Neutralizing betas without neutralizing alphas in funds of hedge funds

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Identification of the relevant factors that drive hedge fund returns is an important component to institutional quality fund of funds investing. We focus specifically on the importance of analyzing the alpha and beta return generators. Additionally, we discuss tail-risk management and the practical methods for mitigation of the point mis-estimation in mean-variance optimization of portfolios of hedge funds.

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• All Hedge Fund Returns Are Not Created Equal

• Portfolio Construction Realities

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Literature Review

Performance:

Transparency/Indexing:
Liew (2002)

Options/Non-Normality:
Fung & Hsieh (1997); Mitchell & Pulvino (2001); Anson & Ho (2003)

Stale Pricing/Autocorrelation:
Scholes & Williams (1977); Asness, Krail & Liew (2001), Lo (2002)

Betas versus Alphas:
Weisman (2002); Asness (2004)

Mean-Variance and Higher Moments:

Asset Allocation:
Brinson et al (1986); Edwards & Liew (1999); Kritzman & Page (2002)

Please refer to the extended reference list at the end of this document for full references and a more complete bibliography of hedge-fund related research.
\[ dX(t) = -\delta X(t)dt + \sigma dW_t \]
\[ \epsilon_{x,t} \equiv \int_{t_{k-1}}^{t_k} e^{-\Delta(t_k-s)} B_x dW_x(s) \]

\[ X_{k} = A_X X_{k-1} + \epsilon_{x,k} \left( \begin{array}{c} \tilde{z}_k \\ \phi \end{array} \right) - \left( \begin{array}{cc} a_p & \phi \\ 0 & 1 \end{array} \right) \left( \begin{array}{c} \tilde{z}_{k-1} \\ 0 \end{array} \right) + \left( \begin{array}{c} 1 \\ 0 \end{array} \right) e_x - \left( \begin{array}{cc} 1 & 0 \\ 0 & -a_p \end{array} \right) e_{x-1} \]

\[ s^2_{x,t} \equiv \text{Var}[\epsilon_{x,k}] = \Omega_r \]
\[ dq(t) = -\left( \gamma q(t) - \lambda X(t) \right) dt + \sigma dW_q \]

\[ \frac{1}{\sigma^2 P^2} \frac{\partial^2 C}{\partial P^2} + \tau P \frac{\partial C}{\partial P} + \frac{\partial C}{\partial \lambda} = rC \]
\[ q_{k} = \alpha_q q_{k-1} + \Phi X_{k-1} + \epsilon_{q,k} \]
Defining Alpha and Beta

Hedge Fund Rets = Alpha Source + Beta Source

Example:

If the hedge fund had a beta of 1.0 to a benchmark, then Alpha Source would be

\[ \text{Alpha Source} = \text{Hedge Funds Rets} - 1.0 \times \text{Benchmark Rets} \]

Under a CAPM world, with S&P500 as the market proxy, we find:

Cross-sectional variation in betas are high

Average Beta to S&P500: 0.31

Source: CSFB/Tremont. Universe of 139 Long/Short Equity Managers, data from May-84 to Oct-04.
In practice how do we estimate alpha and beta?

Typically, four main factors influence hedge fund returns:

1. **Equities** – S&P500, Russell 3000
2. **Fixed Income** – Lehman Aggregate, ML BIG, Term structure
3. **Volatility** – VIX, MOVE, LBOX
4. **Credit** – Merrill Lynch High Yield II, CDS spreads

For example, in each strategy we can fine tune our factors:

- **Long/Short Equity Managers**
  - 1.1 Russell 3000
  - 1.2 HML
  - 1.3 SMB
  - 1.4 VIX

- **Fixed Income Arbitrage Managers**
  - 2.1. Lehman Aggregate
  - 2.2. MOVE
  - 2.3. ML High Yield II
  - 2.4. Term structure
Static Betas may be Misleading

Pitfall: static beta estimates can be misleading; e.g., historic beta to S&P500 is -0.23.

Solution: time-varying betas; capture dynamic changes over time; e.g., current beta is +0.13.

Source: Dubin & Swieca Capital Management, LLC. The chart displays historical exposures to the S&P 500 index. The chart displays rolling beta statistics of a hypothetical hedge fund (“Sample Global Trading Manager”), a hypothetical portfolio of hedge funds (“Sample Portfolio”) and a combination, in 0.05/0.95 allocations, respectively, of the two (“Combined”) over the period 10/1/00 – 8/31/04.
Exposure analysis should be multi-dimensional

Multi-dimensional factor analysis captures a wide variety of risk exposures.

Exposure to US Equity Market

Exposure to Volatility

Exposure to Size (Capitalization)

Exposure to Value

Source: Dubin & Swieca Capital Management, LLC. Each chart displays historical exposures to a risk factor. The charts display rolling beta statistics of a hypothetical hedge fund (“Sample Global Trading Manager”), a hypothetical portfolio of hedge funds (“Sample Portfolio”) and a combination, in 0.05/0.95 allocations, respectively, of the two (“Combined”) over the period 10/1/00 – 8/31/04.
Tail Risk Analysis

Manager 12m Rolling Return v SPX 12m
Correlation of 66% & Beta of 0.34

Manager Net Return vs. SPX in Down SPX Months
Positive Perf in 12 of 17 Months (71%)
Correlation of -35% & Beta of -0.18

Manager Excess Return over Down SPX Months

Source: Dubin & Swieca Capital Management, LLC. The top panel displays return statistics of a hypothetical hedge fund ("Manager") and the S&P 500 index ("SPX") over the period 7/1/01 – 10/31/04. The middle panel displays return statistics of the hypothetical hedge fund and the S&P 500 index during the worst 17 negative monthly periods of the index, sorted by severity of the index return. The bottom panel displays the differential between the two series of the second panel, with months in which the fund’s return was negative highlighted in red.
Nonlinear Payoffs

Merger Arbitrage: short volatility (deals)
Source: Mitchell and Pulvino (2001)

Event Driven: short volatility
Source: Anson & Ho (2003)

Merger Arbitrage: short volatility (funds)

CTA: long volatility
Source: Anson & Ho (2003)
All Hedge Fund Returns Are Not Created Equal
Sharpe Ratio

- Requires IID returns, without serial correlation

\[
\text{SR}(q) = \frac{\mathbb{E}[R_t(q)] - R_f(q)}{\sqrt{\text{Var}[R_t(q)]}}
\]

Non-IID returns, but stationary

\[
\text{Var}[R_t(q)] = \sum_{i=0}^{q-1} \sum_{j=0}^{q-1} \text{Cov}[R_{t-i}, R_{t-j}] = q\sigma^2 + 2\sigma^2 \sum_{k=1}^{q-1} (q-k)\rho_k
\]

Lo’s (2002) GMM approach accounts for serial correlation

\[
\text{SR}(q) = \eta(q) \text{SR}, \quad \eta(q) \equiv \frac{q}{\sqrt{q + 2 \sum_{k=1}^{q-1} (q-k)\rho_k}}
\]

Source: Lo (2002).
Serial Correlation Can Cause Risk to be Underestimated

Do you pick the highest Sharpe Ratio manager?

Once positive serial-correlation is properly accounted for, ranks of managers may change.

Source: CSFB/Tremont's Convertible Arbitrage constituents; top 10 funds by Sharpe Ratio from Nov-88 to Aug-04.
## How severe is positive serial correlation?

### Durbin Watson, 95th conf level

<table>
<thead>
<tr>
<th>% of HFs w/ Pos. Ser. Corr.</th>
<th>Avg. % Decrease in Sharpe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convert Arb</td>
<td>Event Driven</td>
</tr>
<tr>
<td>22</td>
<td>250</td>
</tr>
<tr>
<td>92%</td>
<td>19%</td>
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</table>

<table>
<thead>
<tr>
<th># of HFs</th>
<th># of HFs w/ Significant Positive Serial Correlation</th>
<th>% of HFs w/ Significant Positive Serial Correlation</th>
<th>Average Percent Decrease in Sharpe</th>
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<td>24</td>
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<td>91%</td>
<td>19%</td>
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<tr>
<td>139</td>
<td>88</td>
<td>63%</td>
<td>15%</td>
</tr>
<tr>
<td>13</td>
<td>3</td>
<td>23%</td>
<td>24%</td>
</tr>
</tbody>
</table>

Source: CSFB/Tremont classification and index data; varies from January 1982 to August 2004.
Portfolio Construction Realities

\[ dX(t) = -\delta X(t)dt + \sigma_x dW_x \]

\[ \epsilon_{x,t} \equiv \int_{t_{k-1}}^{t_k} e^{-\Delta(t_k-s)} B_x dW_x(s) \]

\[ X_{k} = A_X X_{k-1} + \epsilon_{x,k} \]

\[ \begin{pmatrix} \tilde{z}_k \\ \tilde{\epsilon}_k \end{pmatrix} = \begin{pmatrix} a_b & \phi \\ 0 & \psi \end{pmatrix} \begin{pmatrix} \tilde{z}_{k-1} \\ \tilde{\epsilon}_{k-1} \end{pmatrix} + \begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \end{pmatrix} \epsilon_k - \begin{pmatrix} 1 & 0 & -a_b \\ 0 & 1 & 0 \end{pmatrix} \epsilon_{k-1} \]

\[ s^2_{x,r} \equiv \text{Var}[\epsilon_{x,r}] = \Omega_r \]

\[ dq(t) = -\left( \gamma_q(t) - \lambda X(t) \right) dt + \sigma dW_q \]

\[ \frac{1}{\sigma^2 p^2} \frac{\partial^2 C}{\partial p^2} + \frac{\gamma}{P} \frac{\partial C}{\partial P} + \frac{\partial C}{\partial \gamma} = rC \]

\[ q_k = \alpha_q q_{k-1} + \Phi X_{k-1} + \epsilon_{q,k} \]
Error Maximization in Mean-Variance Optimization

**Pitfall:** Unconstrained optimization using historical data only; should we rebalance?

**Solution:** Realistic constraints with forward-looking beliefs; rebalancing may be unnecessary.

Source: Dubin & Swieca Capital Management, LLC. The charts illustrate a hypothetical portfolio (pie chart point) of 20 hedge funds. Each fund is displayed as a point in mean-variance space. Data is from inception of each fund through September 30, 2004. The left chart depicts the unconstrained result of the Markowitz (1959) critical line algorithm, with the efficient frontier and its corner portfolios displayed. The right chart depicts a constrained optimization (maximum of 10% to any single fund), with a subjective Bayesian prior imposed on one of the funds [fund at point (0.7, 13.5) shifted to (4.0, 13.5)], and an "indifference region" (left and right frontiers) generated via perturbation of the covariance matrix.
Error Maximization in M-V Optimization (cont’d)

**Pitfall:** Algorithm is bloodthirsty for low-covariance assets  
**Solution:** Employ a shrinkage estimator such as Stein or Ledoit & Wolf (2001)

Source: Dubin & Swieca Capital Management, LLC. The chart illustrates cross-correlations of 33 hedge funds in a hypothetical portfolio, longest common pairwise periods, inception through September 30, 2003. Lower pairwise correlations can reduce total portfolio volatility. Optimization algorithms tend to load on pairs in the upper region (low correlations) and avoid those in the lower (high correlations) region. Shrinkage estimators would compress the vertical range across the grid of cones in this chart.
Enhancing Risk-Adjusted Returns
A Single Measure of Return or Risk is Not Enough

**Pitfall:** Reliance on a single measure of risk-adjusted return can be misleading.

**Solution:** Employ multiple risk models for estimation of risk adjusted return.

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Summary of Benefits to Including Sample Global Trading Manager (@ 5%) to Sample Portfolio From 01/2000 to 08/2004

<table>
<thead>
<tr>
<th></th>
<th>Sample Global Trading Manager</th>
<th>Sample Portfolio</th>
<th>Sample Portfolio w/ Inclusion</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compound Returns</td>
<td>13.15%</td>
<td>6.19%</td>
<td>6.55%</td>
<td>5.76%</td>
</tr>
<tr>
<td>Standard Dev</td>
<td>7.11%</td>
<td>5.02%</td>
<td>4.79%</td>
<td>(4.69%)</td>
</tr>
<tr>
<td>Sharpe Ratio</td>
<td>1.38%</td>
<td>0.63%</td>
<td>0.73%</td>
<td>15.98%</td>
</tr>
<tr>
<td>Lo Ratio</td>
<td>1.34%</td>
<td>0.76%</td>
<td>0.90%</td>
<td>18.12%</td>
</tr>
<tr>
<td>Omega</td>
<td>2.47%</td>
<td>1.43%</td>
<td>1.56%</td>
<td>8.68%</td>
</tr>
<tr>
<td>Jensen’s Alpha</td>
<td>0.69%</td>
<td>0.29%</td>
<td>0.31%</td>
<td>7.01%</td>
</tr>
<tr>
<td>t-stat</td>
<td>0.34</td>
<td>0.67</td>
<td>0.60</td>
<td></td>
</tr>
<tr>
<td>Lagged Beta CAPM’s Alpha (S&amp;P t, t-1, t-2)</td>
<td>0.63%</td>
<td>0.25%</td>
<td>0.27%</td>
<td>7.51%</td>
</tr>
<tr>
<td>t-stat</td>
<td>0.38</td>
<td>0.67</td>
<td>0.60</td>
<td></td>
</tr>
<tr>
<td>Treynor-Mazuy Model’s 2 Factor Alpha (S&amp;P, S&amp;P²)</td>
<td>0.36%</td>
<td>0.39%</td>
<td>0.39%</td>
<td>(0.03%)</td>
</tr>
<tr>
<td>t-stat</td>
<td>0.76</td>
<td>0.64</td>
<td>0.61</td>
<td></td>
</tr>
<tr>
<td>Fama-French 3 Factor Model’s Alpha (S&amp;P, SMB, HML)</td>
<td>0.65%</td>
<td>0.10%</td>
<td>0.13%</td>
<td>26.77%</td>
</tr>
<tr>
<td>t-stat</td>
<td>0.38</td>
<td>1.62</td>
<td>1.23</td>
<td></td>
</tr>
<tr>
<td>Five Factor Model’s Alpha (S&amp;P, SMB, HML, VIX and ML HY II)</td>
<td>0.70%</td>
<td>0.11%</td>
<td>0.14%</td>
<td>28.05%</td>
</tr>
<tr>
<td>t-stat</td>
<td>0.37</td>
<td>1.61</td>
<td>1.20</td>
<td></td>
</tr>
</tbody>
</table>

Source: Dubin & Swieca Capital Management, LLC. The table illustrates the effect of potential inclusion of a hypothetical hedge fund (“Sample Global Trading Manager”) into a hypothetical portfolio of hedge funds (“Sample Portfolio”). All statistics calculated over the period 1/1/00 through 08/31/04.
Manager Selection vs. Strategy Allocation

\[
\begin{align*}
\frac{dX(t)}{X(t)} &= \sigma_X dW_X(t) \\
\epsilon_{x,t} &= \int_{t_{t-1}}^{t} e^{-\lambda(t-s)} B_x dW_X(s) \\
X_{t_0} &= A_X X_{t-1} + \epsilon_{x,t} \\
&= \begin{pmatrix} a \phi \\ 1 \\ 0 \end{pmatrix} \begin{pmatrix} \tilde{x}_t \\ \tilde{x}_{t-1} \\ \epsilon_{t-1} \end{pmatrix} + \begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \end{pmatrix} \epsilon_t - \begin{pmatrix} 1 & 0 & -a \phi \\ 0 & 1 & 0 \end{pmatrix} \epsilon_{t-1} \\
\end{align*}
\]

\[
\sigma^2_{x,t} = \text{Var} [\epsilon_{x,t}] = \Omega_t \\
\begin{align*}
dq(t) &= - (\gamma q(t) - \lambda X(t)) dt + \sigma dW_q \\
rC &= \frac{1}{\sigma^2 P^2 \frac{\partial^2 C}{\partial D^2}} + \tau P \frac{\partial C}{\partial P} + \frac{\partial C}{\partial X} = rC \\
q_t &= \alpha_q q_{t-1} + \Phi X_{t-1} + \epsilon_{q,t}
\end{align*}
\]
Manager Selection vs. Strategy Allocation

CSFB/Tremont Hedge Fund Index current allocations

Strategy Allocation – 10 strategies

Manager Selection – 372 managers identified (382 total)

CSFB/Tremont Hedge Fund Index Strategy Allocations

- Long/Short: 26%
- Event Driven: 21%
- Global Macro: 13%
- Multi-Strategy: 13%
- Fixed Income Arb: 8%
- Managed Fut: 5%
- Eq. Mkt Neut: 5%
- Emg Mkts: 3%
- Dedicated Short: 1%
- Convert Arb: 5%

Source: CSFB/Tremont. The chart depicts the allocation of CSFB/Tremont hedge fund index as of October 31, 2004
Winner: Manager Selection

Compare three investment strategies from Jan-1994 to Aug-2004:

1. Passive investment into CSFB/Tremont Hedge Fund Index
2. Active investment into “Perfect” Strategy Allocation Timing
3. Active investment into “Perfect” Manager Selection

Historically how robust is this result?

$1 grows to

- CSFB/Tremont Hedge Fund Index: $3
- “Perfect” Strategy Allocation Timing: $585
- “Perfect” Manager Selection: $22,520

Annualized Returns over Time

Source: Data from CSFB/Tremont, January 1994 to August 2004; 24-month rolling annualized returns.
allocation decisions, hypothetical fund of funds

brinson hood & beebower (1986) model

source: dubin & swieca capital management, llc. quarterly data from march 1999 to march 2004, hypothetical portfolio for illustration purposes only. the top panel illustrates allocations to four hedge fund strategies over time and the bottom panel illustrates quarterly return attribution to manager selection and strategy timing, using the brinson et al. (1986) model.
Allocation Decisions (cont’d)


Asset Allocation versus Security Selection
5th, 25th, 75th, and 95th Percentile Performance
Annualized Difference From Average [1988 - 2001]

 Allocation Decisions

Diversification from strategy classes

<table>
<thead>
<tr>
<th>Correlation Matrix</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
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<th>10</th>
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<tr>
<td>Equity Market Neutral</td>
<td>1.00</td>
<td>0.05</td>
<td>0.06</td>
<td>0.16</td>
<td>0.33</td>
<td>0.07</td>
<td>0.15</td>
<td>0.19</td>
<td>0.32</td>
<td>0.15</td>
<td>0.23</td>
<td>0.06</td>
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<td>Fixed Income: Convertible Bonds</td>
<td>0.05</td>
<td>1.00</td>
<td>0.53</td>
<td>0.63</td>
<td>0.78</td>
<td>0.08</td>
<td>0.52</td>
<td>0.78</td>
<td>0.00</td>
<td>0.11</td>
<td>0.46</td>
<td>0.67</td>
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<td>Fixed Income: High Yield</td>
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<td>0.55</td>
<td>0.69</td>
<td>0.24</td>
<td>0.38</td>
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<td>0.56</td>
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<td>Distressed Securities</td>
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<td>1.00</td>
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<td>0.57</td>
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<td>0.29</td>
<td>0.46</td>
<td>0.64</td>
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<td>Long-Short Equity</td>
<td>0.33</td>
<td>0.78</td>
<td>0.44</td>
<td>0.58</td>
<td>1.00</td>
<td>0.06</td>
<td>0.44</td>
<td>0.76</td>
<td>0.17</td>
<td>0.08</td>
<td>0.58</td>
<td>0.64</td>
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<tr>
<td>Fixed Income: Arbitrage</td>
<td>0.07</td>
<td>0.08</td>
<td>0.28</td>
<td>0.35</td>
<td>0.00</td>
<td>1.00</td>
<td>0.12</td>
<td>0.17</td>
<td>0.13</td>
<td>0.51</td>
<td>0.13</td>
<td>0.27</td>
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<td>Convertible Arbitrage</td>
<td>0.16</td>
<td>0.62</td>
<td>0.56</td>
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<td>0.44</td>
<td>0.12</td>
<td>1.00</td>
<td>0.58</td>
<td>0.14</td>
<td>0.18</td>
<td>0.39</td>
<td>0.41</td>
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<td>Event-Driven</td>
<td>0.19</td>
<td>0.78</td>
<td>0.68</td>
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<td>0.76</td>
<td>0.17</td>
<td>0.58</td>
<td>1.00</td>
<td>0.22</td>
<td>0.21</td>
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<td>0.69</td>
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<tr>
<td>Fixed Income: Diversified</td>
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<td>1.00</td>
<td>0.21</td>
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<td>0.64</td>
<td>0.27</td>
<td>0.41</td>
<td>0.69</td>
<td>0.12</td>
<td>0.20</td>
<td>0.59</td>
<td>1.00</td>
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Diversification from individual hedge funds

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<tr>
<th>Correlation Matrix</th>
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<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equity Market Neutral</td>
<td>1.00</td>
<td>(0.20)</td>
<td>(0.40)</td>
<td>0.28</td>
<td>(0.25)</td>
<td>0.23</td>
<td>(0.04)</td>
<td>(0.30)</td>
<td>(0.14)</td>
<td>(0.16)</td>
<td>(0.14)</td>
<td>(0.18)</td>
</tr>
<tr>
<td>Fixed Income: Convertible Bonds</td>
<td>(0.20)</td>
<td>1.00</td>
<td>0.17</td>
<td>(0.29)</td>
<td>0.99</td>
<td>(0.14)</td>
<td>0.52</td>
<td>(0.10)</td>
<td>0.28</td>
<td>0.71</td>
<td>(0.26)</td>
<td>(0.20)</td>
</tr>
<tr>
<td>Fixed Income: High Yield</td>
<td>(0.40)</td>
<td>0.17</td>
<td>1.00</td>
<td>0.12</td>
<td>0.62</td>
<td>(0.21)</td>
<td>0.17</td>
<td>(0.15)</td>
<td>0.07</td>
<td>0.31</td>
<td>(0.39)</td>
<td>(0.19)</td>
</tr>
<tr>
<td>Distressed Securities</td>
<td>0.28</td>
<td>(0.29)</td>
<td>0.12</td>
<td>1.00</td>
<td>(0.68)</td>
<td>0.09</td>
<td>0.02</td>
<td>0.01</td>
<td>0.11</td>
<td>(0.19)</td>
<td>0.03</td>
<td>(0.06)</td>
</tr>
<tr>
<td>Long-Short Equity</td>
<td>(0.25)</td>
<td>0.99</td>
<td>0.62</td>
<td>(0.68)</td>
<td>1.00</td>
<td>0.51</td>
<td>(0.08)</td>
<td>0.39</td>
<td>(0.85)</td>
<td>0.97</td>
<td>(0.86)</td>
<td>(0.77)</td>
</tr>
<tr>
<td>Fixed Income: Arbitrage</td>
<td>0.23</td>
<td>(0.14)</td>
<td>(0.21)</td>
<td>0.09</td>
<td>0.51</td>
<td>1.00</td>
<td>(0.71)</td>
<td>(0.52)</td>
<td>(0.49)</td>
<td>(0.37)</td>
<td>(0.17)</td>
<td>(0.48)</td>
</tr>
<tr>
<td>Convertible Arbitrage</td>
<td>(0.04)</td>
<td>0.52</td>
<td>0.17</td>
<td>0.02</td>
<td>(0.08)</td>
<td>(0.71)</td>
<td>1.00</td>
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<td>0.29</td>
<td>0.57</td>
<td>(0.06)</td>
<td>(0.31)</td>
</tr>
<tr>
<td>Event-Driven</td>
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<td>(0.10)</td>
<td>(0.15)</td>
<td>0.01</td>
<td>0.39</td>
<td>0.52</td>
<td>0.31</td>
<td>1.00</td>
<td>0.14</td>
<td>(0.03)</td>
<td>0.18</td>
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<tr>
<td>Fixed Income: Diversified</td>
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<td>0.28</td>
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<td>(0.49)</td>
<td>0.29</td>
<td>0.14</td>
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<td>0.23</td>
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<tr>
<td>Mortgage-backed</td>
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<td>0.71</td>
<td>0.31</td>
<td>(0.19)</td>
<td>0.97</td>
<td>(0.37)</td>
<td>0.57</td>
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<td>(0.28)</td>
<td>(0.39)</td>
<td>0.03</td>
<td>(0.86)</td>
<td>(0.17)</td>
<td>(0.06)</td>
<td>0.18</td>
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<td>Emerging Markets</td>
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<td>(0.48)</td>
<td>(0.31)</td>
<td>0.39</td>
<td>0.28</td>
<td>0.01</td>
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<td>1.00</td>
</tr>
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Source: Dubin & Swieca Capital Management, LLC. Cross-correlations, longest common pairwise periods. Lower pairwise correlations can reduce total portfolio volatility. The top panel illustrates the relatively high cross-correlations of hedge fund categories, proxied by HFR hedge fund indices. The bottom panel depicts the relatively low cross-correlations of hedge funds in a hypothetical portfolio. All correlations are calculated based on the longest common periods of each pair in the matrices from inception through 12/31/03.
Conclusions

- Current academic research very useful
- Understand difference between Alpha and Beta
- Positive serial correlation is an important issue
- Question everything, don’t be lulled into complacency
**Biographies**

**Jimmy Liew**, Ph.D., Investment Manager at Dubin & Swieca Capital Management, LLC, is responsible for research and management for the firm's multi-manager hedge fund business, with a focus on Global Trading and CTA strategies. Dr. Liew also contributes to the firm's risk management and quantitative analysis effort. Prior to joining Dubin & Swieca, Dr. Liew worked as a Principal Investment Officer at The World Bank where he co-managed a $750 million in assets portfolio of hedge funds. Before working at The World Bank, Dr. Liew was a Vice President at Carlyle Asset Management with responsibility for performing due diligence on hedge fund managers that specialized in a variety of strategies. Dr. Liew began his career at Morgan Stanley in Equity Derivatives Research as a Quantitative Strategist. His research has been published in the Journal of Portfolio Management, the Journal of Derivatives and the Journal of Financial Economics. Dr. Liew graduated from the University of Chicago with a B.A. in Mathematics with general honors. Dr. Liew earned his M.Phil and Ph.D in Finance and Economics at the Columbia Business School.

**Craig French**, Director of Quantitative Analysis at Dubin & Swieca Capital Management, LLC, is responsible for portfolio construction and risk management for the firm's multi-manager hedge fund business. Prior to joining the firm, he was the U.S. equity strategist for SEI Investments, where he was responsible for portfolio strategy and risk management of approximately $20 billion. Before that, Mr. French was an associate with Goldman Sachs Asset Management, where he worked as a product manager responsible for quantitative strategies. Prior to this, Mr. French traded currency derivatives on the Philadelphia Stock Exchange and the Chicago Mercantile Exchange for Societe Generale Options, N.A. and Susquehanna Investment Group. His research has been published in the Journal of Investment Management. Mr. French graduated *summa cum laude* from the University of Pennsylvania's Wharton School of Business with a B.B.A., concentrating in Finance and Management.
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