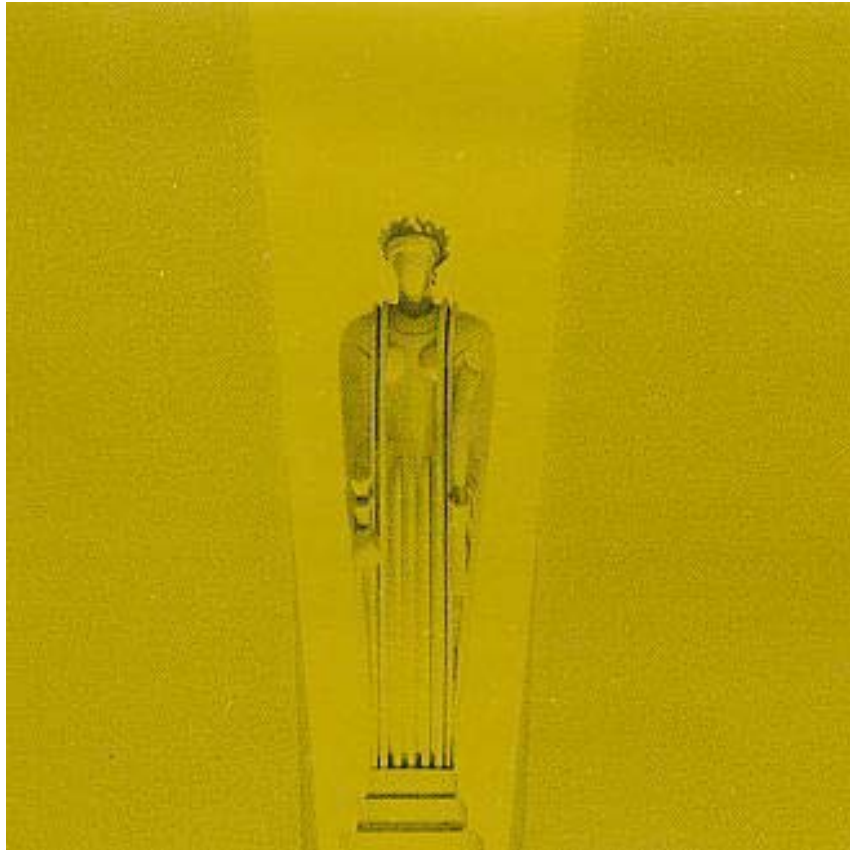


RISK MANAGEMENT FOR ALTERNATIVE INVESTMENTS



Riskinvest Europe 2003

Ms. Hilary Till
Premia Risk Consultancy, Inc.
Chicago

London – 27 & 28 October 2003



PRESENTATION OUTLINE

- I. The Sharpe Ratio and Its Popularity**
- II. Shortcomings**
- III. Alternative Measures**
- IV. Economic Understanding of Source of Returns**



I. The Sharpe Ratio and Its Popularity

A. Mutual Funds

B. Hedge Funds and Other Alternative Investments

C. Required Assumptions



A. Mutual Funds

- **William Sharpe introduced the *reward-to-variability ratio* in 1966 in order to evaluate mutual funds.**
- **It is an investment's excess returns over T-bills divided by its standard deviation.**
- **This ratio later became known as the *Sharpe ratio*.**



A. Mutual Funds

(Continued)

- **Such a ratio is better than just evaluating an investment based on its returns.**
- **For diversified baskets of equities, this measure is appropriate.**
- **The statistical distribution of returns of diversified baskets of equities is symmetrically shaped.**



B. Hedge Funds and Other Alternative Investments

- 1. Hallmark of Hedge Funds is the Use of Leverage**
- 2. Widespread Usage**
- 3. Metric for Comparing Other Investments**



1. Hallmark of Hedge Funds is the Use of Leverage

- To get a clearer picture of risk taken to achieve returns, many investors use the Sharpe ratio to evaluate managers.

Levered and Delevered Returns by Hedge Fund Strategy

1997-2001

Style	Average Levered Return (%) [*]	Average Delevered Return (%) [*]
Short Biased	13.7	9.3
Global Macro	16.8	8.9
Emerging Markets	16.9	8.8
Event Driven	14.7	8.3
Merger Arbitrage	14.7	7.0
Long/Short Equity	14.0	6.3
Fixed Income	9.6	4.8
Convertible Arbitrage	10.6	4.2
Managed Futures	10.5	4.2
Distressed Securities	n/a	n/a

*** Leverage analysis was done for funds with 5-year historical leverage and performance data.**

Source: Rahl, Leslie, “Hedge Fund Transparency: Unraveling the Complex and Controversial Debate,” Slide 52, RiskInvest 2002, Boston, 12/10/02.



2. Widespread Usage

- **A recent study on hedge funds in Europe found that the Sharpe ratio was the most frequently quoted metric ...**

Indicator	Total number quoted(1)	Number of favoured quotations(2)
Sharpe Ratio	100%	93%
Sortino Ratio	28%	3%
M ² and SRAP	19%	NS
Renta/VaR	9%	2%
Others (including RI)	14%	2%

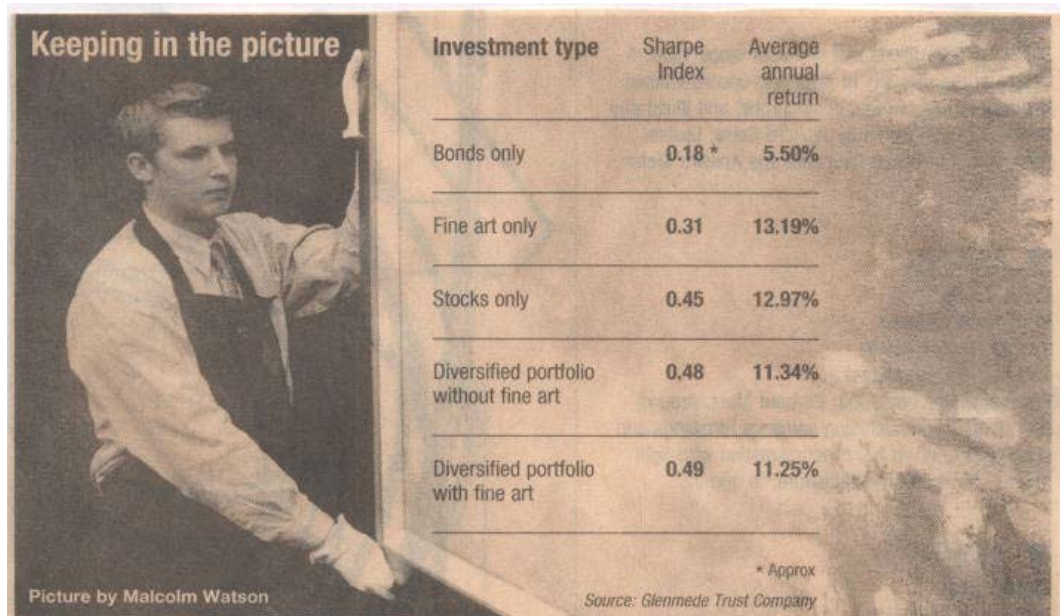
Indicators used in performance comparison Source: EDHEC (2002) (1) several possible responses (2) use of the indicator as a favoured risk-adjusted return measure in the sales literature.

Source: Amenc, Noel, “The Sharpe Ratio: Handle with Care!,” Editorial, EDHEC-Risk Asset Management Research, 2003.



3. Metric for Comparing Other Investments

- **“Sharpe Investors Find New Art Form:
A formula devised for risk and reward shows that fine
art earns its place in a portfolio.”**



Source: Taylor, Paul, Financial Times, 4/20/03.



C. Required Assumptions

- 1. Historical Results Have Some Predictive Ability;**
- 2. The Mean and Standard Deviation Are Sufficient Statistics;**
- 3. The Investment's Returns Are Not Serially Correlated; and**

Source: Sharpe, William, "The Sharpe Ratio," Journal of Portfolio Management, Fall 1994.

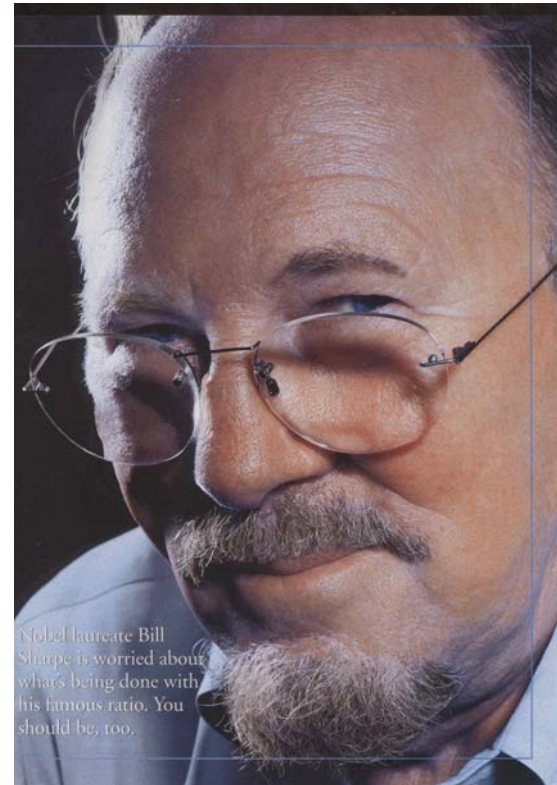


C. Required Assumptions (Continued)

4. **The Candidate Investments Have Similar Correlations with the Investor's Other Assets.**

5. **Conclusion: Sharpe himself states that the use of historical Sharpe ratios as the basis for making predictions ...**

“is subject to serious question.”



Source: Lux, Hal, “Risk Gets Riskier,” Institutional Investor magazine, October 2002.



II. Shortcomings

- A. Predictive Ability in Question**
- B. The Mean and Standard Deviation May Not Be Sufficient**
- C. Investment Returns That Trend**
- D. Candidate Investments May Not Have Similar Correlations With Other Investments**



A. Predictive Ability in Question

1. **Momentum**
2. **LTCM**
3. **Correlations and Standard Deviations May Persist,
But There is No Evidence That Returns Do**



1. Momentum

- **Paradoxically, a high Sharpe ratio could indicate that one is nearing the end of a successful momentum-based strategy.**

Bouncing Sharpe ratios

High Sharpe ratios — these mutual funds all had better ratios than the 0.5 of the Standard & Poor's 500* at the start of 2000 — clearly don't guarantee good, or safe, results. Moral: risk-adjusted returns can't be counted on to predict the future — and Sharpe ratios go up and down.

Fund	Sharpe ratio 12/30/99**	2000 return	2001 return	2002 return 8/31/02	Sharpe ratio 8/31/02
Fidelity Aggressive Growth	1.26	-27.1%	-47.3%	-43.6%	-1.07
Janus Twenty	1.47	-32.4	-29.2	-21.2	-0.99
Firsthand Technology Value	0.89	-10.0	-44.0	-56.1	-0.67
Amerindo Technology	0.74	-64.8	-50.7	-42.1	-1.19
Van Wagoner Emerging Growth	0.70	-11.8	-47.8	-42.5	-0.70

*Sharpe ratio for Standard & Poor's 500 index assumes risk-free rate of 0 percent.
**Sharpe ratios for funds are based on three-year trailing historical numbers.

Source: Morningstar.

Source: Lux, Hal, "Risk Gets Riskier," Institutional Investor magazine, October 2002.



2. LTCM

- **Long Term Capital Management reportedly had a Sharpe ratio of 4.35 (*after* fees) after 31 months of operation.**



3. Correlations and Standard Deviations May Persist, But No Evidence That Returns Do

- **There is evidence of strong persistence in individual hedge funds' standard deviations and their correlation with the stock market.**
- *There is little evidence of persistence in average returns.*

Source: Kat, Harry and Faye Menexe, "Persistence in Hedge Fund Performance: The True Value of a Track Record," Journal of Alternative Investments, Spring 2003.



3. Returns Do Not Persist (Continued)

Practitioner Confirmation

- “Predicting invested return with pre-invested return
Invested Return(i) =
Constant + Beta * [Pre-Invested Return(i)] + e(i)
- R-squared = 0 (with or without outliers)”

Source: Gordon, David, “Risk By Any Other Name,” Glenwood Capital Investments, LLC, Presentation to Chicago QWAFEFW, 10/16/03.



3. Standard Deviations Persist (Continued)

Practitioner Confirmation

- **“Invested Volatility(i) =
Constant + Beta * [Pre-Invested Volatility(i)] + e(i).**
- **R-squared = 37%.**
- **Note: Past performance is not indicative of future results.”**

Source: Gordon, David, “Risk By Any Other Name,” Glenwood Capital Investments, LLC, Presentation to Chicago QWAFEFW, 10/16/03.



B. The Mean and Standard Deviation are Sufficient Statistics

- 1. Asymmetric Outcomes**
- 2. Illiquid Holdings**
- 3. Maximizing Risk and Illiquidity**



1. Asymmetric Outcomes

- a. **Negatively Skewed Outcomes**
- b. **Positively Skewed Outcomes**
- c. **Manipulated Outcomes**
- d. **Beyond the Mean-Variance Paradigm**



a. Negatively Skewed Outcomes

- **The Sharpe ratio identifies risk as the standard deviation around the investment's return.**
- **The fact that investors have a preference for positively skewed outcomes and an aversion to negatively skewed outcomes is not captured by a risk measure that equally weights the two outcomes.**



a. Negatively Skewed Outcomes (Continued)

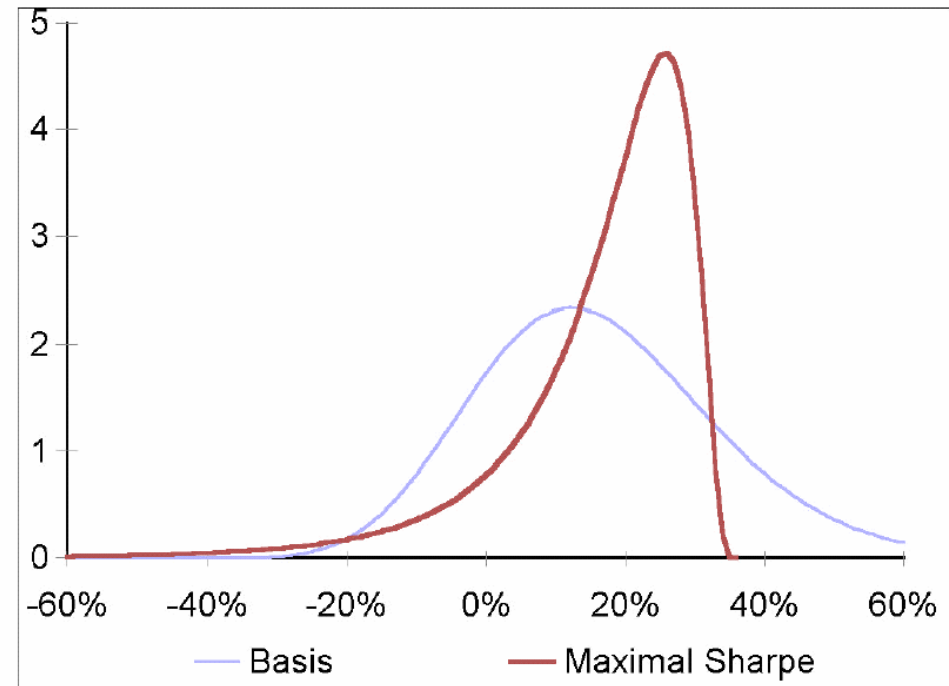
- **One can increase the Sharpe ratio of an investment by selling fairly valued options.**
- **An investor is accepting the possibility of negatively skewed outcomes in exchange for improving the investment's returns.**

Source: Leland, Hayne, "Beyond Mean-Variance: Performance Measurement of Portfolios Using Options or Dynamic Strategies," University of California – Berkeley, Research Program in Finance Working Papers, October 1998.



a. Negatively Skewed Outcomes (Continued)

- **Four Yale University professors have derived an optimal strategy for maximizing the Sharpe ratio.**
- **The optimal strategy has a truncated right tail and fat left tail.**

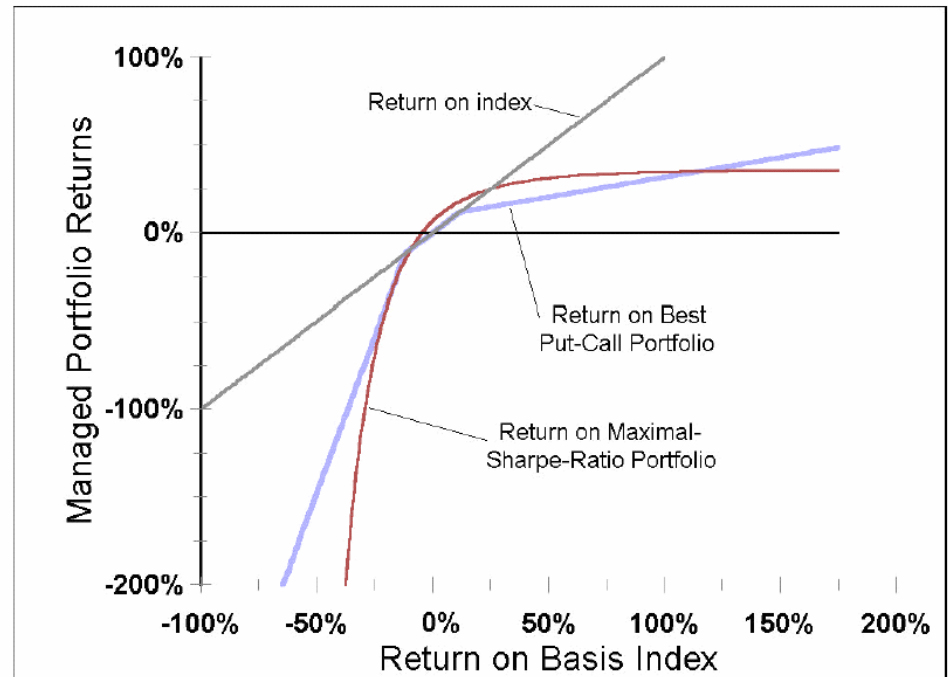


Source: Goetzmann, William, Jonathan Ingersoll, Matthew Spiegel, and Ivo Welch, "Sharpening Sharpe Ratios," Yale School of Management, Working Paper, February 2002.



a. Negatively Skewed Outcomes (Continued)

- **This strategy can be achieved by selling certain ratios of calls and puts against a core equity market holding.**



Source: Goetzmann, William, Jonathan Ingersoll, Matthew Spiegel, and Ivo Welch, "Sharpening Sharpe Ratios," Yale School of Management, Working Paper, February 2002.



a. Negatively Skewed Outcomes (Continued)

- **The Yale professors conclude that:**

“expected returns being held constant, high Sharpe ratio strategies are, by definition, strategies that generate modest profits punctuated by occasional crashes.”



b. Positively Skewed Outcomes

- **The possibility of large gains is not rewarded by the Sharpe ratio.**
- **An extreme example is as follows:**
 - **Take a lottery whose ticket costs one cent today, and where winners pocket fifty billion dollars next year with probability 10%, and nothing otherwise.**
 - **This lottery has a Sharpe ratio of 0.33.**

Source: Bernardo, Antonio and Olivier Ledoit, “Gain, Loss and Asset Pricing,” Journal of Political Economy, 2000, Vol. 8, No 1.



c. Manipulated Outcomes

- **One can improve the Sharpe ratio of one's investment by using derivatives securities to shift returns from the highest monthly return of each year to the lowest one.**
- **“This smoothes observed returns – and lowers observed volatility – without significantly altering the annual return.”**

Source: Spurgin, Richard, “How to Game Your Sharpe Ratio,” Journal of Alternative Investments, Winter 2001.



d. Beyond the Mean-Variance Paradigm

- **“High Sharpe ratios tend to go together with negative skewness and high kurtosis.**
- **This means that the relatively high mean and low standard deviation offered by hedge fund indices is no free lunch.”**

Source: Brooks, Chris and Harry Kat, “The Statistical Properties of Hedge Fund Index Returns and Their Implications for Investors,” Journal of Alternative Investments, Fall 2002.



d. Beyond the Mean-Variance Paradigm

(Continued)

Higher Moments Defined

- **“The mean and standard deviation are the first two moments of the return distribution.**
- **All other moments are labeled as higher moments.**
- **The most prominent ones are skewness and kurtosis.”**

Source: Bacmann, Jean-Francois and Stefan Scholz, RMF Investment Management, “Alternative Performance Measures for Hedge Funds,” AIMA Journal, June 2003.



d. Beyond the Mean-Variance Paradigm

(Continued)

Higher Moments Defined (Continued)

- **Skewness “mainly describes how asymmetric the distribution is.**
- **[Kurtosis] ... is linked to the existence of extreme returns.**
- **... risk averse investors like positive skewness and dislike negative skewness and high kurtosis.”**

Source: Bacmann, Jean-Francois and Stefan Scholz, RMF Investment Management, “Alternative Performance Measures for Hedge Funds,” AIMA Journal, June 2003.



2. Illiquid Holdings

- a. Required Return Premium**
- b. Possibility of Stale Pricing**



a. Required Return Premium

- **If an investor can passively adopt a strategy that results in a superior performance measure, then that metric is flawed.**
- **The previous section discussed how one could engage in fairly valued derivatives strategies to produce a superior Sharpe ratio.**
- **Another way to produce a higher average return is to invest in equity proxies that are illiquid.**



a. Required Return Premium (Continued)

- **There tends to be a liquidity premium embedded in such investments.**
- **The Sharpe ratio does not penalize illiquidity.**



b. Possibility of Stale Pricing

- **If the underlying investments of a hedge fund contain illiquid securities, there may be a lag in investments being revalued.**
- **This would give the impression of stable returns and therefore result in an artificially low standard deviation.**
- **This factor would then tend inflate the investment's Sharpe ratio.**



b. Possibility of Stale Pricing (Continued)

Stale prices or intertemporal correlations?
It doesn't matter which ... they're real

Dependent Variable: HFRI Fund-weighted Index

Variable	Coefficient	t-Statistic	Prob.
Constant	0.007	8.29	0.000
SP500	0.083	3.21	0.002
SP500(-2)	0.036	1.92	0.057
RUS2000	0.285	13.95	0.000
RUS2000(-1)	0.069	4.68	0.000
RUS2000(-4)	0.031	2.10	0.038

Source: Feldman, Barry, "Portfolio Construction with Alternative Investments," Ibbotson Associates, Presentation to Chicago QWAFEFW, 8/22/02.



3. Maximizing Risk and Illiquidity

- **If one uses the Sharpe ratio, one may be inadvertently maximizing risk (due to taking on negatively skewed investments) and ...**
- **... maximizing illiquidity (due to illiquid investments giving the appearance of stable, superior returns.)**

Source: Weisman, Andrew and Jerome Abernathy, “The Dangers of Historical Hedge Fund Data,” Risk Budgeting, Edited by Leslie Rahl, Risk Books, 2000.



C. Investment Returns That Trend

- 1. Annualization Adjustment in Question**
- 2. Significant Serial Correlation**



1. Annualization Adjustment in Question

- **Sharpe noted in his 1994 article that if an investment strategy's returns are serially correlated, one should not use simple adjustments to “annualize” the Sharpe ratio.**
- **It is common practice to annualize a Sharpe ratio calculated with monthly data by multiplying this statistic by the square root of 12.**
- **When an investment's returns trend, this adjustment will overstate the Sharpe ratio.**



2. Significant Serial Correlation

- **“All of the Convertible Arbitrage indices have a first order correlation of at least 0.4, which are also statistically significant at the 1% level.**
- **A similar feature is observed for Distressed Securities and some of the Risk Arbitrage, Emerging Markets and Equity Market Neutral series.**
- **It is also reflected in the Fund of Fund results ...”**

Source: Brooks, Chris and Harry Kat, “The Statistical Properties of Hedge Fund Index Returns and Their Implications for Investors,” Journal of Alternative Investments, Fall 2002.



2. Significant Serial Correlation (Continued)

- **Similarly, when Professor Andrew Lo of MIT examined twelve hedge funds across styles, he found that most of the funds exhibited meaningful serial correlation.**
- **As a result, “the annual Sharpe ratio can be overstated by as much as 65% ...”**

Source: Lo, Andrew, “The Statistics of the Sharpe Ratio,” Financial Analysts Journal, July/August 2002.



D. Candidate Investments May Not Have Similar Correlations With Other Investments

- **The Sharpe ratio does not take into consideration an investment's correlation with other investments.**
- **Therefore, according to Sharpe in his 1994 article, the ratio “will not by itself provide sufficient information to determine a set of decisions that will produce an optimal combination of asset risk and return ...”**



D. Candidate Investments May Not Have Similar Correlations With Other Investments (Continued)

- **Researchers at Kenmar have noted that the current composition of the hedge fund industry is highly correlated with the equity market.**
- **The Sharpe ratio “does not differentiate between risk that is correlated with the stock market ... and risks that are not correlated with the equity market.”**

Source: Horwitz, Richard, Marc Goodman, and Kenneth Shewer, Kenmar Global Investment, “Integrating Market Correlation Into Risk-Adjusted Return,” Risk magazine, June 2002.



III. Alternative Measures

A. Other Summary Measures

- Admittedly, investors want *one* number to compare competing investments.

B. Asset-Based Style Factors

- Preferably, one would use this approach if allowed to summarize an investment with more than *one* number.



III. Alternative Measures

(Continued)

C. Due Care in Using Hedge Fund Index Results

- **They vary across index providers and do not necessarily represent manager-level results.**



A. Other Summary Measures

- 1. Risk-Adjusted Return Measures**
- 2. Risk Measures**
- 3. Adjustments to Flawed Historical Data**



1. Risk-Adjusted Return Measures

- a. **Bernardo-Ledoit Gain-Loss Ratio**
- b. **Excess Downside Deviation Adjustment**
- c. **BAVAR**
- d. **Other “Higher Moment” Performance Measures**



a. Bernardo-Ledoit Gain-Loss Ratio

- **If a symmetric distribution cannot be assumed, one would like a measure that accounts for an investor's preference for positively skewed outcomes and their avoidance of negatively skewed outcomes.**
- **The Bernardo-Ledoit gain-loss ratio is one such measure.**
- **It is the ratio of the expectation of the positive part of the returns divided by the expectation of the negative part.**

Source: Bernardo, Antonio and Olivier Ledoit, "Gain, Loss and Asset Pricing," Journal of Political Economy, 2000, Vol. 8, No 1.



b. Excess Downside Deviation Adjustment

- **Some hedge fund strategies may be in effect “short options” through bearing overpriced risks associated with rare events.**
- **Researchers from Financial Risk Management Ltd recommend examining the downside deviation of an investment’s return distribution.**
- **Given that the Sharpe ratio is so prevalent, they propose making an adjustment to this ratio to incorporate the extra information contained in the downside deviation calculation.**



b. Excess Downside Deviation Adjustment (Continued)

- **The researchers’ “adjusted Sharpe ratio” is defined as:**

“the Sharpe ratio that would be implied by the fund’s observed downside deviation if returns were distributed normally.”

- **The authors show one example hedge fund strategy where this adjustment can be quite dramatic:**

“a Sharpe ratio of over 2.50 is reduced to 0.79 ...”

Source: Johnson, Damian, Nick Macleod, and Chris Thomas, Financial Risk Management Ltd., “A Framework for the Interpretation of Excess Downside Deviation,” AIMA Newsletter, September 2002.



c. BAVAR

- **Researchers at Kenmar have developed a “Beta and Volatility Adjusted Returns” Ratio.**

- **This ratio:**

“adjusts the [equity] beta of various investments to be equivalent, so that a fund that has a lower return but is uncorrelated to the [equity] market can be appropriately compared with a fund that achieves a higher return but is highly correlated with the market.”



c. BAVAR (Continued)

- **The authors note that investing in hedge funds that are not market neutral is acceptable ...**
- **... as long as the higher correlation to the stock market is sufficiently compensated with higher returns.”**

Source: Horwitz, Richard, Marc Goodman, and Kenneth Shewer, Kenmar Global Investment, “Integrating Market Correlation Into Risk-Adjusted Return,” Risk magazine, June 2002.



d. Other “Higher Moment” Performance Measures

- **Traditional measures “may not sufficiently weigh extreme realizations and thus reflect the attitude of investors toward risk.”**
- **The Omega measure and Stutzer index “incorporate higher moments.”**

Sources:

- **Bacmann, Jean-Francois and Sebastien Pache, RMF Investment Management, “Optimal Hedge Fund Style Allocation Under Higher Moments,” RMF Research, April 2003;**
- **Keating, Con and William Shadwick, “A Universal Performance Measure,” Journal of Portfolio Measurement, Spring 2002; and**
- **Stutzer, Michael, “A Portfolio Performance Index,” Financial Analysts Journal, May/June 2000.**



d. Other “Higher Moment” Performance Measures

(Continued)

- **Compared to the mean-variance framework for optimally allocating among investments,**
- **“the new measures significantly decrease the allocation of hedge fund indices exhibiting negative skewness and high kurtosis and ...**
- **... increase the weight of ... [symmetrically] distributed or positively skewed indices.”**

Source: Bacmann, Jean-Francois and Sebastien Pache, RMF Investment Management, “Optimal Hedge Fund Style Allocation Under Higher Moments,” RMF Research, April 2003.



2. Risk Measures

- a. **Conditional Value-at-Risk**
- b. **Modified Value-at-Risk**



a. Conditional Value-at-Risk

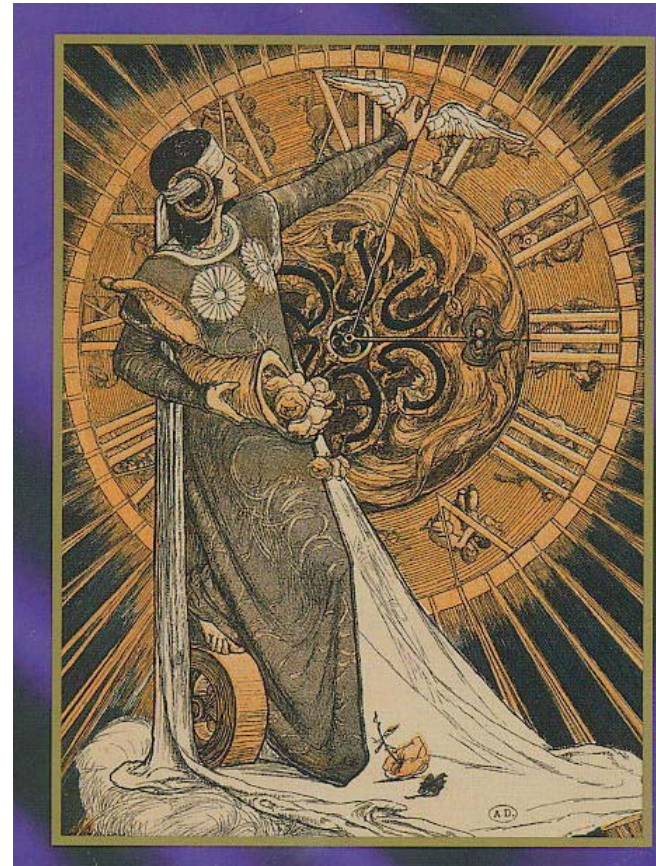
- **Conditional Value-at-Risk (CVar) vs. Value-at-Risk (VaR)**
- **“[Whereas] VaR measures the maximum loss for a given confidence interval, ... CVar corresponds to the expected loss conditional on the loss being greater than or equal to the VaR.”**

Source: Agarwal, Vikas and Narayan Naik, “Risks and Portfolio Decisions involving Hedge Funds,” Forthcoming Review of Financial Studies (2003).



a. Conditional Value-at-Risk (Continued)

- **When the goal is to keep extreme losses under control ...**
- **... CVaR should be used as the risk constraint during portfolio construction.**

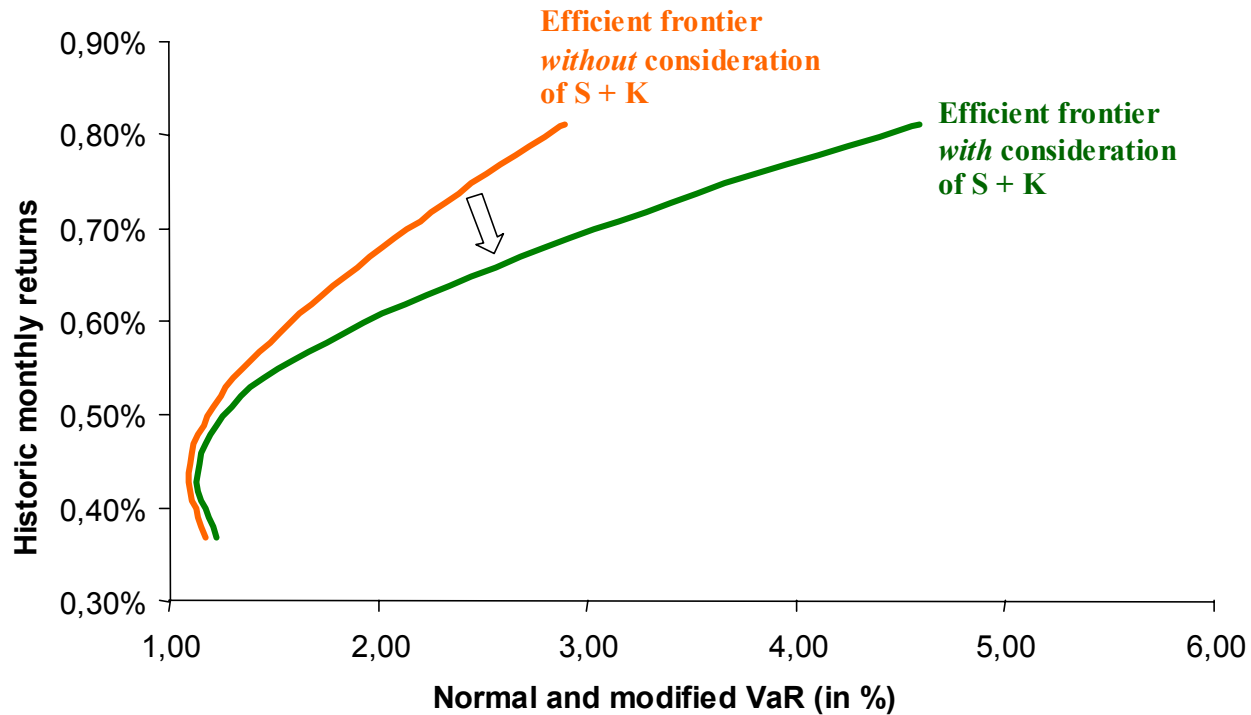


b. Modified Value-at-Risk

- **In addition to CVaR, another measure is “modified VaR,” which takes into consideration the skewness and kurtosis of a distribution.**
- **On the following slide, the figure illustrates how the efficient frontier is affected when using modified VaR rather than VaR as the risk constraint.**
- **The sample portfolio includes absolute-return strategies, some of which have asymmetric payoffs.**



b. Modified Value-at-Risk (Continued)



Source: Signer, Andreas and Laurent Favre, “The Difficulties of Measuring the Benefits of Hedge Funds,” Journal of Alternative Investments, Summer 2002.



3. Adjustments to Flawed Historical Data

- **One way to correct for the survivorship bias that likely exists in hedge fund databases is apply a “haircut” to returns.**
- **Commonly used adjustments amount to about -2% to -3% per year.**
- **But this adjustment does not adequately capture the risk reflected by attrition, according to Ibbotson Associates researchers.**



3. Adjustments to Flawed Historical Data (Continued)

- **The Ibbotson researchers propose default-like models of attrition risk.**
- **Specifically:**

“in every period, with fixed probability, a fund loses half of its assets ...We set the probability of failure at 0.25% per month.”

Source: Feldman, Barry, Peng Chen, and Chandra Goda, “Portfolio with Hedge Funds,” Working Paper, Ibbotson Associates, 10/16/02.



3. Adjustments to Flawed Historical Data (Continued)

- **This model causes the negative skewness and excess kurtosis of modeled hedge fund returns to increase considerably.**
- **Both of these adverse properties negatively impacted recommended allocations to hedge funds.**
- **One would expect that the specific parameters to use in models of hedge fund attrition to be a matter for future research.**



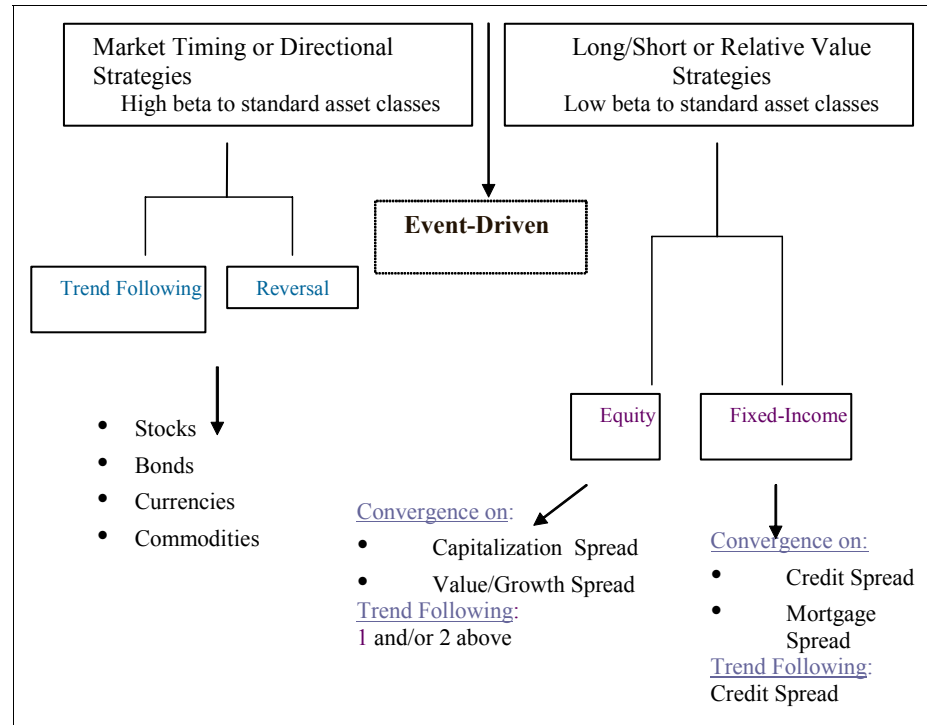
B. Asset-Based Style Factors

- **Being able to model the shape of uncertainty is key to establishing proper risk-adjusted performance measures.**
- **The current academic thinking is to use “asset-based style factors” to characterize an alternative investment.**
- **The idea is if an investor can link a hedge fund’s returns to its underlying “style factors,” then one can use the style factor’s longer history of returns to evaluate the risk of a specific hedge fund.**



B. Asset-Based Style Factors (Continued)

Hedge Fund Styles That Can be Modeled with Asset-Based Style Factors



Source: Fung, William and David Hsieh, “The Risk in Hedge Fund Strategies: Alternative Alphas and Alternative Betas,” The New Generation of Risk Management for Hedge Funds and Private Equity, forthcoming Euromoney book (2003)



B. Asset-Based Style Factors (Continued)

- 1. Equity Arbitrage Strategies**
- 2. Fixed Income Arbitrage Strategies**
- 3. Generic Model Decomposition**
- 4. Systematic Style Biases**



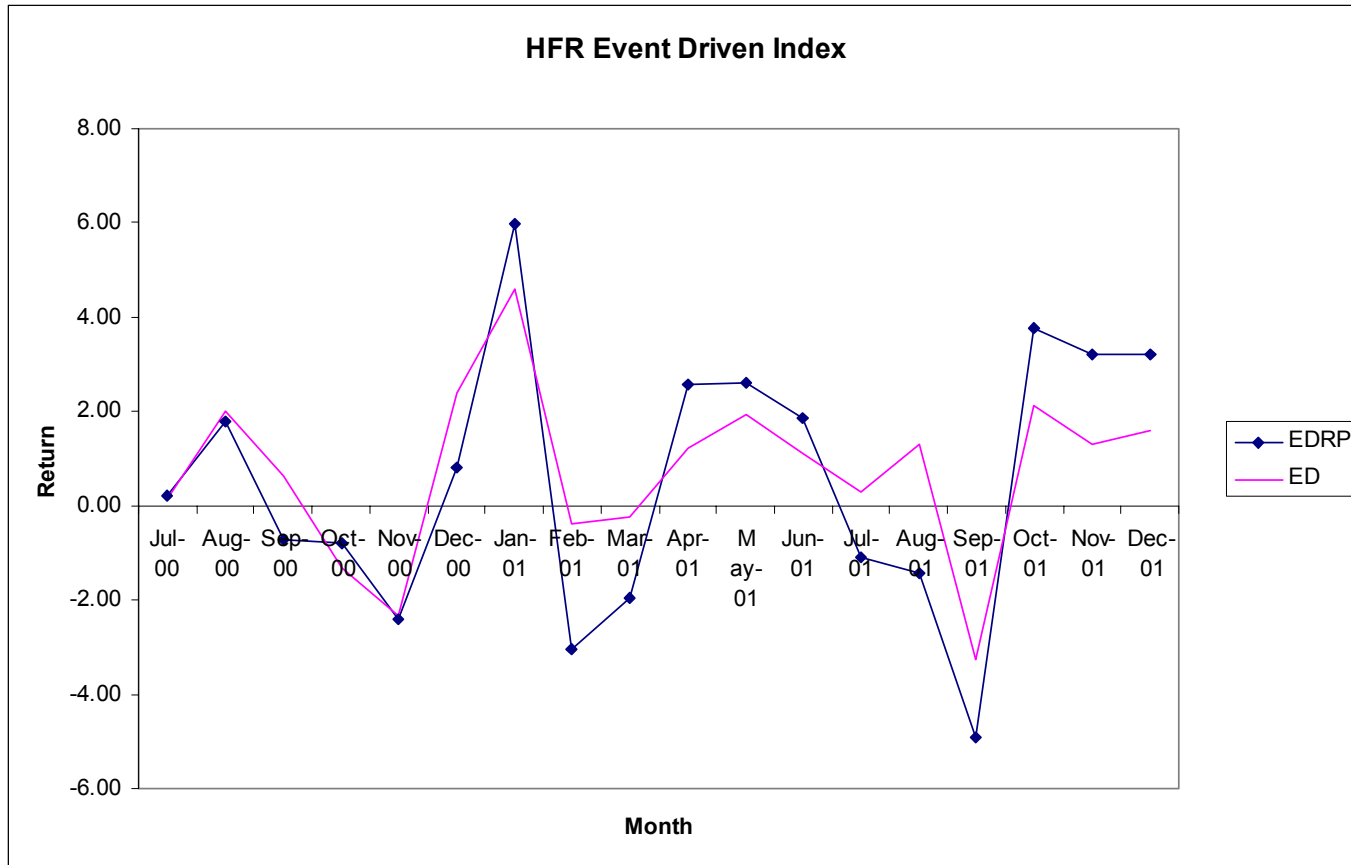
1. Equity Arbitrage Strategies

- **The payoffs of a number of arbitrage strategies resemble that from writing a put option on the market index.**
- **The figure on the next page illustrates the performance of the Event Driven hedge fund index versus a replicating portfolio of equity style factors and an out-of-the-money put on the S&P 500 ...**

Source: Agarwal, Vikas and Narayan Naik, “Risks and Portfolio Decisions involving Hedge Funds,” Forthcoming Review of Financial Studies (2003).



1. Equity Arbitrage Strategies (Continued)



Source: Agarwal, Vikas and Narayan Naik, “Risks and Portfolio Decisions involving Hedge Funds,” Forthcoming Review of Financial Studies (2003).



2. Fixed Income Arbitrage Strategies

- **Two researchers advocate extracting common risk factors in groups of fixed-income funds using principal component analysis.**
- **This procedure then links the extracted factors to market observable prices, which have longer price histories.**

Source: Fung, William and David Hsieh, “Risk in Fixed-Income Hedge Fund Styles,” Journal of Fixed Income, September 2002.



2. Fixed Income Arbitrage Strategies (Continued)

- **The authors find that fixed-income hedge funds primarily have exposure to fixed-income related spreads, including:**
 - **the convertible/Treasury spread,**
 - **the high yield/Treasury spread,**
 - **the mortgage/Treasury spread, and**
 - **The emerging market bond/Treasury spread.**



2. Fixed Income Arbitrage Strategies (Continued)

- **The authors also find a strong correlation between a particular fixed-income hedge fund style and a specific corporate credit spread, according to recent data.**
- **They show that if one extrapolates this relationship using longer price history, one would find losses that are double the worst loss experienced during the brief history of this category of hedge fund.**



3. Generic Model Decomposition

- **Another application of the asset-based style factor approach is Generic Model Decomposition.**
- **Under this approach, one uses an optimization technique to fit a hedge fund's returns to certain underlying assets and options.**
- **One example is a mortgage-backed securities manager. This manager had a reported Sharpe ratio of 4.99 prior to August 1998.**



3. Generic Model Decomposition (Continued)

- **A decomposition of the fund's returns showed that a similar pattern of returns was achievable using substantial leverage and short options exposure.**
- *After August 1998, the manager reported a very large loss.*

Source: Weisman, Andrew and Jerome Abernathy, "The Dangers of Historical Hedge Fund Data," Risk Budgeting, Edited by Leslie Rahl, Risk Books, 2000.



4. Systematic Style Biases

- **When creating a portfolio with a number of hedge funds, one might consider figuring out the structural and systematic risks undertaken by each hedge fund in one's overall portfolio.**
- **That way one will attempt to ensure that their overall portfolio is not inadvertently exposed to too much of any one factor risk.**



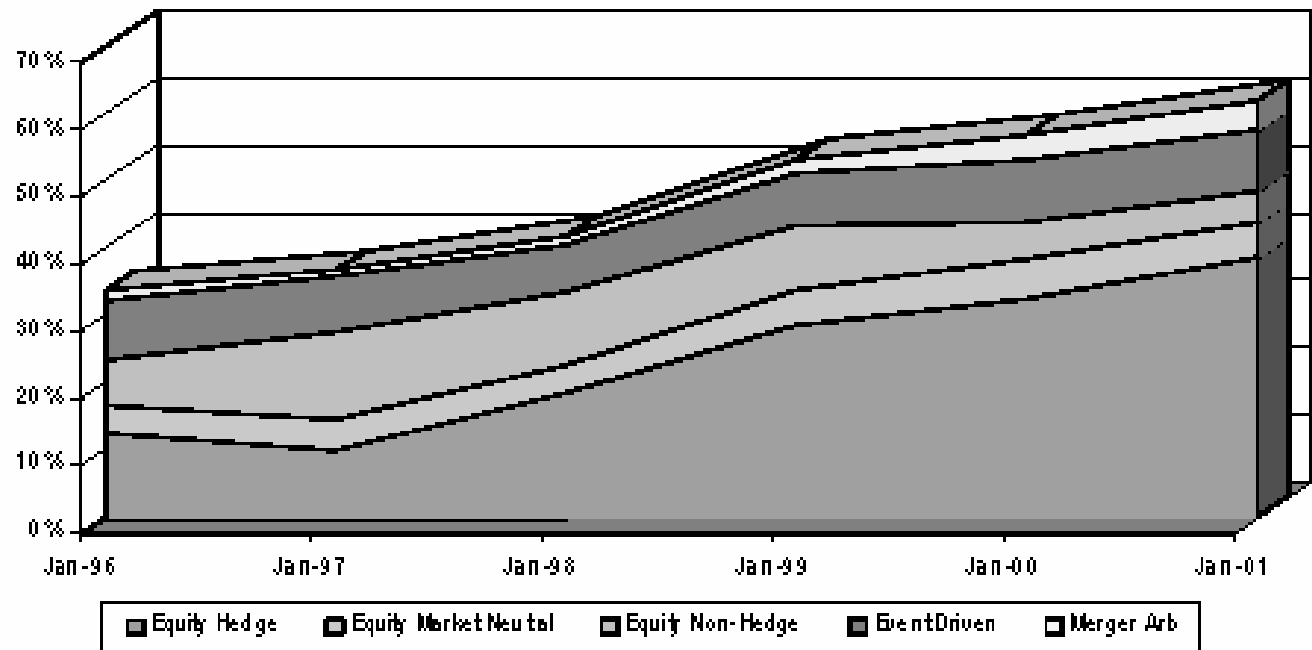
4. Systematic Style Biases (Continued)

- For example, hedge funds currently have a structural bias to the small capitalization and value equity styles.

Systematic Value/Small Cap Bias
Growth in Equity Based Hedge Funds

Equity Based Strategies
As a Percent of the HFR Universe

KENMAR



Source: Horwitz, Richard, "Constructing a 'Risk-Efficient' Portfolio of Hedge Funds," Slide 26, RiskInvest 2002, Boston, 12/11/02.



C. Due Care in Using Hedge Fund Index Results

- 1. Results Depend on Index Provider**
- 2. Dispersion of Exposures Across Managers**



1. Results Depend on Index Provider

Measures of Heterogeneity in Hedge Fund Indices

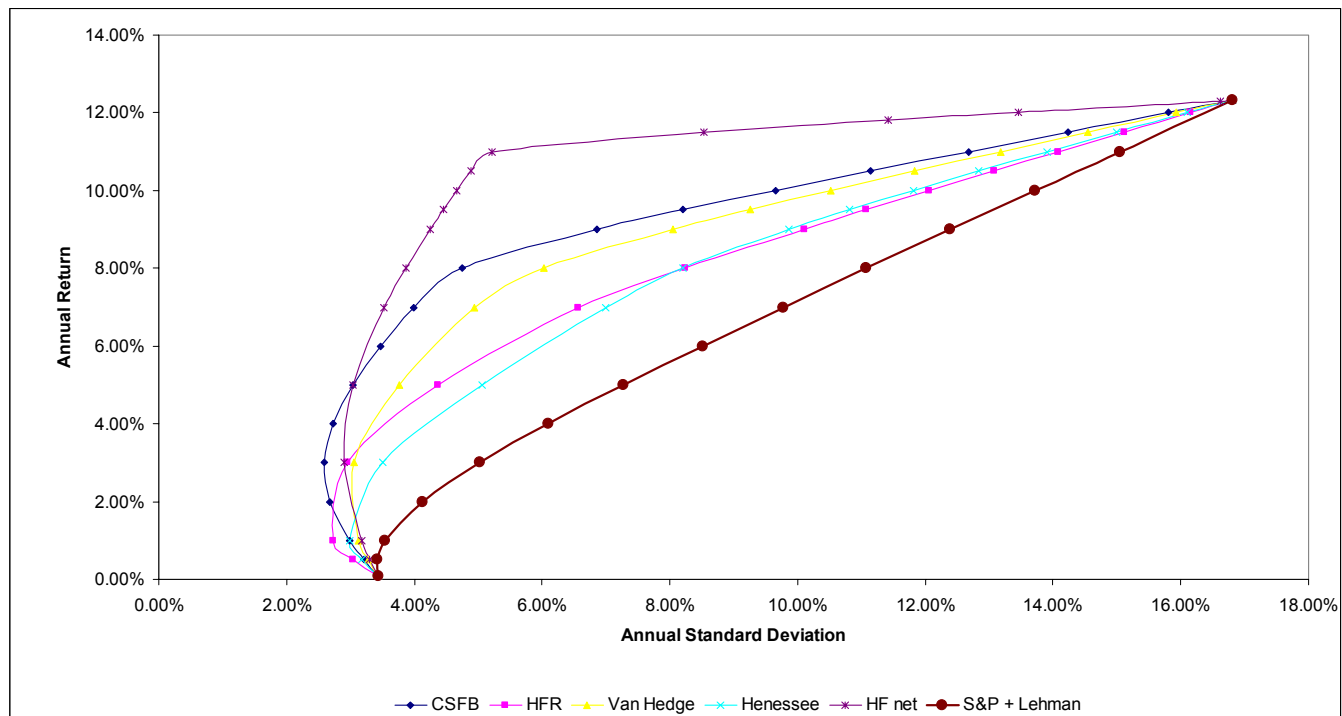
<u>Sub-Universe</u>	<u>Maximum Difference in percent (with dates and indices)</u>
Convertible Arbitrage	4.75% (Oct 98; CSFB (-4.67) / Hennessee (0.08))
Emerging Markets	19.45% (Aug 98; MAR (-26.65) / Altvest (-7.2))
Equity Market Neutral	5.00% (Dec 99; Hennessee (0.2) / Van Hedge (5.2))
Event Driven	5.06% (Aug 98; CSFB (-11.77) / Altvest (-6.71))
Fixed Income Arbitrage	10.98% (Oct 98; HF Net (-10.78) / Van Hedge (0.2))
Global Macro	17.80% (May 00; Van Hedge (-5.80) / HF Net (12))
Long/Short	22.04% (Feb 00; EACM (-1.56) / Zurich (20.48))
Merger Arbitrage	1.85% (Sep 98; Altvest (-0.11) / HFR (1.74))
Relative Value	10.47% (Sep 98; EACM (-6.07) / Van Hedge (4.40))
Short Selling	21.20% (Feb 00; Van Hedge (-24.3) / EACM (-3.09))
Distressed Securities	7.38% (Aug 98; HF Net (-12.08) / Van Hedge (-4.70))
Fund of Funds	8.01% (Dec 99; MAR-Zurich (2.41) / Altvest (10.42))

Source: Amenc, Noel and Lionel Martellini, “The Brave New World of Hedge Fund Indices,” EDHEC Graduate School of Business and University of Southern California, Working Paper, 10/19/02.



1. Results Depend on Index Provider (Continued)

Heterogeneity in Diversification Benefits



Source: Amenc, Noel and Lionel Martellini, “The Brave New World of Hedge Fund Indices,” EDHEC Graduate School of Business and University of Southern California, Working Paper, 10/19/02.



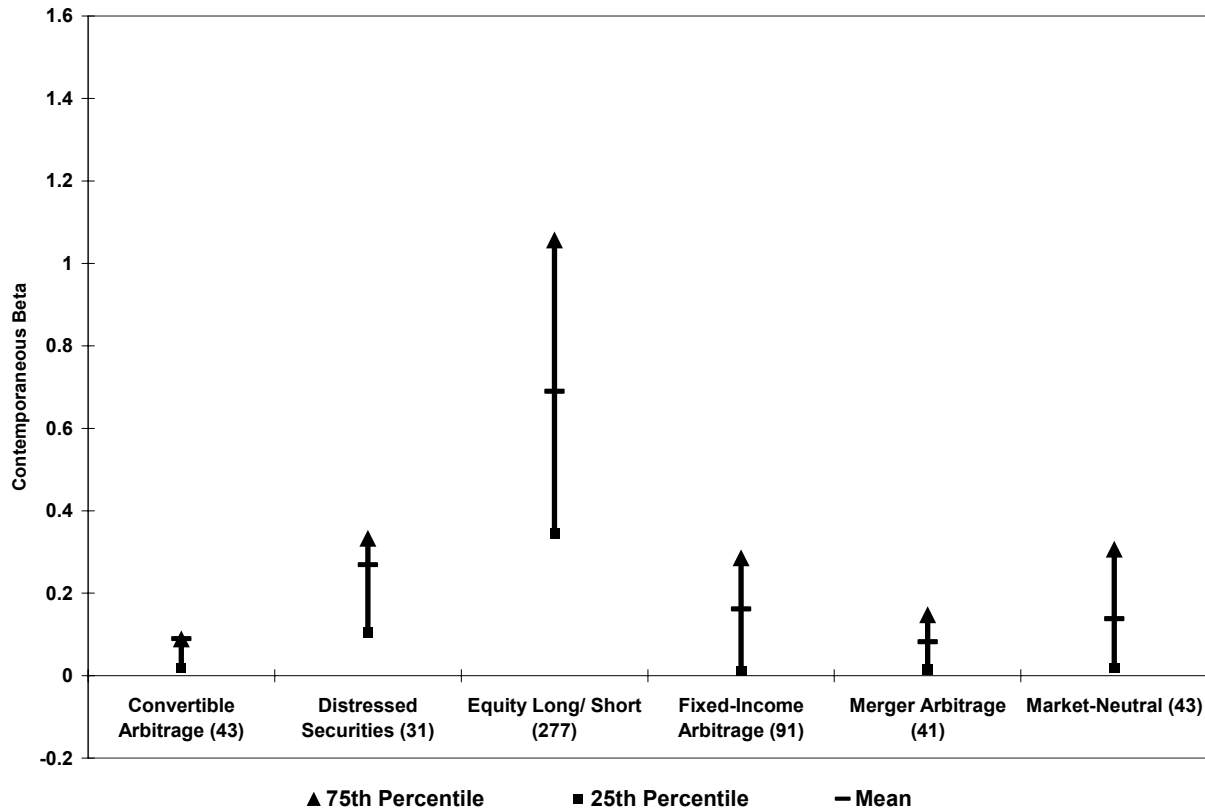
2. Dispersion of Exposures Across Managers

- **The figure on the next slide “demonstrates the range of betas [with respect to the Russell 3000 equity index] attributable to managers within the styles they follow.”**



2. Dispersion of Exposures Across Managers (Continued)

Range of Beta Estimates by Style



Source: Ross, Leola and George Oberhofer, "What the 'Indexes' Don't Tell You about Hedge Funds," Russell Research Commentary, May 2002.



IV. Economic Understanding of the Source of Returns

A. Short Volatility

B. St. Petersburg's Paradox



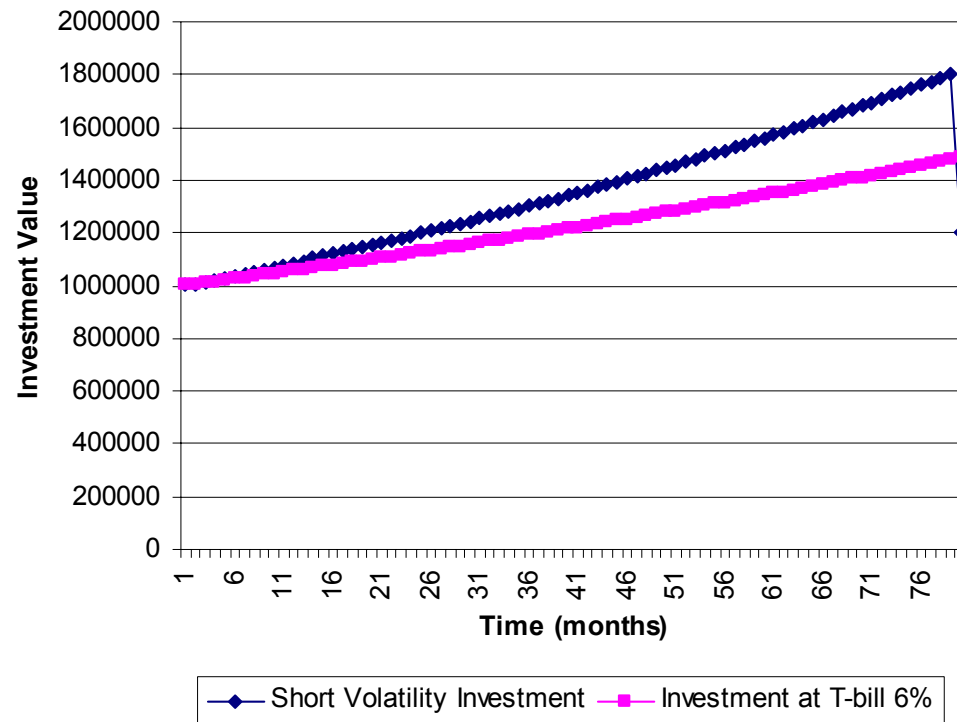
A. Short Volatility

- **In a hypothetical example, a manager could produce superior risk-adjusted return numbers by leveraging his or her capital by selling out-of-the-money calls and puts on the S&P 500.**
- **This strategy will seemingly have superior performance until a large move occurs in the stock market.**
- **In this example, it takes on average about seven years for the “volatility event” to occur and leave the investor with sub-T-bill returns.**



A. Short Volatility (Continued)

Simulated Short Volatility Investment Strategy



Source: Anson, Mark, "Symmetrical Performance Measures and Asymmetrical Trading Strategies: A Cautionary Example," Journal of Alternative Investments, Summer 2002.



A. Short Volatility (Continued)

Performance Statistics for Short Volatility Investment Strategy

	Pre-Volatility Event	Post-Volatility Event
Average Annual Return	9.00%	2.85%
Excess Return	3.00%	-3.15%
Standard Deviation	0.42%	3.71%
Sharpe Ratio	7.14	-0.85

Source: Anson, Mark, “Symmetrical Performance Measures and Asymmetrical Trading Strategies: A Cautionary Example,” Journal of Alternative Investments, Summer 2002.



B. St. Petersburg's Paradox

- **One can point to another hypothetical strategy that requires no investment skill and yet for long periods of time seems to provide superior returns.**
- **One makes a bet on a single coin toss. If successful, bet again with the same bet size.**
- **If one loses, double up.**



B. St. Petersburg's Paradox (Continued)

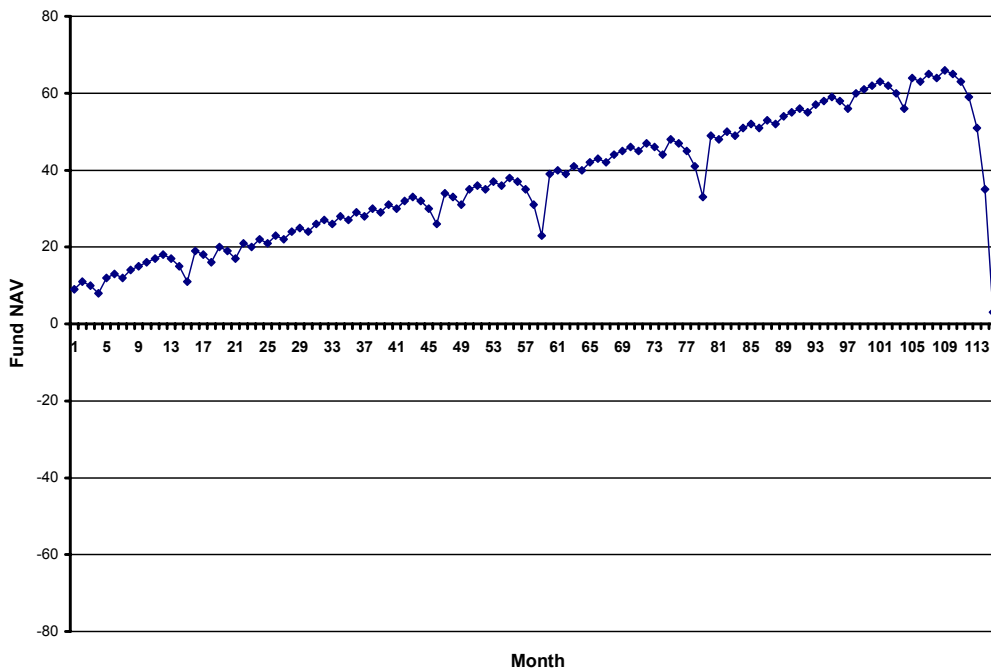
- **“Monthly reporting tends to obscure much of the fund’s volatility, the ‘draw-downs’ have a very limited duration, and the returns are consistently positive.**
- **In fact, right up until [the strategy fails] ..., such a fund would generate approximately a 15% annualized rate of return with about a 12% annualized standard deviation and would be profitable about 78% of all months.”**

Source: Weisman, Andrew, “Informationless Investing and Hedge Fund Performance Measurement Bias,” Journal of Portfolio Management, Summer 2002.



B. St. Petersburg's Paradox (Continued)

Performance of St. Petersburg-Like Investment Strategy



A similar chart appears in Weisman, Andrew, “Informationless Investing and Hedge Fund Performance Measurement Bias,” Journal of Portfolio Management, Summer 2002. (This chart was created using the algorithm in Weisman’s article.)



Conclusion

- **Researchers are developing risk measures to take into consideration the unique performance characteristics of hedge funds.**
- **Traditional risk measures may understate the risk of hedge fund strategies.**



Conclusion (Continued)

- **Researchers are also grappling with how to extract useful risk information from brief and flawed historical data.**
- **Although the proposals noted here are highly statistical in nature, they each require considerable professional judgment in application.**



Conclusion (Continued)

- **Because a number of hedge fund strategies provide minimal transparency to their investors, the burden is on the investor to understand the economic basis of a manager's returns.**



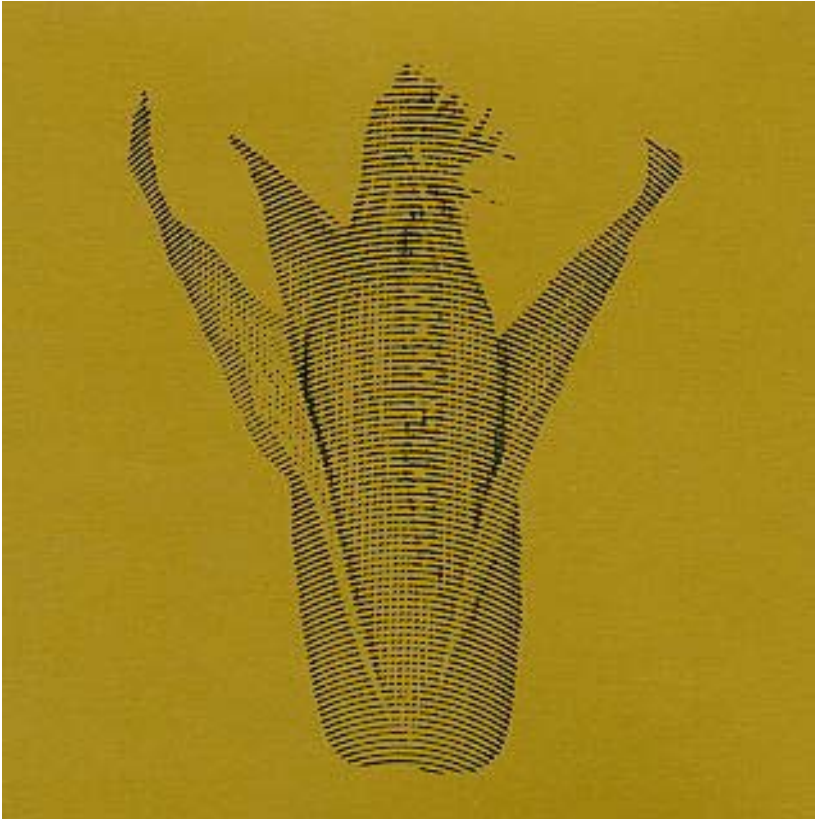
Source of Graphics

(not directly credited in presentation)

- **Slide 1, Statue of Ceres, ancient Roman goddess of the harvest, Chicago Board of Trade.**
- **Slide 56, cover of Fooled By Randomness: The Hidden Role of Chance in the Markets and Life by Nassim Nicholas Taleb, Texere LLC, 2001.**



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