A Note to Investment Committees: Are You Prepared for the Next Bernie Madoff?

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If you are a manager of an endowment or pension plan and one or more of your hedge fund managers were delivering the quarterly performance shown below relative to an established benchmark, what might you conclude? Keep in mind the fund in question, SFA Long/Short, is a real fund, although its name has been changed, and the returns shown are the NAV-based returns actually reported to investors. In addition, the benchmark portfolio (SRP) is constructed to reflect the same strategy deployed by SFA Long/Short.

Chart 1: SFA Long/Short vs. Benchmark
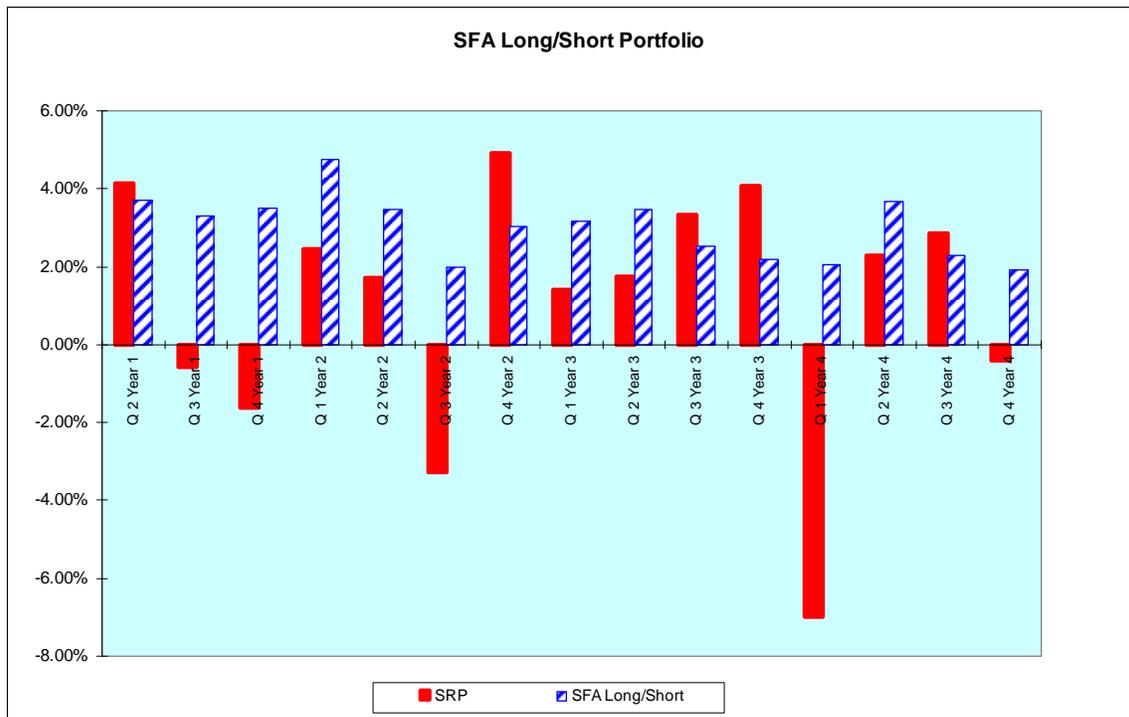
Upon perusing the return history, you might conclude the following: 1) the SFA Long/Short portfolio frequently outperforms the SRP benchmark but does not do so all the time, 2) there are periods when the differences in returns between the two portfolios are not large. For example, the returns from SFA Long/Short and SRP between Q1,yr2 and Q4,yr3 are reasonably close with the exception of Q3,yr2. *Your auditor, playing the*

devil's advocate, might say: "As one responsible for ensuring that the returns and net asset values reported are proper, is there anything in the chart above that would give you reason to think the SFA Long/Short Fund manager is lying?" Finally, you confide in your auditor and say: "Hey look, I trust the SFA Long/Short manager; this is why we invested in the fund in the first place. Everything looks "Kosher", why do I need to worry?" Your auditor replies: "This is true. I understand you have confidence in the manager and you trust what he says but in the end you need to verify what he is telling you even when things appear to be fine".

As a person responsible for insuring that investment values are reported properly, you decide, after some frustration, to delve a bit deeper into the returns reported by SFA Long/Short. A summary of what was found appears in Chart 2 below.

Chart 2: Return Differences and the Confidence Line
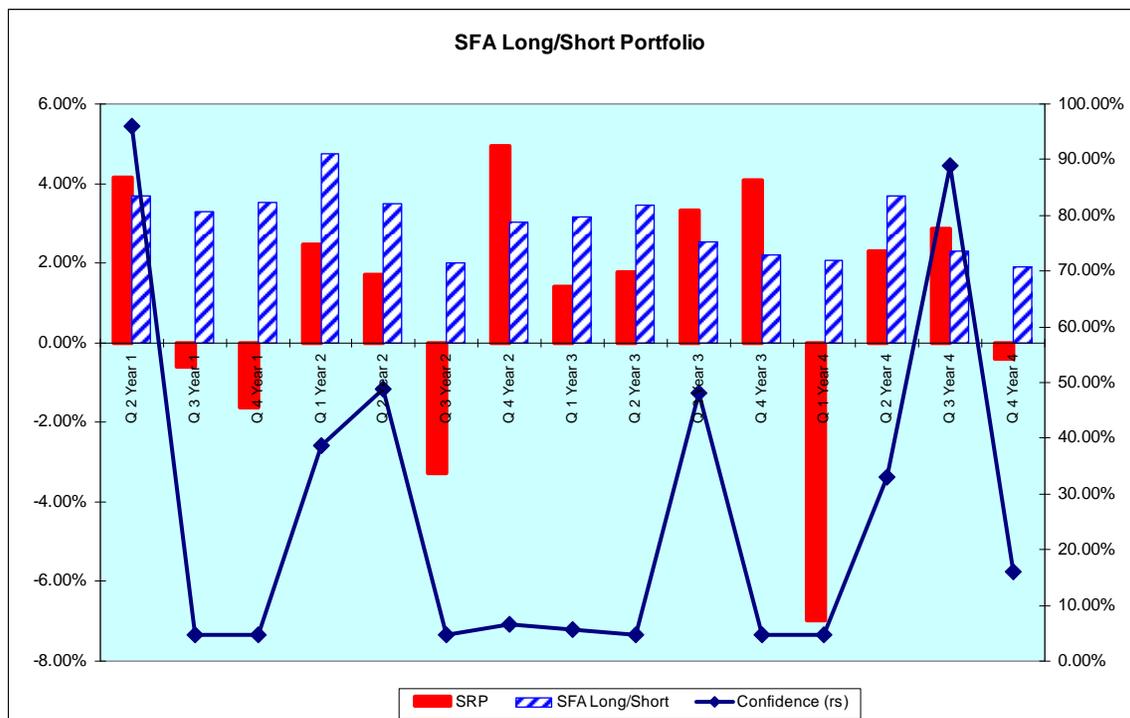
The only difference between Chart 1 and Chart 2 is the solid line. This line, the confidence line, is produced by AIRAS (Alternative Investment Return Authentication Service). AIRAS is a statistical detective tool designed to uncover when a hedge fund or private equity (Alternative Investment (AI)) manager is not reporting truthfully. The confidence line value at each time period (its construction is described below) measures the degree of confidence that the return reported by the AI manger and the characteristics of the portfolio disclosed to investors are aligned. That is, the confidence curve measures the likelihood that the portfolio described by the AI manager can deliver the reported return.

What is most striking about the above chart is that the returns reported by SFA Long/Short are not dissimilar to the returns generated by the benchmark for the Q4,yr2 to Q4,yr3 period, yet the AIRAS confidence line indicates there is a consistent pattern of low confidence that the SFA Long/Short manager reported truthfully.

After considering the results you throw your hands up and say: "Hey wait a minute. What is this AIRAS thing? It is telling me to simply ignore the fact that SFA Long/Short returns look reasonable. I trust the SFA Long/Short manager and I do not believe the AIRAS finding that the manager may not be reporting truthfully."

If a fiduciary or manager of an investor entity did indeed react this way, it would be a shame. The reason is that the SFA Long/Short fund is really the *Fairfield Sentry Fund*, a Madoff feeder fund. The return history shown in the above charts spans the period 1991:Q2 to 1994:Q4 well before the Madoff fraud was exposed. The strategy followed by *Fairfield Sentry Fund* is a split-strike strategy described below.

The Fund seeks to obtain capital appreciation of its assets principally through the utilization of a non-traditional options strategy described as a split-strike conversion to which the Fund allocates the predominant portion of its assets. The investment strategy has defined risk and reward parameters. The establishment of a typical position entails (i) the purchase of a group or basket of securities that are intended to highly correlate to the S&P 100 Index, (ii) the sale of out-of-the-money S&P 100 Index call options with a notional value approximately equal to the market value of the basket of equity securities. The basket typically consists of 40-50 stocks in the S&P 100 Index. The primary purpose of the long put options is to limit the market risk of the stock basket at the strike price of the long puts. The primary purpose of the short call options is to largely finance the cost of the put hedge and increase the stand-still rate of return. The "split-strike conversion" strategy is implemented by Bernie L. Madoff Investment Securities LLC ("BLM"), a broker dealer registered with the Securities and Exchange Commission through accounts maintained by the Fund in that firm. The services of BLM and its personnel are essential to the continued operation of the Fund and its profitability.

While the Madoff fraud was uncovered in 2009 as a result of not being able to meet a large withdrawal request, the AIRAS analysis was performed on returns from the early 1990s. AIRAS would have indicated that something may be seriously wrong about fifteen years before the Madoff scandal broke and would have prevented serious financial ruin for many individuals and investor entities.

How Does AIRAS Work?

AIRAS is based on the concept of the replicating portfolio. It uses the principles of modern portfolio theory and mathematical optimization to create a series of portfolios that have the same portfolio characteristics as those disclosed by the hedge fund or private equity manager. In terms of investment theory, the set of replicating portfolios has

the same factor structure as the target portfolio. Since the factors that generate the returns for both the manager and replicating portfolios are the same, it follows that the return from the manager portfolio should be within a band of returns defined by the set of replicating portfolios. The further away the manager's return is from the band of returns, the less confidence one has that the manager is reporting properly. AIRAS calculates the NAV fair value for a reporting period based on the quarter for which the difference between the reported confidence level and 80% is the highest.[1] If the reporting period were 1994:4 we would have used 1991:2 as the starting point for calculating fair value, given the confidence line pattern shown, and then calculate NAV fair value going forward based on the returns from the optimal replicating portfolio.[2]

In the Fairfield Sentry case, the returns were similar but not similar enough. That is, the strategy described by Madoff implied a very small volatility in returns, which meant that portfolios that were constructed based on the strategy articulated, could not have very large return differences unless of course a manager was fraudulently reporting. **This means that something may not be correct even if the manager reported a return that is too low as opposed to too high.** The key to discovering that a manager is misreporting, and therefore concluding the NAVs are not measured at fair value, is when the returns reported do not line up with what the manager says he is doing. That is, the manger's disclosure about portfolio characteristics is not aligned with the returns reported.

The AIRAS Confidence Curve

To demonstrate how the confidence curve is constructed, we show the curve for the period YR3:Q3 which in actuality is 1993:Q3. AIRAS used the Fairfield Sentry Fund description above to develop the SRP replicating portfolio. This portfolio combined returns from the S&P 100 (OEX), and one month maturity call, and put returns at 5% out of the money, which we calculated using Black Scholes and adjusted for any loss or gain at the end of each month.

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[1] If AIRAS is 80% confident that a return is proper, we conclude that the NAVs upon which the return is based are reported at fair value. If confidence is blow 80%, fair value is established at the measurement date by going back to the last NAV which AIRAS concluded was properly measured and then uses optimal replicating portfolio returns to move the base NAV forward to the measurement date.

[2] Given the confidence pattern shown, we would expect managements of investor entities to initiate a forensic due diligence which would have certainly led to discovering the Madoff fraud well before 2009.

Chart 3: The Confidence Curve
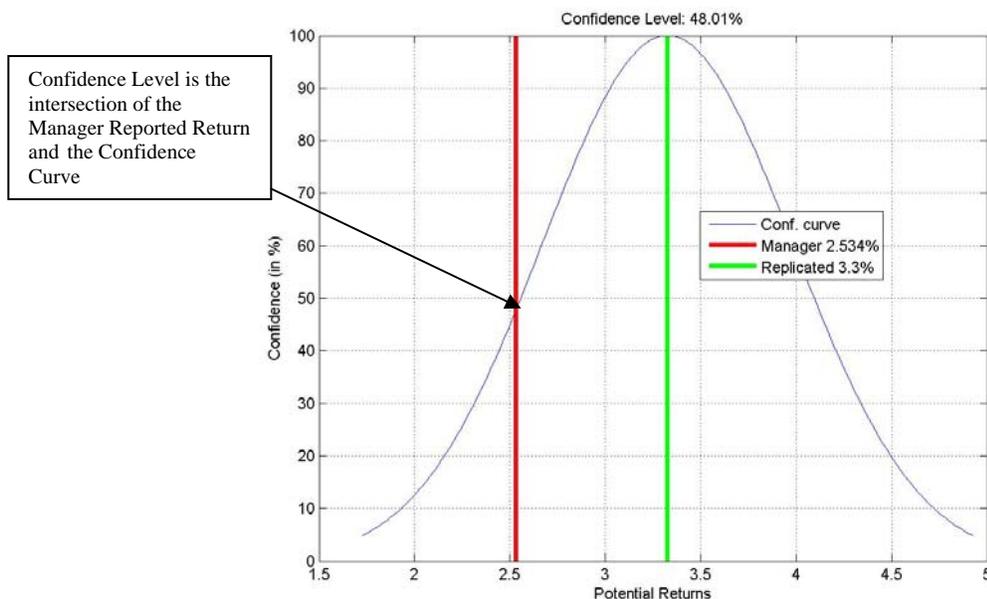
As shown in Chart 3, the Madoff reported return is lower than the optimal replicating portfolio return. As noted above, what is important is not the level of returns but the difference in returns. *Here the return difference between the replicating portfolio and the Fairfield Sentry Fund is less than 1% which does not appear large on its face, but is in fact substantial when it is considered in terms of a permissible range based on the articulated strategy.* If Madoff had reported a 3% rather than a 2.53% return, AIRAS would conclude a 90% confidence rather than below a 50% confidence that Madoff is reporting properly.

The Lesson Learned by Studying Madoff

If the Madoff scandal has taught us anything, it is that managements of investor entities need to live by the motto: **Trust but Verify**. The verification standard means that in cases where the manager either does not disclose constituent investments, or as in the case of private equity, the valuation of portfolio investments are at issue, an analytical standard needs to be in place that tests whether the NAV-based returns are reasonable. If the return reported is not reasonable, then the NAV upon which it is based is incorrect; the investment by definition is not reported at fair value. Not deploying a verification analytical system just increases the probability that a smarter Madoff may be in your future.