A Volatility Balanced Approach To Constructing A Diversified Hedge Fund Portfolio

Basic portfolio construction considerations apply to hedge fund investing

- **Risk**
- **Diversification**
- **Returns**

Risk can be defined in several ways

- **Variance or Standard Deviation**
- **Downside Deviation**
- **Tracking Error to Benchmark**
- **Drawdown**

Each definition of risk has a corresponding ratio for comparing risk adjusted returns

- **Sharpe Ratio**
  - **excess return / SD of total return**
- **Sortino Ratio**
  - **excess return / downside SD**
- **Information Ratio**
  - **alpha / SD of alpha**
- **Sterling Ratio**
  - **3yr avg annual return / 3yr avg annual drawdown**

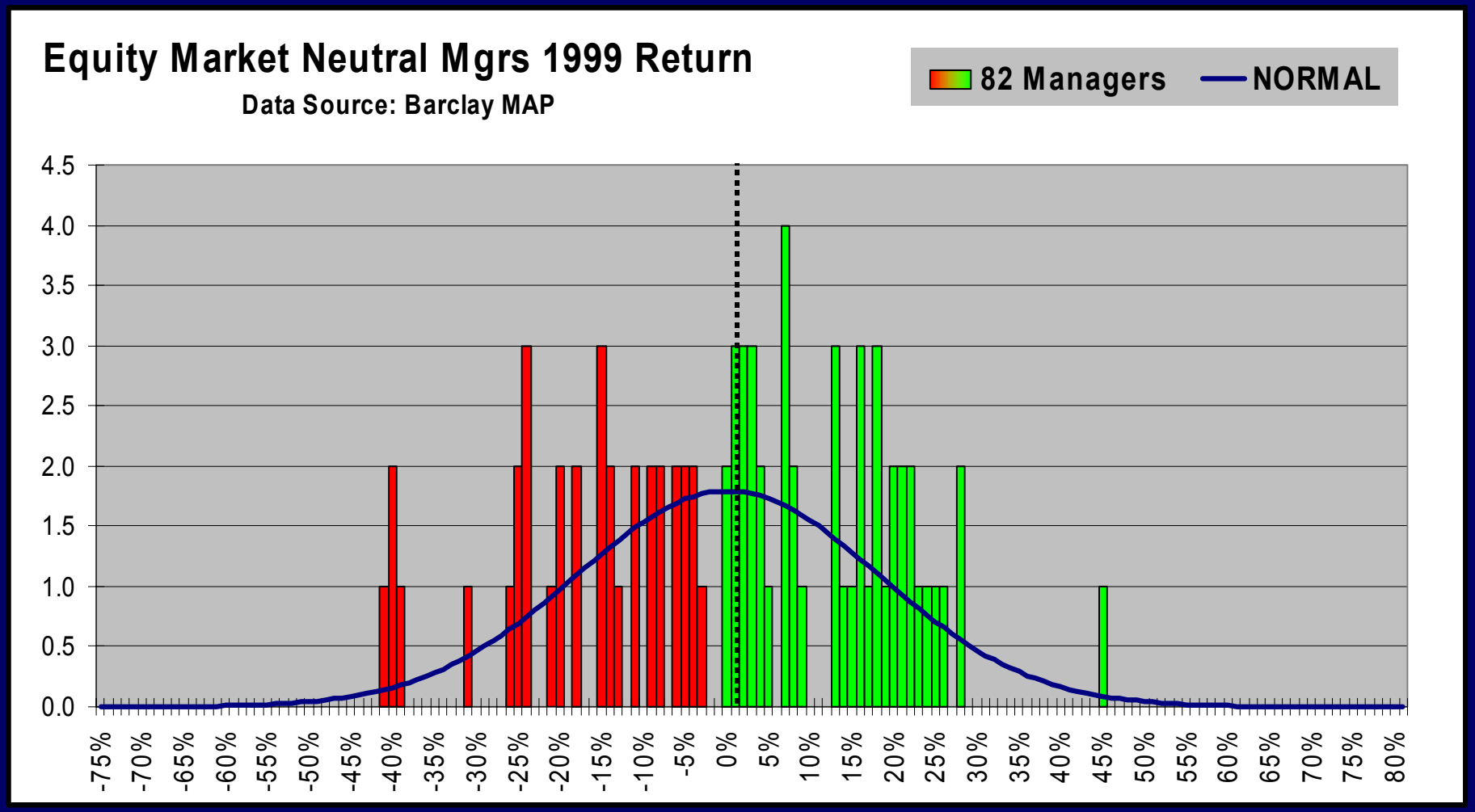
Diversification should be qualitative ...

- **Strategy diversification**
- **Style diversification within strategy**
  - **multiple managers within strategies to diversify risk of adverse manager**
- **Large number of strategies**
  - **reversion to mean return**
  - **experiment with new strategies and unseasoned managers**

Additional qualitative factors to consider

- **Seasoned Programs**
  - **older programs tend to show lower returns, lower return / risk ratios**
- **Money under Management**
  - **larger programs tend to exhibit the same characteristics**

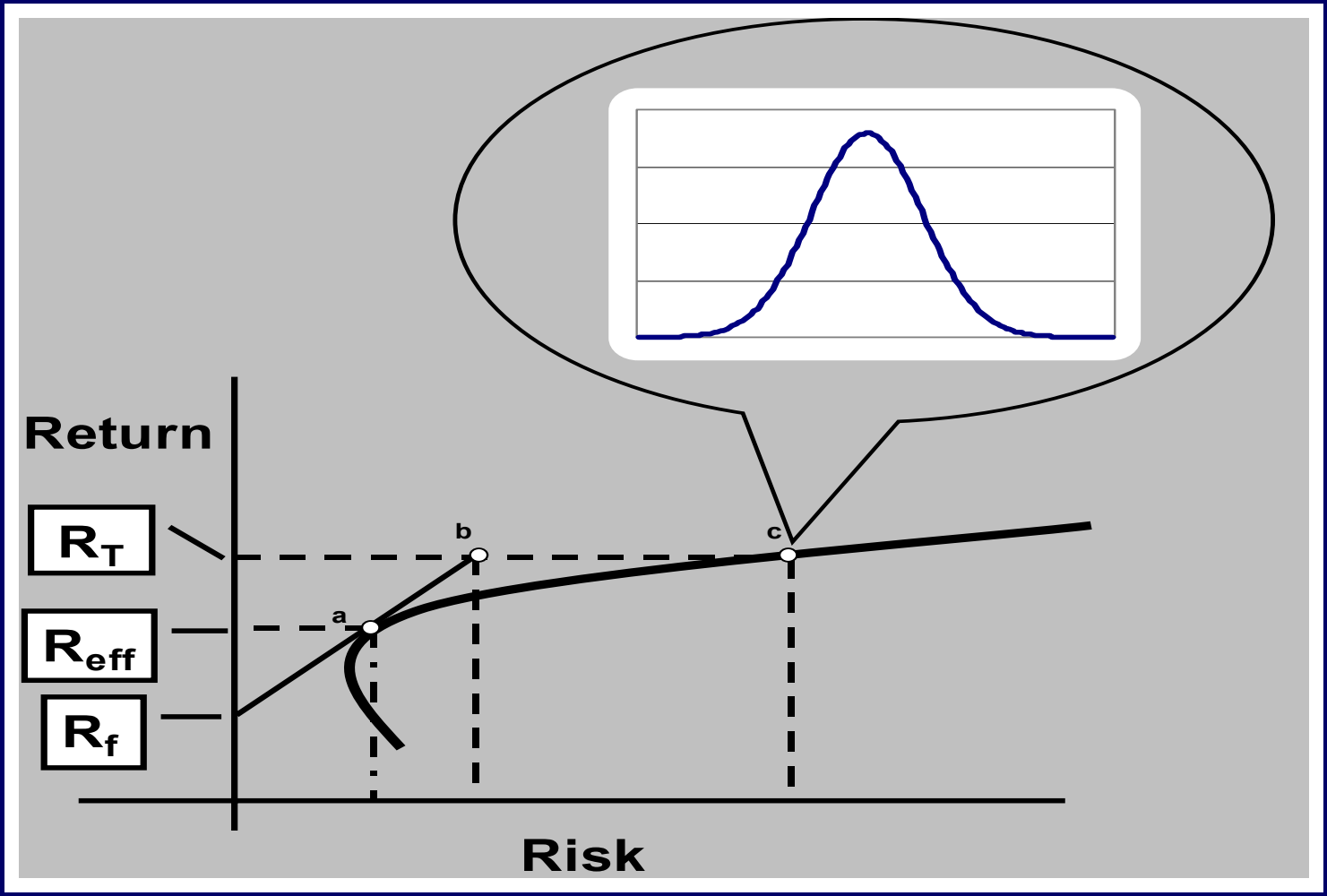
Cross- sectional distribution of equity market neutral manager returns in 1999 shows wide variance with little clustering about a mean.



Diversification should also be quantitative

- **Correlation with major assets classes should be low or negative**
- **Covariance among managers within fund of funds should be low or negative**
- **Correlations converge during high volatility**

Negative tail risk is caused by correlation convergence

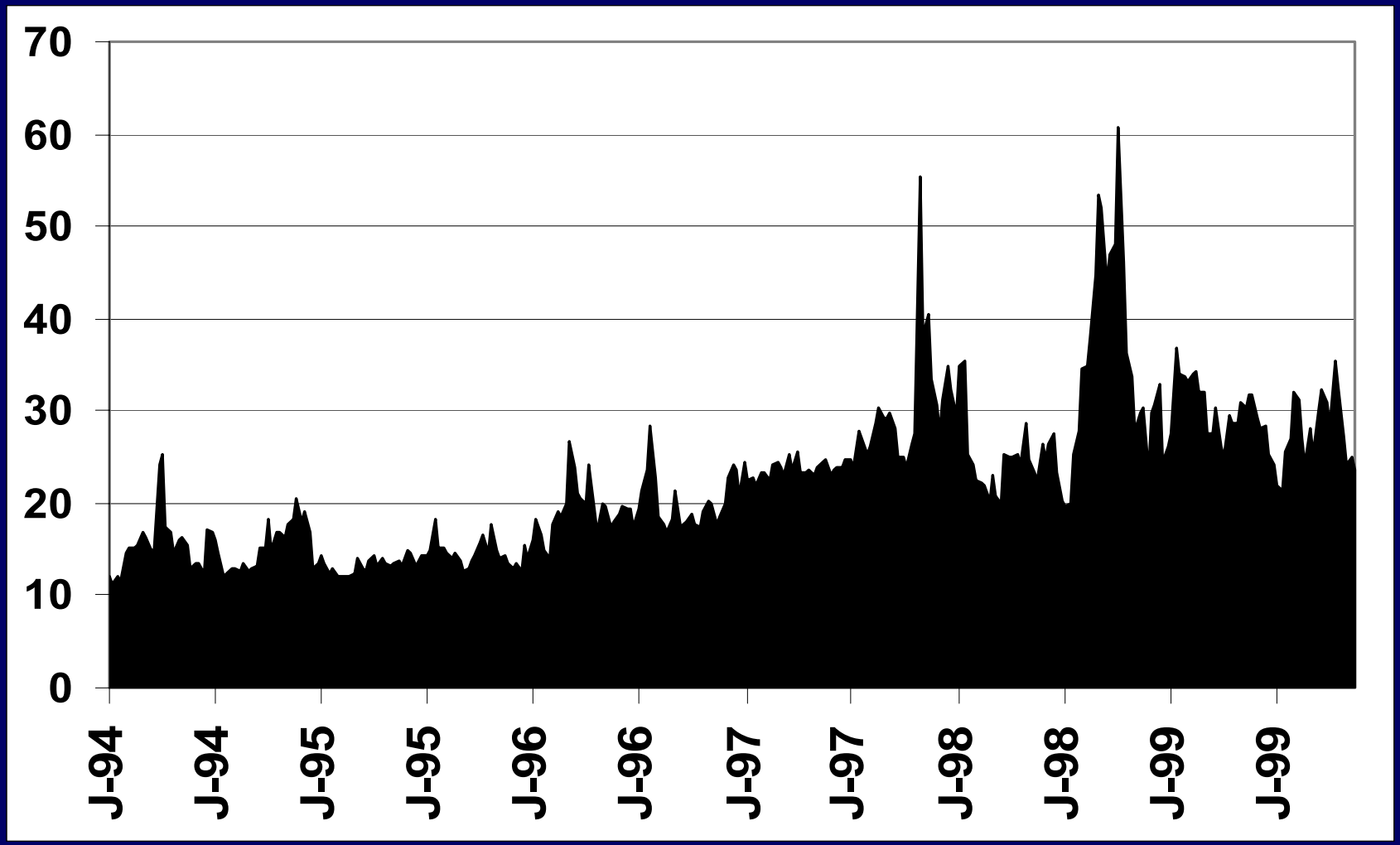


Insure portfolio against correlation convergence

- **Balance short volatility and long volatility strategies**
- **Most hedge fund strategies are convergence trades that are inherently short volatility**
  - **relative value, merger,**
- **Momentum base strategies are divergence trades that are inherently long volatility.**
  - **systematic trend following CTA's**

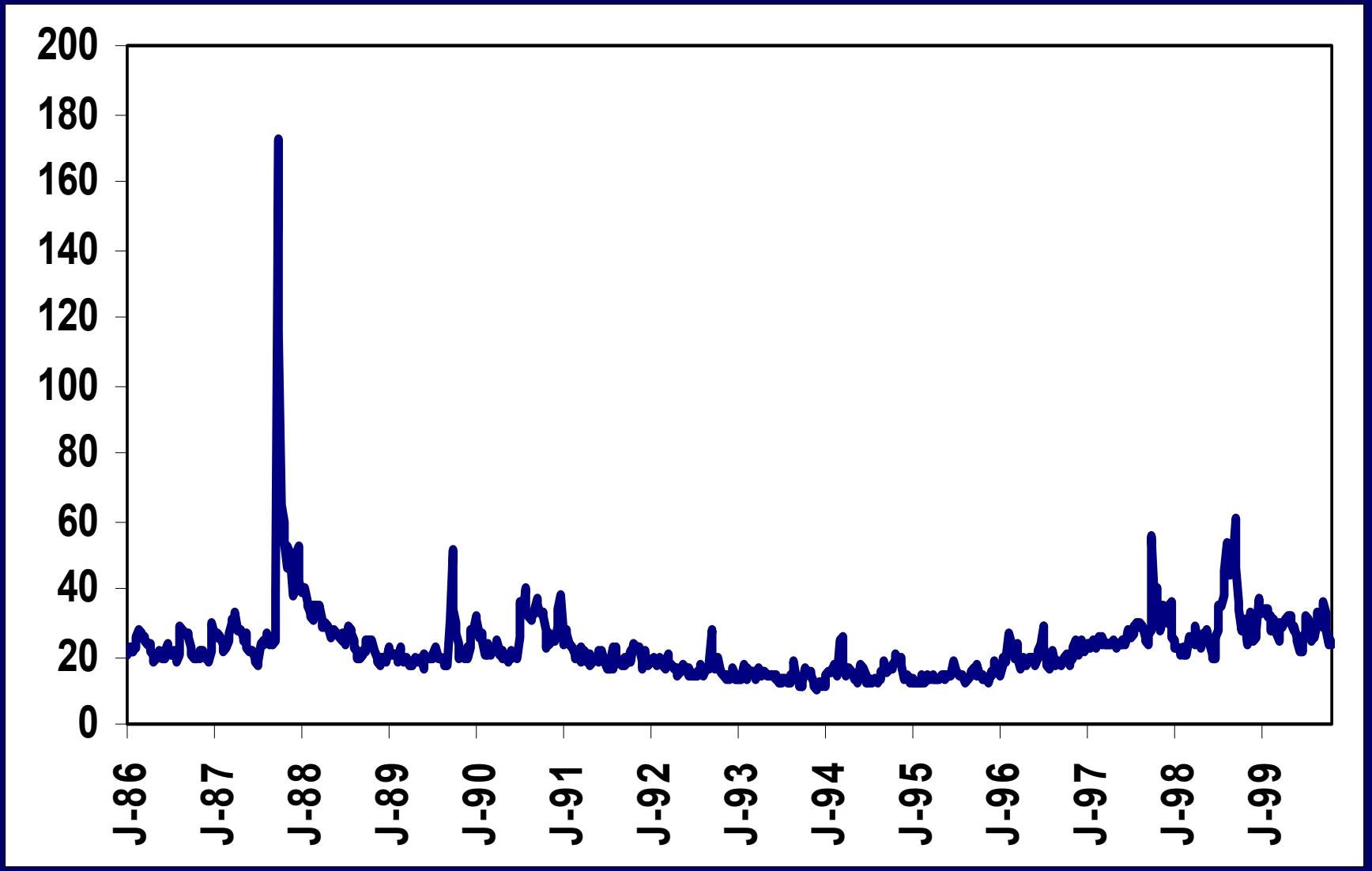
Volatility Index 1994 - 1999

Source: Bloomberg



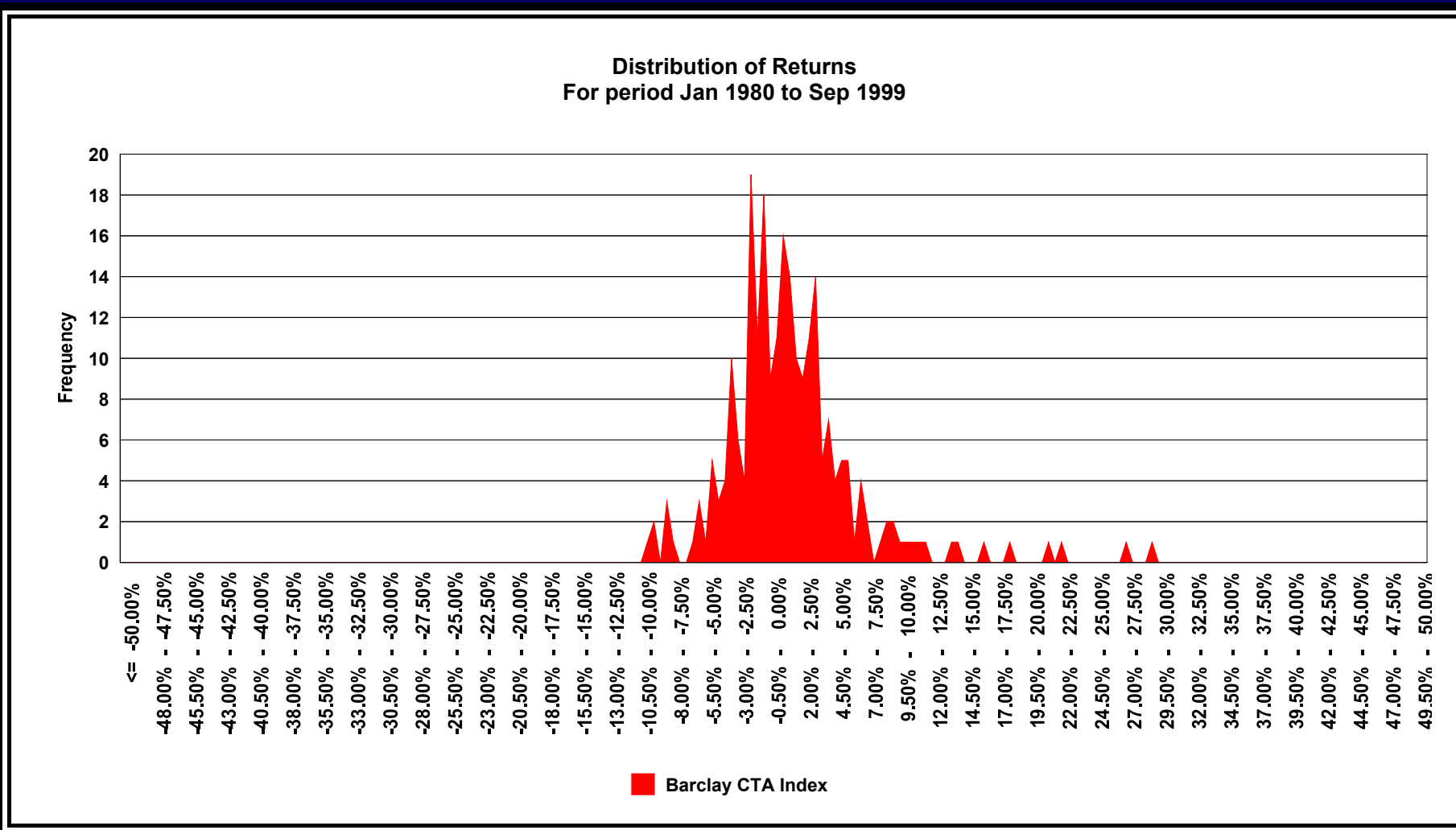
Volatility Index 1986 - 1999

Source: Bloomberg



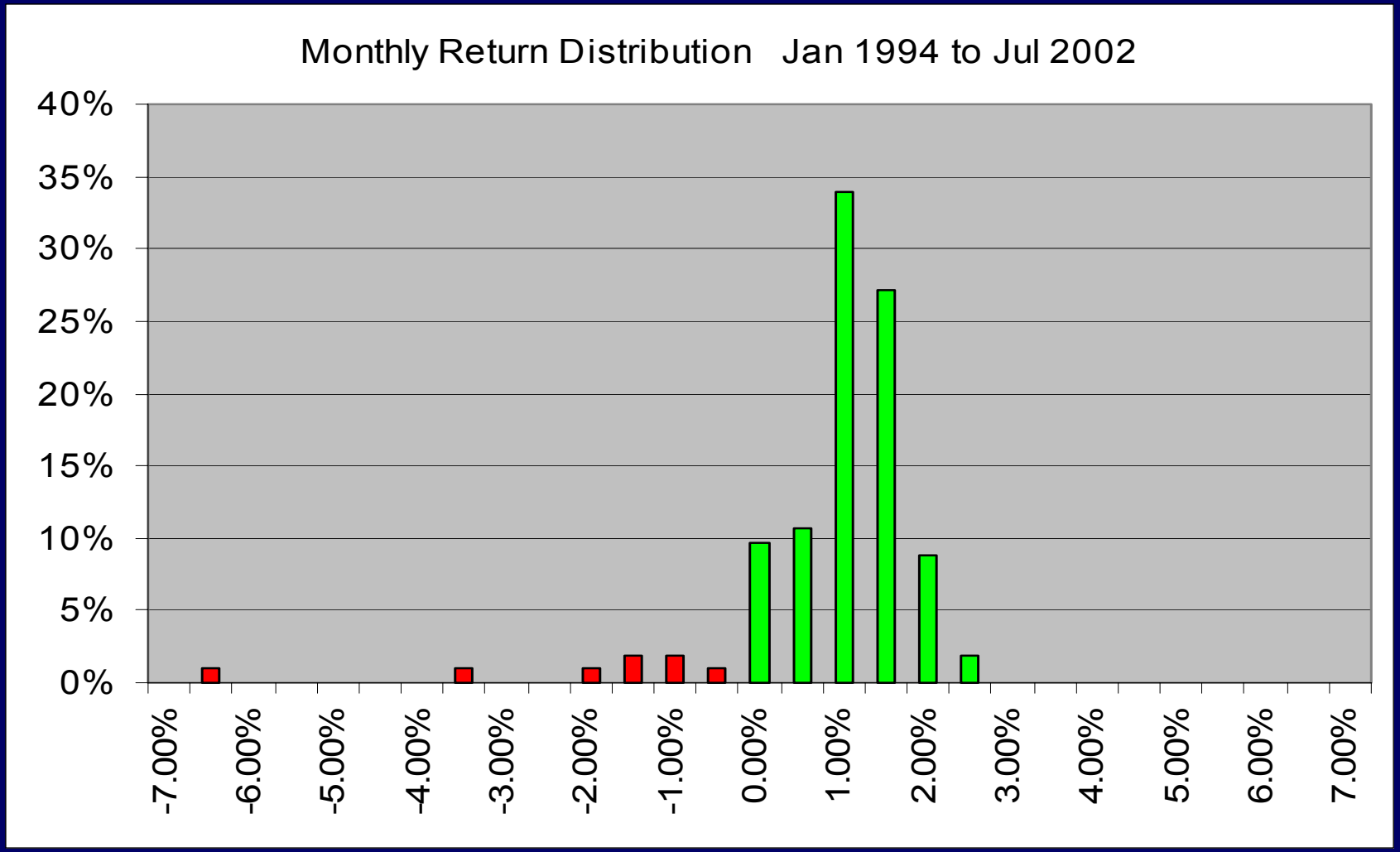
Barclay CTA Index shows positive tail feature of a long volatility strategy

Source: Barclay MAP



CSFB/Tremont Fixed Income Arbitrage Index shows the negative tail of a short volatility strategy

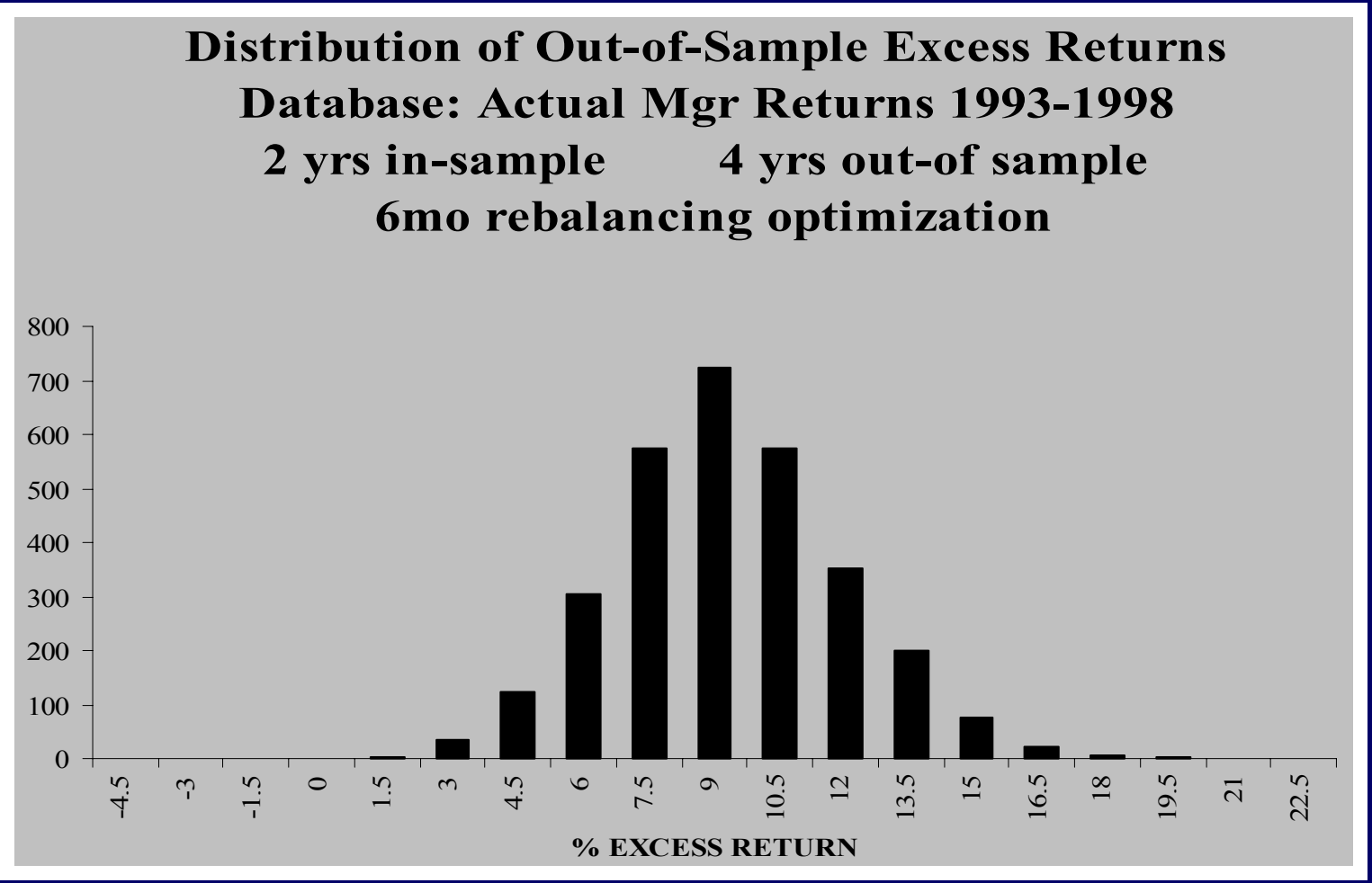
Source: CSFB & Tremont



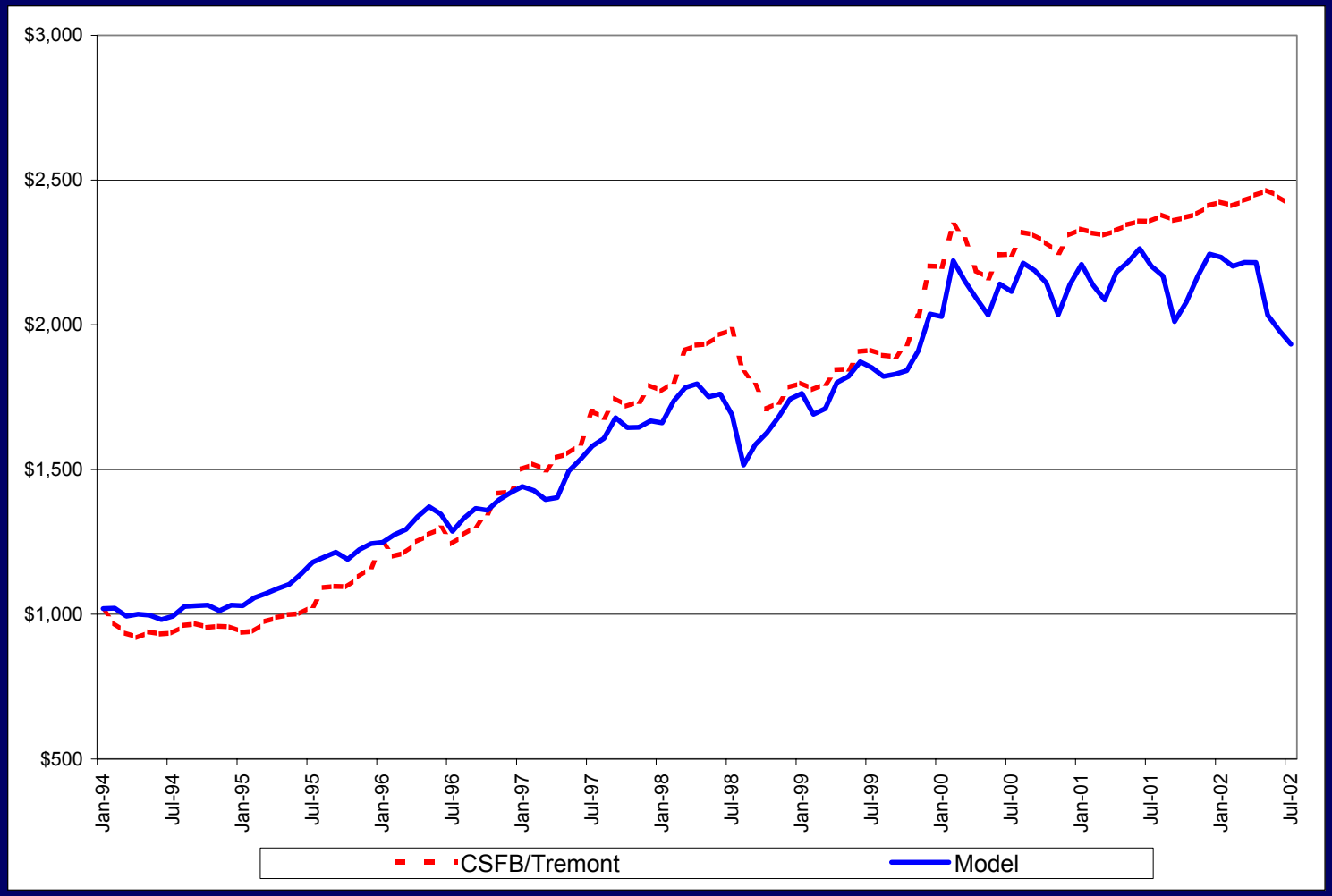
Constructing a diversified hedge fund portfolio

- Select combination of managers with lowest covariance matrix
- Modify selection such that volatility is balanced (check Aug 98).
- Define objective function that maximizes return while minimizing defined risk
- Rebalance portfolio to optimize the defined objective function

Monte Carlo simulation of returns shows a normal distribution with mean excess return over T-bill of 9% volatility of 2%



Factor Model for Composite Hedge Fund Returns



Composite Hedge Fund Returns Appear Highly Correlated to Small Cap Equity Returns

$r = 0.59$

CSFB / Tremont to Russell 2000

Jan 1994 – Jul 2002

Composite Hedge Fund Returns Exhibit a High Beta to Short Term Interest Rates

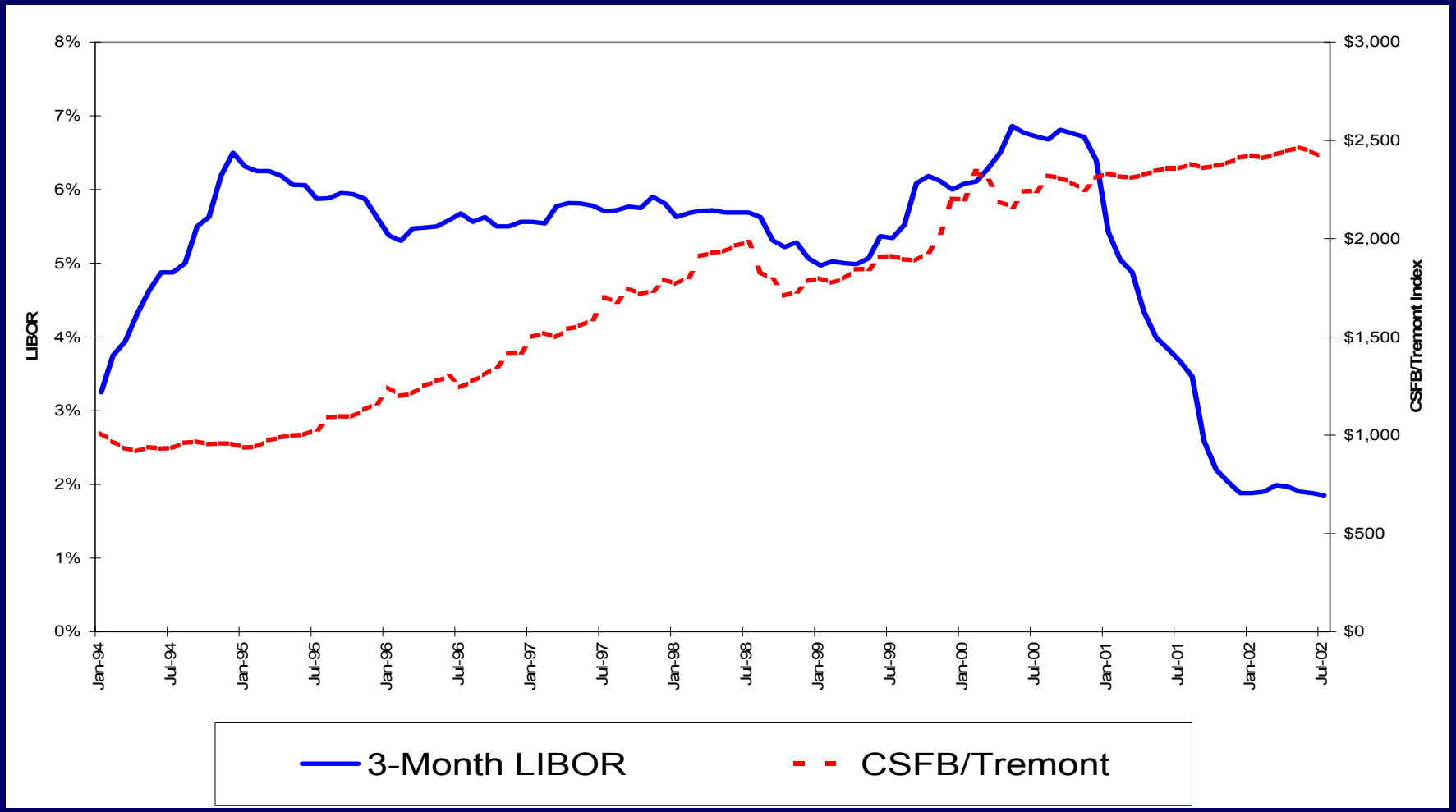
Source: Fung, W, D. Hsieh, 2002."Hedge-Fund Benchmarks: Information Content and Biases" *Financial Analysts Journal*, vol.58, no.1 (Jan/Feb): 22-34

Beta = 3.78

CSFB/Tremont to 3 mo LIBOR

Jan 1994 to Jul 2002

Hedge Fund Composite Performance Vs LIBOR



Factor Model Formula

- Model Return = 3 mo LIBOR + Net Beta*R2000
- Gross Long = 100%
- Long Beta = 1.25 to R2000
- Gross Short = 100%
- Short Beta = 0.7 to R2000