of sample, it is highly probable that they would hold in the future. **Figure 1** shows the projected half-life of funds based on their  $\omega$ -score and return volatility (a measure of financial risk). The  $\omega$ -score was an accurate predictor of the disappearance of funds from the sample: the higher the  $\omega$ -score, the shorter the projected fund life.

The  $\omega$ -score is significant for such styles as convertible arbitrage,

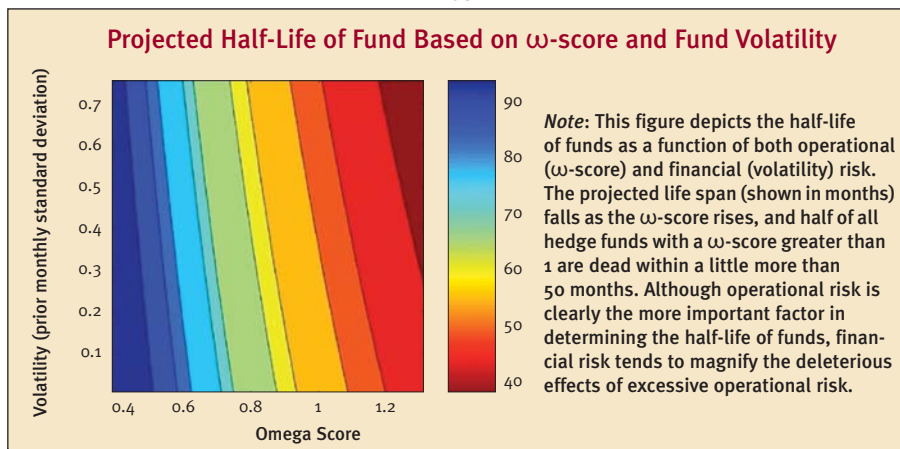
dedicated short bias, emerging markets, equity market neutral, fund of funds, and long-short equity. The findings imply that operational risk is an important reason for fund failures in these categories. The coefficients are insignificant, however, for such styles as event driven, fixed-income arbitrage, global macro, and managed futures. For these categories, financial risk or other types of risk may be important co-factors of fund failures. For such styles as convertible arbitrage, emerging markets, event driven, fund of funds, and managed futures, higher operational risk is also related to higher financial risk.

### No Substitute

Numerical scoring models are not new to the investment industry. Altman's Z-score model, for example, evaluates the ambient factors that anticipate a company's bankruptcy. Although a quantitative model can never fully replace human judgment, it can help prioritize the due-diligence process.

"I think the reason this particular article ["Estimating Operational Risk for Hedge Funds: The  $\omega$ -Score"] stood out among the many solid articles published in *FAJ* last year is because it is exceptional in both quality and relevance," says Rodney Sullivan, CFA, *FAJ*'s editor, who reviews all articles but doesn't get to vote on the Graham and Dodd

FIGURE 1



## Graham and Dodd Awards of Excellence

The Graham and Dodd Award for Best Article is presented annually for the most outstanding article published in the previous year's *Financial Analysts Journal*. In addition, several articles are chosen to receive the highly respected Graham and Dodd Scroll Awards. The Scroll Awards salute excellence in financial writing while paying tribute to Graham and Dodd. The Graham and Dodd Best Perspectives Award recognizes the favorite Perspectives column among a subset of the voting body. *FAJ* readers are also invited to weigh in by casting their vote electronically for the most thought-provoking article from their viewpoint (the Readers' Choice Award). The 2009 winners (recognized in 2010) are as follows:

### Best Article

"Estimating Operational Risk for Hedge Funds: The  $\omega$ -Score" by Stephen Brown, William Goetzmann, Bing Liang, and Christopher Schwarz (January/February 2009).

### Scroll Awards

"Absence of Value: An Analysis of Investment Allocation Decisions by Institutional Plan Sponsors" by Scott D. Stewart, CFA, John J. Neumann, Christopher R. Knittel, and Jeffrey Heisler, CFA (November/December 2009).

"Do Security Analysts Reduce Noise?" by Maria Schutte and Emre Unlu (May/June 2009).

"The Wages of Social Responsibility" by Meir Statman and Denys Glushkov (July/August 2009).

### Best Perspectives Award

"Markets in Crisis" by John C. Bogle (January/February 2009).

### Readers' Choice Award

"Tumbling Tower of Babel: Subprime Securitization and the Credit Crisis" by Bruce I. Jacobs (March/April 2009).



awards. "By quality, I mean that the research was done in a very rigorous fashion. The authors use a type of hazard function, similar to that used in the insurance industry to estimate the probability of an insurable event such as an earthquake or auto accident, so these are advanced applied statistical concepts."

"What is even more important, though, is the article's high degree of relevance to the investment community," he continues. "It speaks to a very timely and important topic to investors—those in a fiduciary capacity need to consider a wide array of risks in performing due diligence. This means not only investment risk but also operational risk. This paper provides an important tool in helping us assess the risk that relates to maintaining a viable ongoing operation."

The idea of the  $\omega$ -score is to reduce a complicated, multidimensional problem to a simple statistic that any fund of hedge funds can employ. Yet, as Brown is quick to point out, for all of its merits, the  $\omega$ -score could never replace full-blown hedge fund operational due diligence, which is a lengthy and expensive commitment. The process involves interviewing managers on site, dissecting the procedures for valuing securities and calculating the fund's

net asset value, conducting background checks, verifying the authenticity of audits, examining risk management infrastructure, and evaluating compliance procedures. And that's just for starters.

Operational due diligence may be conducted by an investor's in-house team or outsourced to a due diligence firm, or an investor may rely on a combination of internal and external resources. Each hedge fund has its own unique set of characteristics, and the evaluation will pull in not only auditors, lawyers, and administrators but also specialists whose expertise is particularly suitable to the fund being evaluated.

"The questions that you're asking in broad categories are generally the same, but they're going to be tailored within those categories to be fund specific," says Jessica Davis, attorney and chief compliance officer for Protégé Partners, a large fund-of-hedge-funds manager. "There's a wide variety of fund strategies, management structures, and so on. What may be perfectly fine for one fund may be risky for another." Davis, along with Daniel Federmann, CFA, CPA, Protégé's chief financial officer, spearheads the firm's operational due diligence team.

“We bring our practical experience to bear on the process,” Federmann adds. “When we review other managers, we know what’s inside the sausage factory, if you will.” Protégé also relies on a dedicated due-diligence firm to complement its efforts. “Independence is a big issue for us. Our work stands by itself, but having an external consultant, someone dedicated solely to operational due diligence and who’s unbiased, who’s not a member of the partnership or the management company, and who can’t be influenced at all, is hugely important to us,” says Federmann.

### Seeking Alpha

At Protégé, expenses associated with due diligence conducted by the internal team are borne by the firm; expenses associated with commissioned work are allocated to the partnership. Brown and his colleagues, following up on their award-winning paper, examined data directly from

commissioned operational due-diligence reports of one such dedicated consulting firm.<sup>3</sup> They found that reports are typically 100–200 pages long and cost an average of US\$12,500.

The researchers have hypothesized that large funds of hedge funds that can absorb the high cost of due diligence and operate at a competitive advantage relative to smaller funds of hedge funds.<sup>4</sup> For example, Protégé Partners, which has more than US\$3 billion under management, has the internal resources to tackle a facet of the most important operational risk factor underlying fund failure—the valuation of difficult-to-price securities. Protégé’s proprietary algorithm, called the Bias Ratio, measures the potential for return smoothing among hedge funds trading illiquid assets. The formula has been incorporated

by some risk management database services as part of their offering.

Ironically, it appears that operational risk factors do not impede fund flow. A recent decision model constructed by the four authors shows that operational due-diligence reports are typically issued on high-return funds nine months after the historical performance has peaked and three months after the investor flows have peaked. “Operational risk is understood by sophisticated investors,” concludes Brown, “but it doesn’t mitigate the naive tendency to chase past returns regardless of operational risk exposure.” ▀

*Susan Trammell, CFA, provides business plan writing and market research services through her New York City consulting firm.*

<sup>3</sup> Stephen Brown, William Goetzmann, Bing Liang, and Christopher Schwarz, “Trust and Delegation,” National Bureau of Economic Research working paper (November 2009).

<sup>4</sup> Stephen Brown, Thomas Fraser, and Bing Liang, “Hedge Fund Due Diligence: A Source of Alpha in a Hedge Fund Portfolio Strategy,” *Journal of Investment Management* (January 2008).

