INSTITUTIONAL FINANCE

Lecture 06: Portfolio Evaluation and Hedge Funds

OVERVIEW

1. A Primer on Hedge Funds
   - ❑ History, Compensation
     - ■ Hedge Fung and Hsieh, 1999, A Primer on Hedge Funds, *Journal of Empirical Finance*.
   - ❑ Hedge Fund Strategies
     - ■ CSFB-Tremont http://www.hedgeindex.com;
     - ■ Fung and Hsieh, 2004, Extracting Portable Alphas from Equity Long-Short Hedge Funds, *Journal of Investment Management*
     - ■ Malkiel and Saha, 2005, Hedge Funds: Risk and Return, *Financial Analysts Journal*
2. Performance
   - ❑ alpha versus beta
     - ■ stale prices
     - ■ non-linear payoffs
   - ❑ Focus I: Merger Arbitrage
     - ■ Mitchell and Pulvino, 2001, Characteristics of Risk and Return in Risk Arbitrage, *J of Finance*
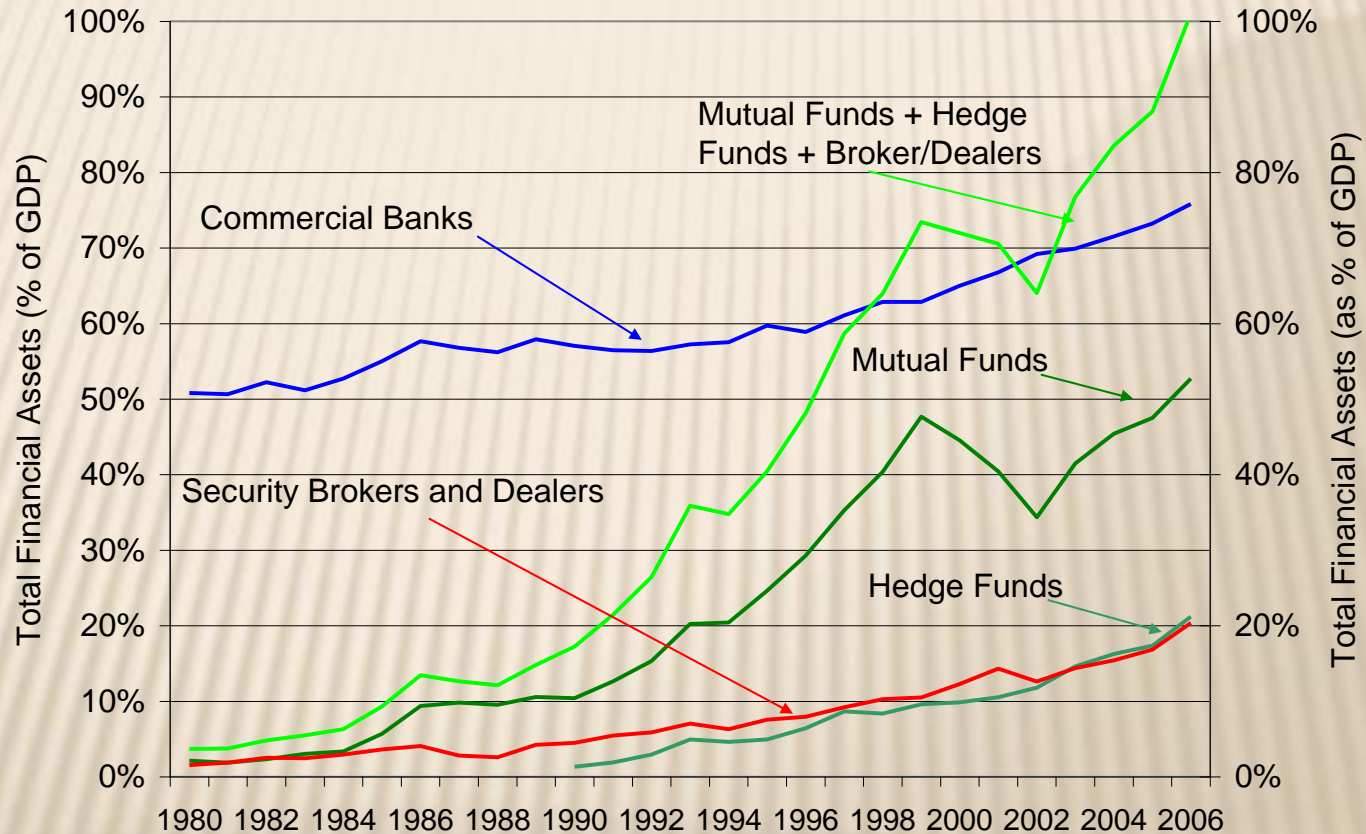3. Liquidity Risk and Risk Management
   - ❑ Fund flows
   - ❑ Liquidity Spirals and Leverage
   - ❑ Correlation across Hedge Funds
   - ❑ Focus II: 2007 Quant crisis

TOTAL FINANCIAL ASSETS AS % OF GDP

WHAT ARE HEDGE FUNDS?

- □ private investment vehicles for individuals or institutional investors.
- □ Typically organized as limited partnerships, in which the investors are limited partners and the managers are general partners.
- □ As general partners, the fund managers usually invest in a significant portion of their personal wealth into the partnership to ensure the alignment of economic interests among the partners.
- □ Investors to the partnership are charged a performance-based fee where the potential payout to successful managers can be significantly higher than the fixed management fee.
- □ A major difference in return characteristics between hedge funds and mutual funds is due to differences in their trading strategies.
- □ Hedge funds deploy dynamic trading strategies whereas most mutual funds employ a static buy-and-hold strategy.
- □ Hedge funds typically leverage their bets by margining their positions and through the use of short sales. · In contrast, the use of leverage is often limited if not restricted for mutual funds.

HISTORY OF HEDGE FUNDS

- First hedge fund by Albert Wislow Jones in 1949.
  - primary strategy used long-short equity positions and leverage.
  - incentive fee based on performance.
- Until 1966 hedge funds remained relatively obscure
- In 1966 article in Fortune described Jones' funds to have returns (net of fee) substantially higher than the best performing mutual funds.
- Rapid expansion in 1967-68
- Setback during the bear markets of 1969-70 and 1973-74, when many funds suffered losses and capital withdrawals.
- Hedge funds faded back into obscurity until 1986, when an article in Institutional Investor reported that Julian Robertson's Tiger Fund had compounded annual returns of 43% during its first six years of existence, after expenses and incentive fee. This reignited interests in hedge funds, with the formation of many new hedge funds.

HEDGE FUND COMPENSATION

- Managers can receive certain types of performance-based fees that are prohibited to mutual funds.
- The typical compensation for hedge fund managers is a
  - 2% management fee and
  - 20% performance fee with high water mark.
- substantially higher compared to mutual funds.
  - Mutual fund performance-based fee must satisfy the "fulcrum" rule:
    - gains and losses must have a symmetric effect (over- and underperformance relative to a benchmark must result in the same amount of positive and negative incentive fees for a mutual fund manager
  - HF are not subject to "fulcrum" rule and managers typically receive asymmetric fees
- Embedded "put option" is highly debated
  - On the one hand, the significant amount of personal wealth that hedge fund managers place at risk alongside investors inhibits excessive risk taking.
  - On the other hand, there are extreme circumstances where the disproportional payout from the incentive fee may outweigh the risk of losing personal wealth even if reputational risks are taken into account.

ORGANIZATION OF HEDGE FUNDS

* Problem confronting a money manager who
  + believes that he has superior investment skills
  + limited own capital
* Financing options
  + Equity
  + Debt – putting up personal assets as collateral - in most cases insufficient
* Disclosure
  + Fund managers adverse to fully disclose his "winning strategy"
  + Excludes organizational forms that must meet a high level of "transparency" and "disclosure"
  + Favors "private vehicles" – explains the lack of "publicly offered" hedge fund products
* Investors demand limited liability and protection
  + disclosure documents are at best cursory and complex
  + "recommendations from a reliable source", managers "reputation" plus performance statistics and computer simulations.
* Commitment of manager's personal capital and the incentive fee structure are often critical elements.

REGULATION OF HEDGE FUNDS

- **Securities Exchange Commission (SEC)** oversees publicly traded securities, including the corporations that issue them, broker-dealers, investment advisors and mutual funds
  - Enforces federal securities laws designed to protect investors and ensure disclosure
  - Regulates firms that purchase or sale of securities, provide investment advice, and investment companies.
  - **Securities Act of 1933**
    - requires firms issuing publicly traded securities to register and file disclosure reports.
    - *Exemption for HF:* Claim status of a private placement under the safe harbor provision of Rule 506 in Regulation D
  - **Securities Exchange Act of 1934**
    - Regulate securities broker-dealers that face potential conflicts in executing customer orders versus own accounts.
    - *Exemption for HF:* as long as they trade only for own accounts.   -
  - **Investment Advisers Act of 1940**
    - requires investment advisors to register and to conform to statutory standards.
    - *Exemption for HF:* have less than 15 clients, don't solicit business from the general public
  - **Investment Company Act of 1940**
    - severely restricts a mutual fund's ability to leverage
    - *Exemption for HF:* Have no more than 99 investors (recently 499 and < $5million in asset), don't make any public offerings
- **CFTC**

REGULATION OF HEDGE FUNDS

- The Commodity Futures Trading Commission (CFTC) oversees futures industry
  - ***Commodity Exchange Act of 1974*** to regulate the futures markets in the US, the CFTC is mandated to protect market participants against manipulation, abusive trade practices and fraud in the futures markets.
    - Entities that handle *customer funds* or provide *trading advice* in futures contracts must register with the National Futures Association (NFA), a futures industry self-regulatory body approved by the CFTC. In addition, these registrants must disclose market risks and past performance information to prospective customers.
    - If a hedge fund trades futures and options on futures on behalf of its investors, it is generally required to file as a commodity pool operator with the Commodity Futures Trading Commission.

REGULATION OF HEDGE FUNDS

Hedge funds are not exempted from general regulations designed to monitor and safeguard the integrity of markets.

- ❑ The U.S. Treasury requires traders to report large positions in selected *foreign currencies* and *treasury securities*.
- ❑ The SEC requires traders to report positions
  - ❑ that exceed 5% of the shares of a publicly traded firm
  - ❑ Quarterly position for "large" HFs (13F filing)
- ❑ The Federal Reserve has margin requirements for stock purchases (Reg T)
- ❑ The CFTC requires traders with large futures positions to file daily reports.
- ❑ The CFTC and the futures exchanges set *futures margins* and position limits on futures contracts.

These regulations apply to all market participants, including hedge funds.

HEDGE FUND STRATEGIES

- Credit Suisse Tremont
  - asset-weighted hedge fund index
    - calculated and rebalanced monthly
    - Net of fee and expenses
  - includes only funds, as opposed to separate accounts
  - 4500 funds
    - minimum of US$50 million under management
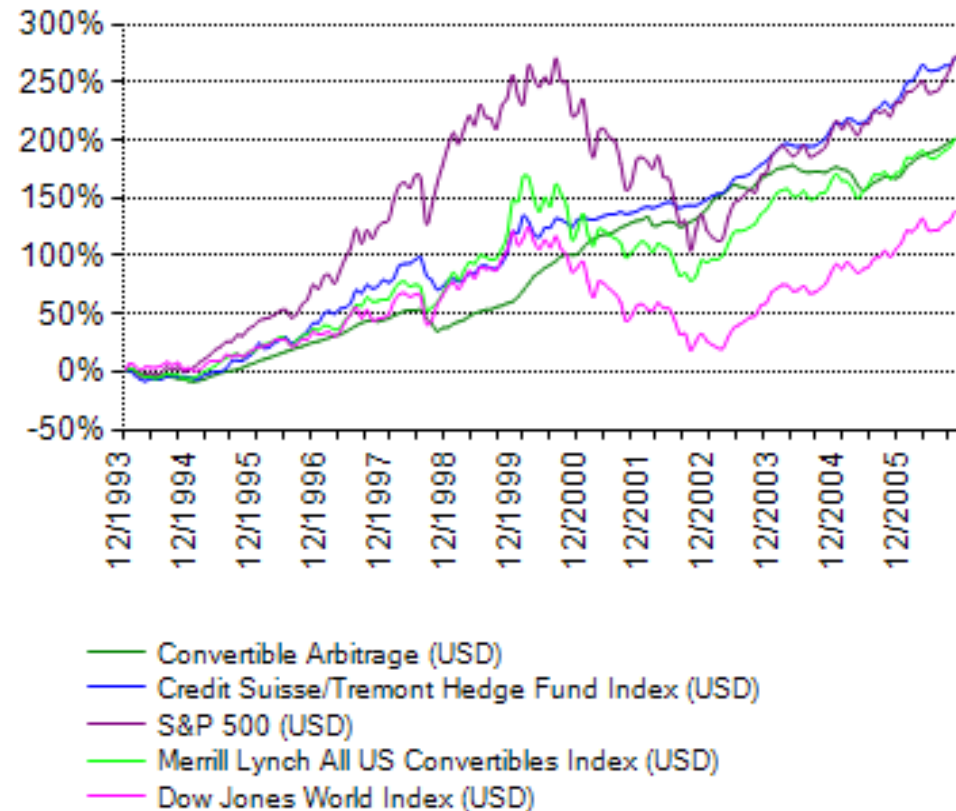   - 12-month track record
    - audited financial statements

Chart legend:
- Credit Suisse/Tremont Hedge Fund Index (USD)
- S&P 500 (USD)
- Dow Jones World Index (USD)
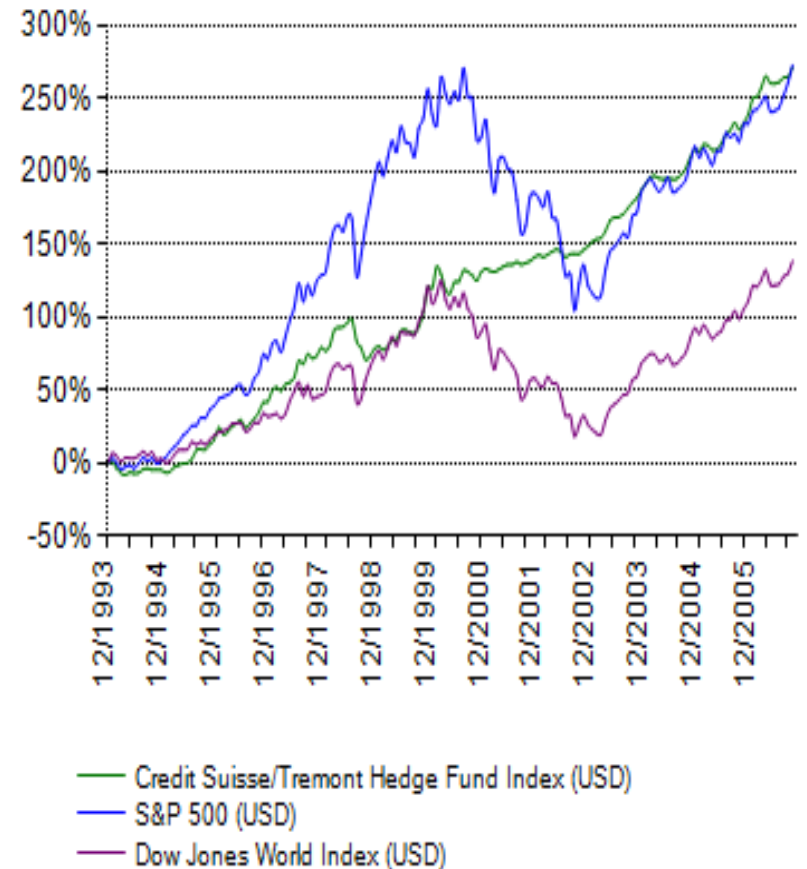
THE 10 STRATEGIES - OVERVIEW

Convertible Arbitrage: 2.7%	Event Driven: 23.3%	Managed Futures: 4.9%
Dedicated Short Bias: 0.5%	Fixed Income Arbitrage: 6.9%	Multi-Strategy: 9.9%
Emerging Markets: 6.8%	Global Macro: 11.2%	
Equity Market Neutral: 5.3%	Long/Short Equity: 28.4%	

CONVERTIBLE ARBITRAGE

- convertible securities
- hedge the equity component by shorting the underlying stock or options
- Also, interest rate, volatility and credit hedges
- Hedge ratios adjusted as markets move
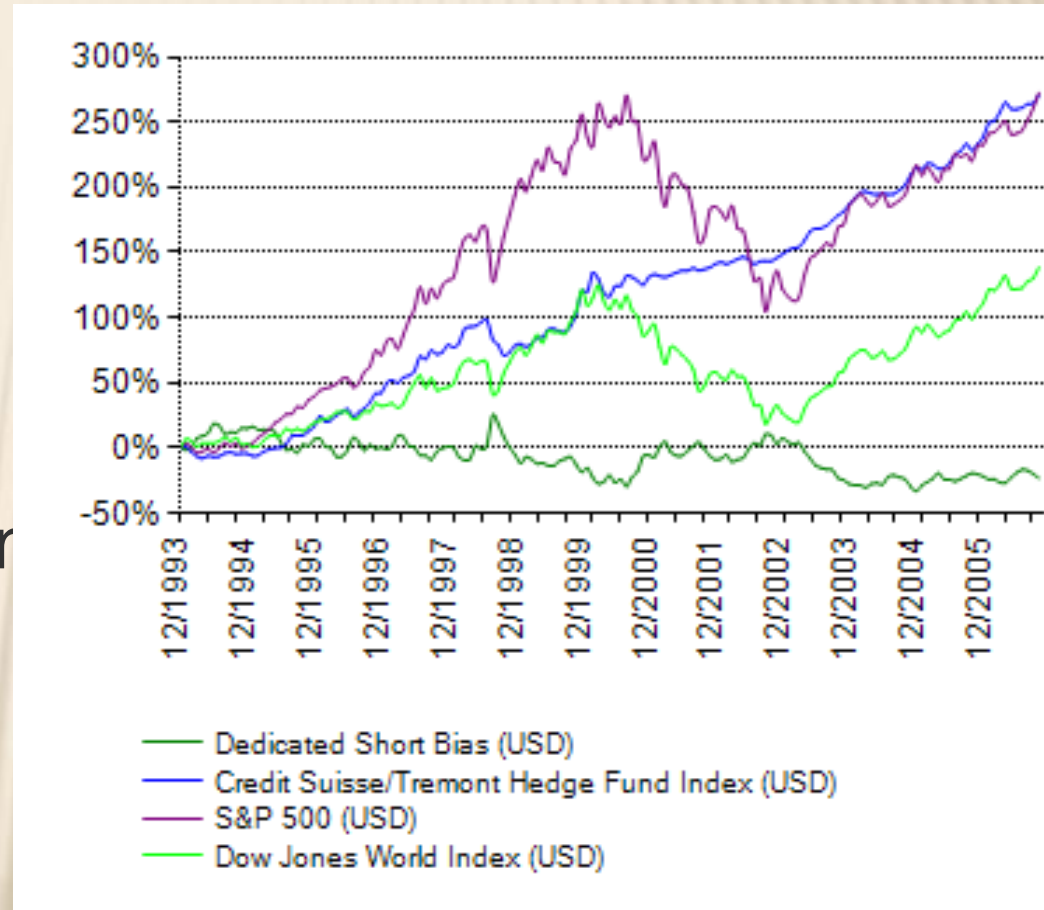- typically designed to create profit irrespective of market moves.

Legend:
— Convertible Arbitrage (USD)
— Credit Suisse/Tremont Hedge Fund Index (USD)
— S&P 500 (USD)
— Merrill Lynch All US Convertibles Index (USD)
— Dow Jones World Index (USD)

ASIDE: CONVERTIBLE BONDS/ARBITRAGE

* Price of convertible bonds
  + Investment value = the price if it were a straight bond
  + Conversion value = value if converted into its equity equivalent (e.g. converted into 5 shares of stock with price $10, then $50)
    (usually, price of bond > max {investment value, conversion value})
  + Option value (time value)
* Convertible arbitrage
  + short position in the stock
  + delta hedging: divide price of the convertible by stock price conversion premium and then multiplying by option delta.
  + Example:
    × Convert's price is $1000, current stock price is $50, conversion premium is 50%, so value of the stock price conversion premium is $75. Option delta is 0.65.
    × Number of shares to short, hedge ratio, is then: ($1000/$75)*0.65=8.6667.
    × For small stock price movements this short position provides hedge.
    × Creates a market neutral position
    × During volatile markets this hedge breaks down, but can be profitable
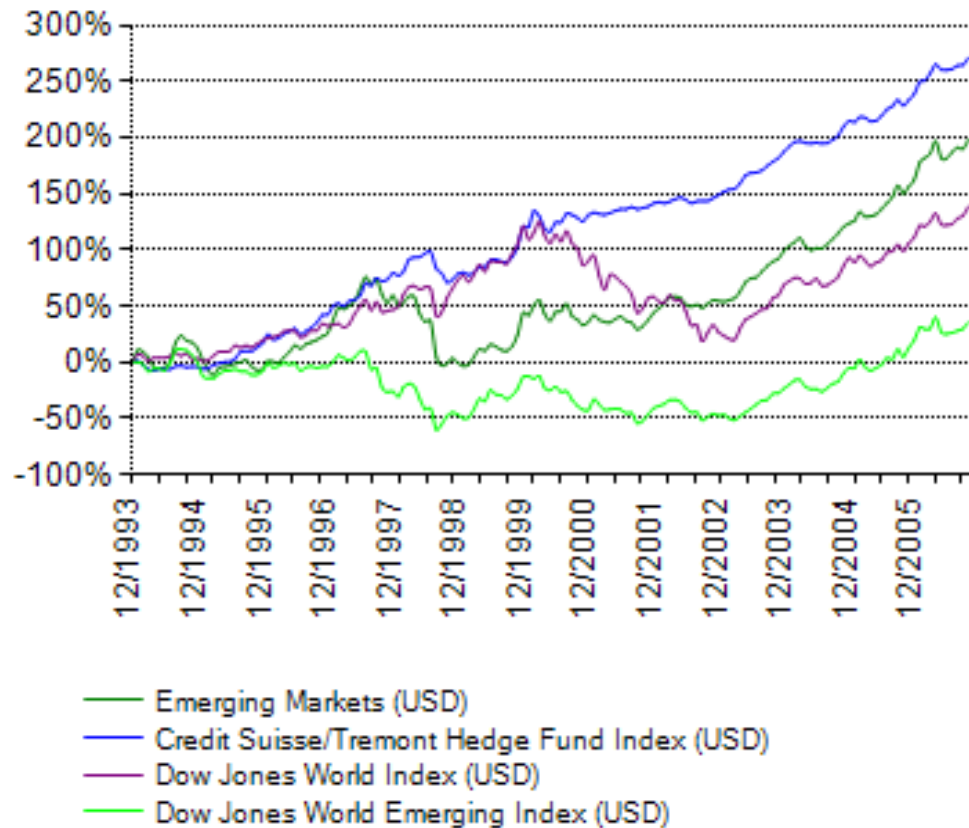   × Cash in the coupon payments

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DEDICATED SHORT BIAS

- Overall net short portfolios of long and short equities
- focus on companies with weak cash flow generation is common
- Risk management consists of offsetting long positions and stop-loss strategies.

300% | 250% | 200% | 150% | 100% | 50% | 0% | -50% plotted from 12/1993 to 12/2005

— Dedicated Short Bias (USD)
— Credit Suisse/Tremont Hedge Fund Index (USD)
— S&P 500 (USD)
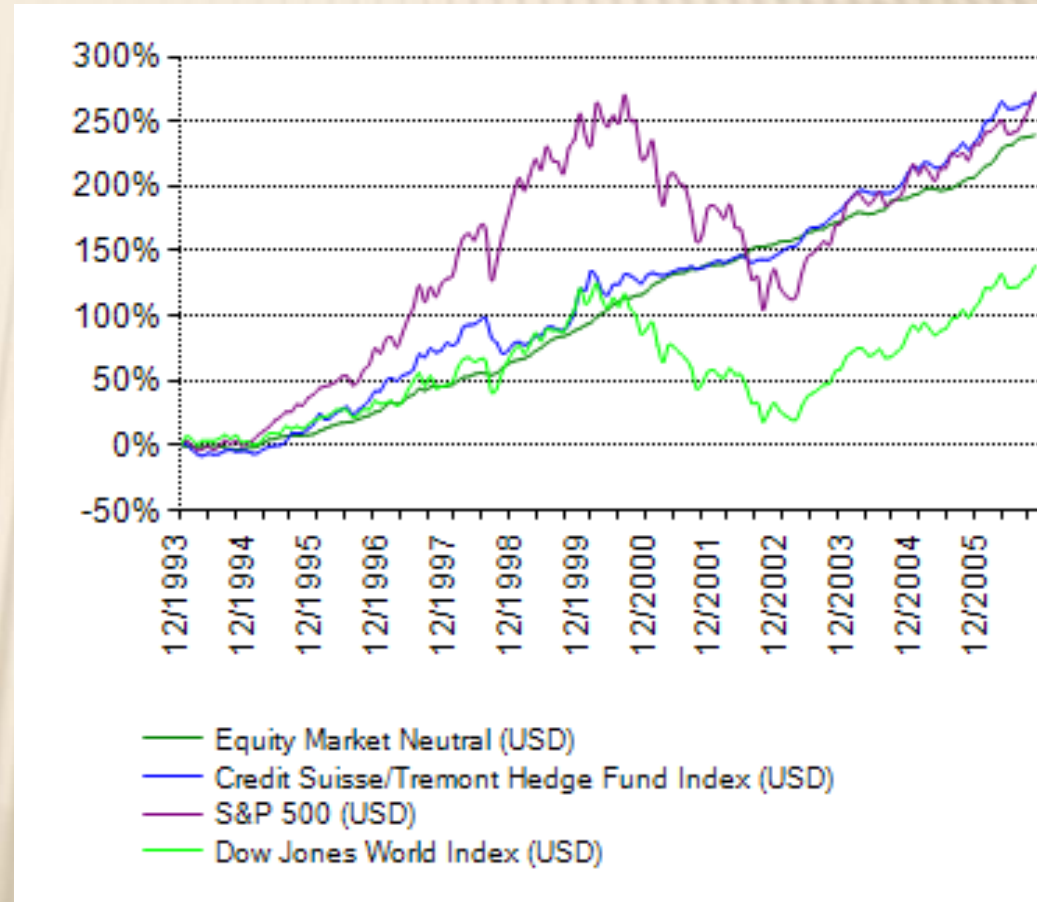— Dow Jones World Index (USD)

EMERGING MARKETS

- investments in currencies, debt instruments, equities and other instruments of "emerging" markets countries (typically measured by GDP per capita).
- Latin America, Eastern Europe, Africa, and Asia
  - BRIC
  - Next-11
- sub-sectors, including arbitrage, credit and even driven, fixed income bias, and equity bias.

—— Emerging Markets (USD)
—— Credit Suisse/Tremont Hedge Fund Index (USD)
—— Dow Jones World Index (USD)
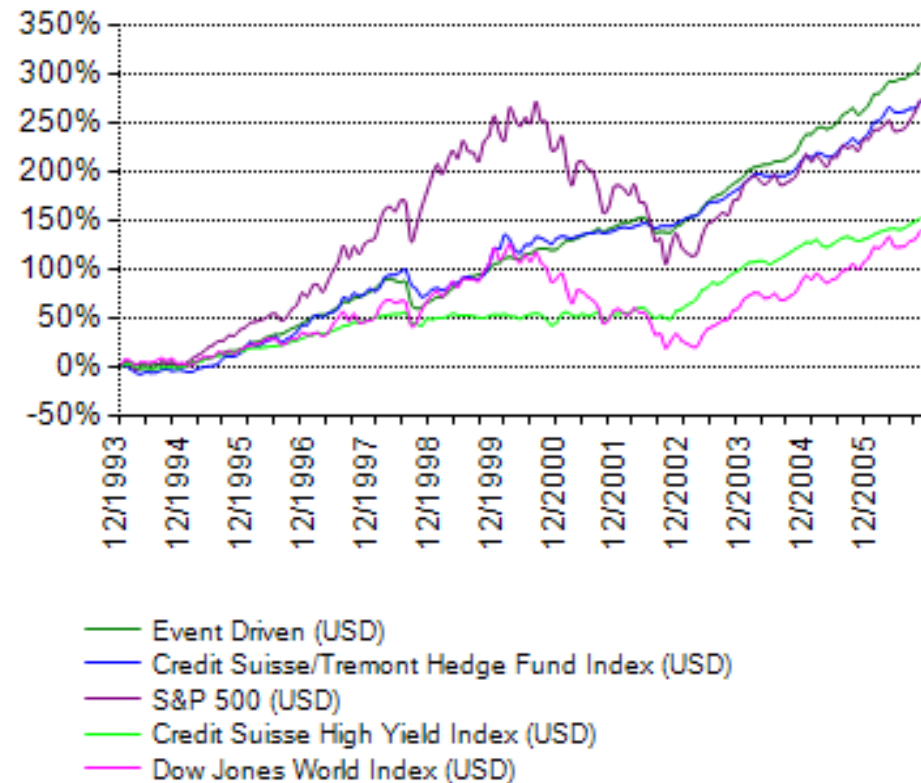—— Dow Jones World Emerging Index (USD)

EQUITY MARKET NEUTRAL

□ exploiting pricing relationships between different equities or related securities

□ typically hedging exposure to overall equity market

□ Sub-sectors
  ▪ Statistical arbitrage
  ▪ Quantitative long/short
  ▪ Fundamental long/short
  ▪ Index arbitrage

□ Leverage is common

Legend:
— Equity Market Neutral (USD)
— Credit Suisse/Tremont Hedge Fund Index (USD)
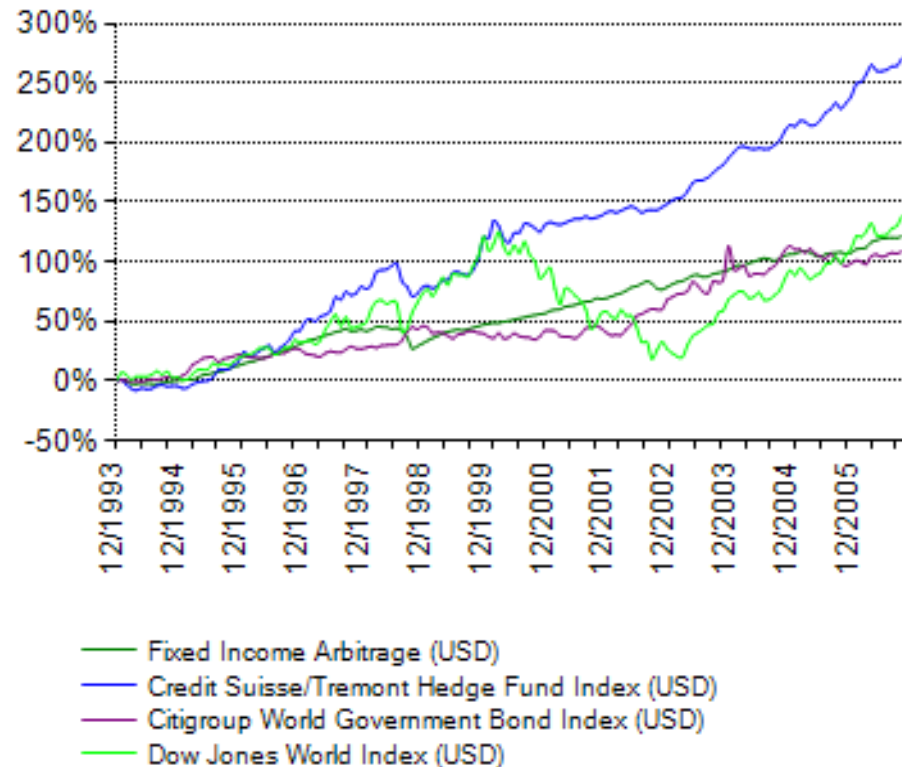— S&P 500 (USD)
— Dow Jones World Index (USD)

EVENT DRIVEN

* Subsectors
  + Risk (Merger) Arbitrage Specialists are typically long the stock of the company being acquired and short the stock of the acquirer.
  + Distressed/High Yield Securities Fund managers invest in claims of companies in financial distress or already in default. They trade at substantial discounts, since they are difficult to evaluate and have a lack of street coverage.
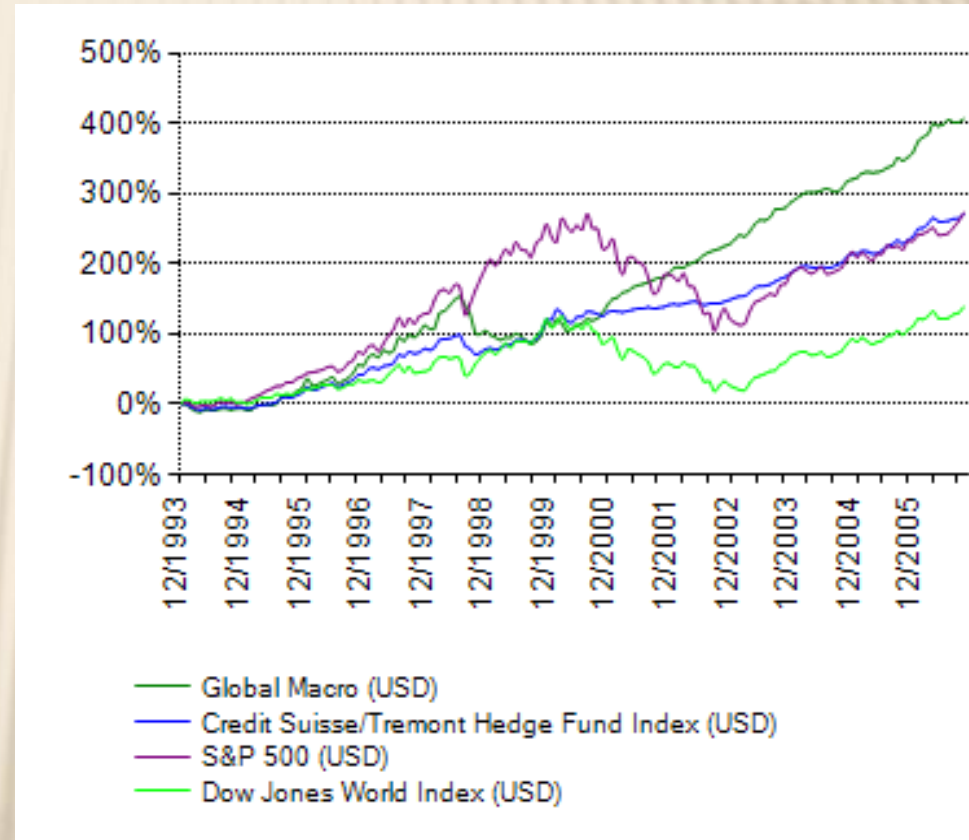 + Reg. D - investments in micro capitalization public companies that are raising money in private capital markets.

Legend:
— Event Driven (USD)
— Credit Suisse/Tremont Hedge Fund Index (USD)
— S&P 500 (USD)
— Credit Suisse High Yield Index (USD)
— Dow Jones World Index (USD)

FIXED INCOME

- Different fixed income securities
- Yield curve carry trade
- Instruments
  - interest rate swaps
  - T-Bonds
  - futures
  - vol-trading involving options
  - mortgage backed securities

Legend:
- Fixed Income Arbitrage (USD)
- Credit Suisse/Tremont Hedge Fund Index (USD)
- Citigroup World Government Bond Index (USD)
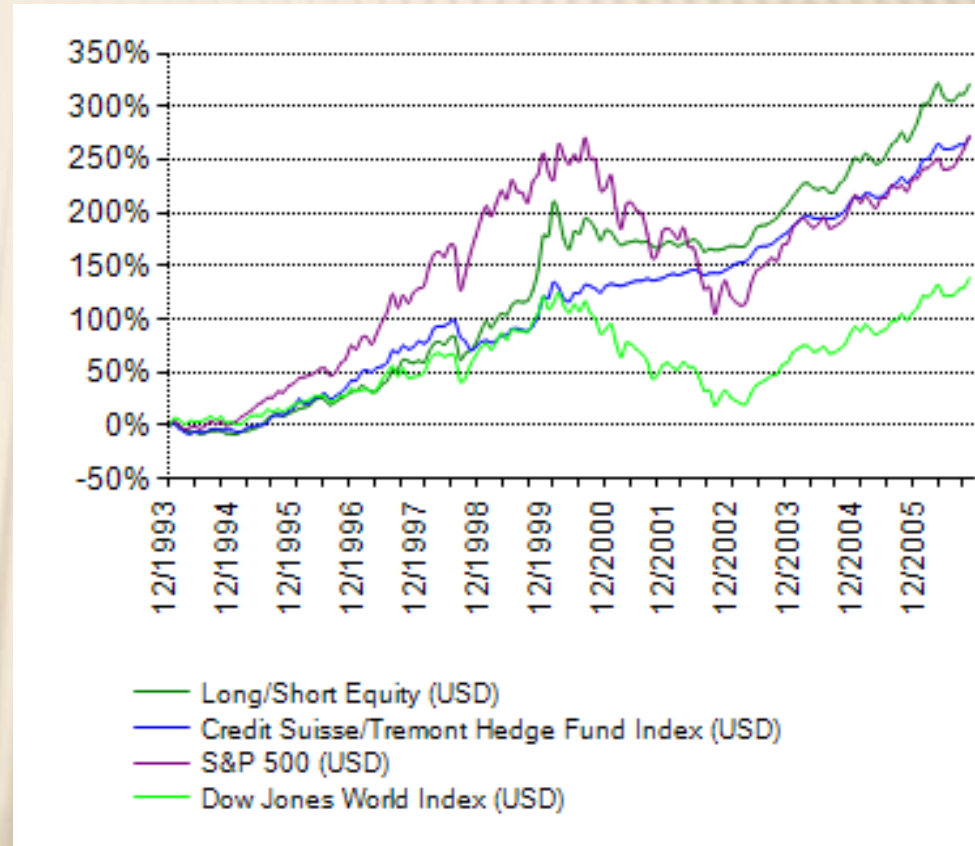- Dow Jones World Index (USD)

GLOBAL MACRO

- FX carry trades
- Fixed income, currency, equity, commodity (indices)
- Focus on shifts in world economies, political changes or global supply/demand imbalances
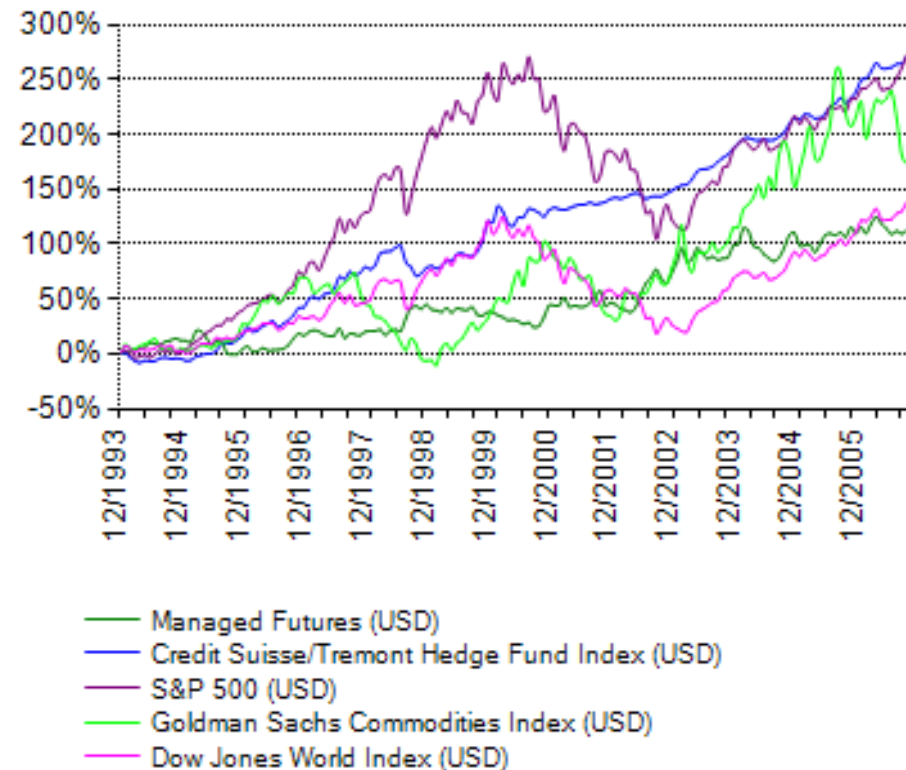- Focus on liquid instruments

Legend:
- Global Macro (USD)
- Credit Suisse/Tremont Hedge Fund Index (USD)
- S&P 500 (USD)
- Dow Jones World Index (USD)

LONG/SHORT EQUITY

- Long and short
  - Stocks
  - Futures/options
- Shift from
  - value to growth,
  - small to large
  - net long to net short
- Focus
  - Global, regional, or sectorial

Long/Short Equity (USD)
Credit Suisse/Tremont Hedge Fund Index (USD)
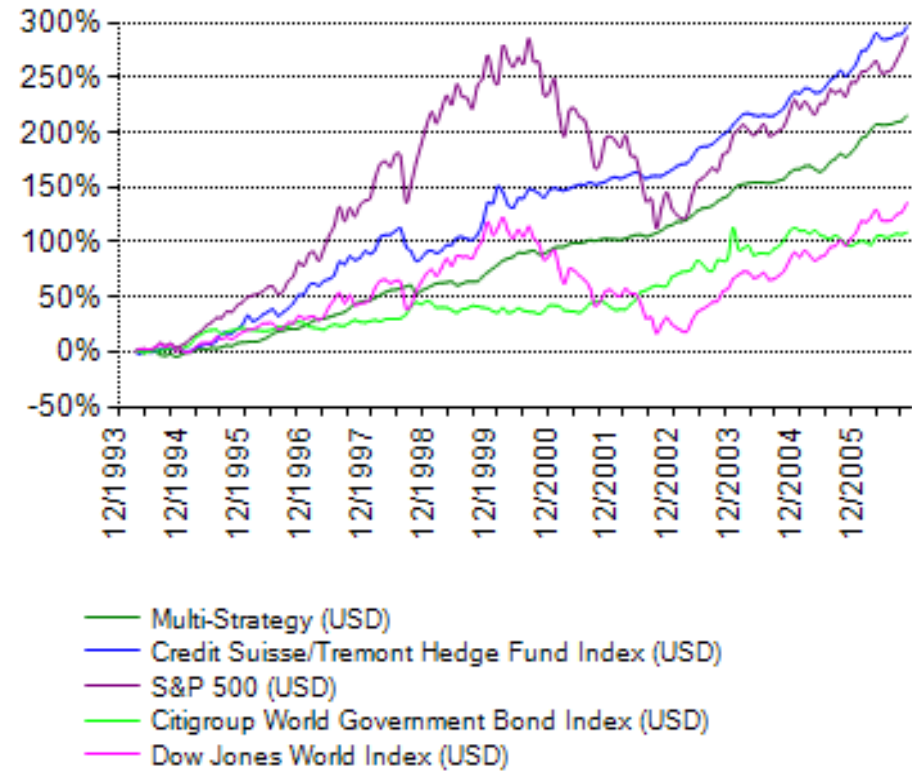S&P 500 (USD)
Dow Jones World Index (USD)

MANAGED FUTURES

- Investment in listed bonds, currency, equity and commodity futures markets globally
- Referred to as Commodity Trading Advisors (CTA)
- Rely on trading programs base on past price data
  - Long-term trend following
  - Short-term counter trend
  - Hybrid systematic/discretionary programs
  - Use stop-loss points to control risk

Legend:
- Managed Futures (USD)
- Credit Suisse/Tremont Hedge Fund Index (USD)
- S&P 500 (USD)
- Goldman Sachs Commodities Index (USD)
- Dow Jones World Index (USD)

MULTI-STRATEGY

- Number of different strategies
- (started as convertible arbs and diversified in other strategies)
- Often highly leveraged

Multi-Strategy (USD)
Credit Suisse/Tremont Hedge Fund Index (USD)
S&P 500 (USD)
Citigroup World Government Bond Index (USD)
Dow Jones World Index (USD)

Panel A: Hedge Funds Strategies

	Sharpe	Mean	Std Dev	Skew	Kurt	Min	5%	Obs	Weight Dec-06
Long/Short Equity	0.22	0.63	2.83	0.12	6.89	-11.85	-3.52	171	29%
Event Driven	0.36	0.58	1.61	-3.16	24.84	-12.19	-1.83	171	24%
Global Macro	0.27	0.82	3.00	-0.06	6.20	-11.89	-3.58	171	11%
Multi-Strategy	0.33	0.42	1.26	-1.13	5.65	-5.10	-2.00	171	10%
Emerging Markets	0.12	0.53	4.48	-0.74	8.00	-23.45	-7.31	171	7%
Fixed Income Arbitrage	0.11	0.13	1.16	-3.14	18.19	-7.30	-1.88	171	6%
Equity Market Neutral	0.59	0.46	0.79	0.18	3.66	-1.59	-0.80	171	5%
Managed Futures	0.09	0.30	3.46	0.01	3.11	-9.80	-5.24	171	5%
Convertible Arbitrage	0.23	0.32	1.39	-1.58	7.22	-6.04	-1.86	171	3%
Dedicated Short Bias	-0.06	-0.31	4.83	0.80	4.89	-9.13	-7.48	171	1%

Panel B: Financial Institution Indices

	Sharpe	Mean	Std Dev	Skew	Kurt	Min	5%	Obs
Hedge Fund Index	0.25	0.54	2.15	0.00	5.40	-7.97	-2.61	171
Investment Banks	0.02	0.13	5.29	-0.27	3.25	-16.63	-9.31	168
Commercial Banks	0.15	0.78	5.20	-0.60	5.66	-24.45	-7.46	168
Insurance Companies	0.16	0.76	4.64	0.10	6.49	-16.23	-6.30	168
Market	0.13	0.56	4.17	-0.74	3.97	-16.20	-6.44	172

TAKEAWAY FROM HF RETURNS

- Average Hedge fund Index return is comparable to S&P500.
- However, volatility of the hedge fund index is much smaller than S&P 500 (about half).
  - primarily due to the sharp decline of the S&P 500 in 2000 and 2001:
  - hedge funds have, on average, been able to unload the market risk prior to the decline, see e.g. Brunnermeier and Nagel (2004)
- Consequently, the Sharpe ratio for hedge funds is higher than the Sharpe ratio for the S&P500.
- Correlation of hedge fund index with market is low (49%)
  - Varies large across strategies
- Correlation of strategies with HF index is generally high

- Note in Malkiel and Saha (2005) returns are lower. They use equal weighted (instead of value weighted) returns of the TASS database.
  - In general, small funds perform worse than large funds

CORRELATION ACROSS STRATEGIES

CORRELATION STATISTICS (October 2006)

	Credit Suisse/Tremont Hedge Fund Index	S&P 500	MSCI World
Convertible Arbitrage	0.41	0.14	0.13
Dedicated Short Bias	-0.49	-0.76	-0.75
Emerging Markets	0.65	0.48	0.54
Equity Market Neutral	0.33	0.36	0.34
Event Driven	0.67	0.56	0.60
Fixed Income Arbitrage	0.45	0.03	0.04
Global Macro	0.86	0.23	0.19
Long/Short Equity	0.79	0.59	0.63
Managed Futures	0.15	-0.14	-0.08
Multi Strategy	0.22	0.10	0.17
Credit Suisse/Tremont Hedge Fund Index	1.00		
S&P 500	0.49	1.00	
MSCI World	0.49	0.94	1.00

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   - Focus I: Merger Arbitrage
     - Mitchell and Pulvino, 2001, Characteristics of Risk and Return in Risk Arbitrage, *J of Finance*
3. Liquidity Risk and Risk Management
   - Fund Flows
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   - Correlation across Hedge Funds
   - Focus II: 2007 Quant crisis

PERFORMANCE – RETURN ISSUES

1. Biases
   - Survivor – all alive funds have a 20% death rate
   - Backfill – smooth out returns
   - Self-reported
2. Estimation impression of mean returns
   - $\sigma / \sqrt{T}$, if σ=15%, then uncertainty about 5 year mean return is 1.96*15/5$^{.5}$=+/-13%
3. Stale prices – return smoothing
4. Non-linear strategies
   - Small prob. Disaster – historical averages are a poor measure
5. little persistence in outperformance

Conclusion
- Evaluation of average returns or alphas is very noisy
- Evaluation of risk measure or betas is useful

PERFORMANCE MEASURES

✖ Jensen α (risk that is not due to loading on market risk)
  ✚ For CAPM

$$r_{P,t} = \alpha_P + \beta_P r_{M,t} + \varepsilon_{P,t}$$

$$E[r_P] = \alpha_P + \beta_P E[r_M]$$

  ✖ β_P: tendency of return to rise if market rises
  ✖ $\beta_P r_{M,t}$: can get simply be investing in index ("style")
  ✖ α_P: return in excess – selection/timing
  ✖ $\varepsilon_{P,t}$: extra risk beyond index fund
  ✚ For multi-factor model
✖ Appraisal (information) $\alpha_P/\sigma_\varepsilon$ (takes leverage into account)

PERFORMANCE MEASURES

* Jensen's α

* Appraisal Ratio

* Sharpe Ratio $\qquad \dfrac{E[r_P] - E[r_f]}{\sigma_P}$

  + earned average risk premium of portfolio/fund P per unit of total risk $\qquad \dfrac{E[r_P] - E[r_f]}{\beta_P}$

* Treynor Index

 + earned average risk premium of portfolio/fund P per unit of systematic risk (measured by beta)

ALPHAS OVER TIME

Hedge Fund Performance
Controlling for the S&P 500 Return and the VIX Return

Source: FRBNY calculations from TASS
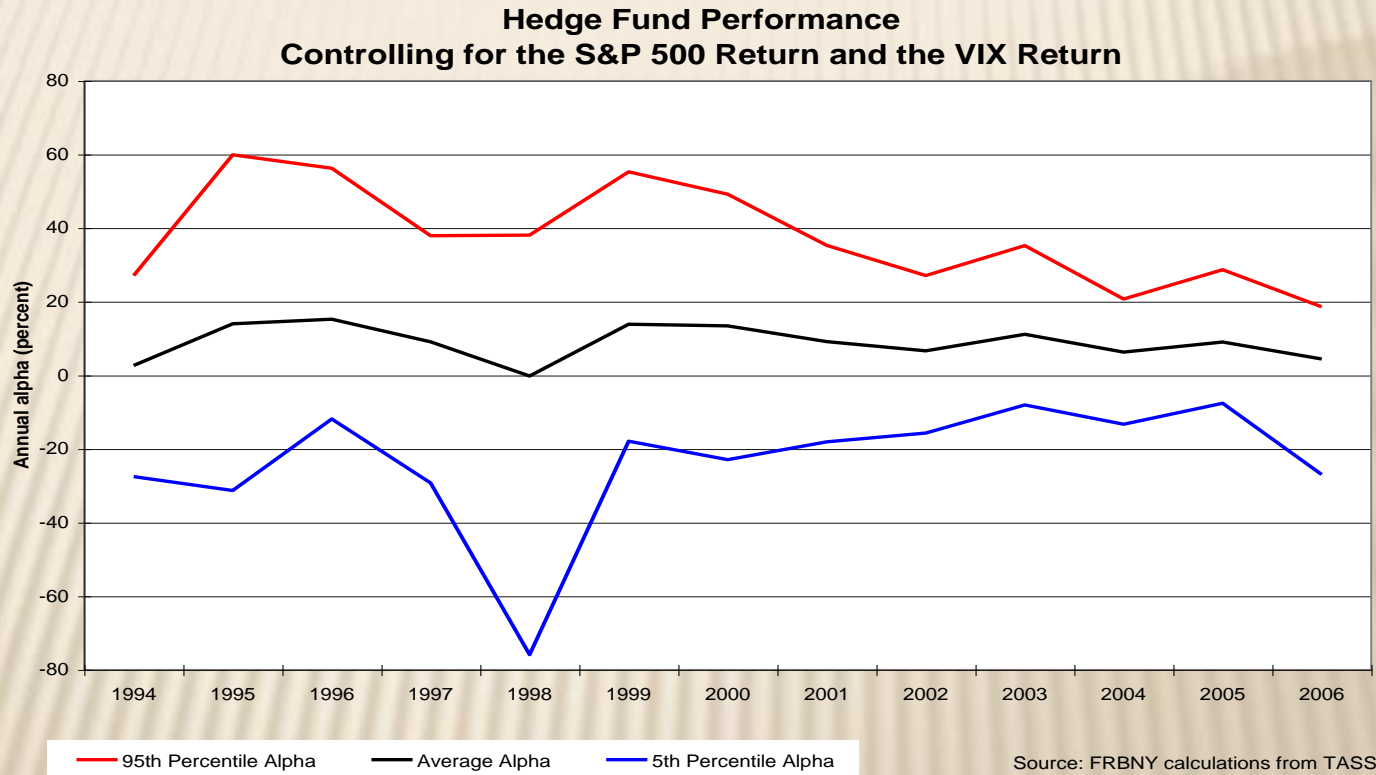
- ❑ Alpha for two factor model with S&P500 and VIX
- ❑ Note cross-section alpha is getting compressed over time

MARKET-BETA OVER TIME

Annual Hegde Fund S&P500 Betas (TASS)
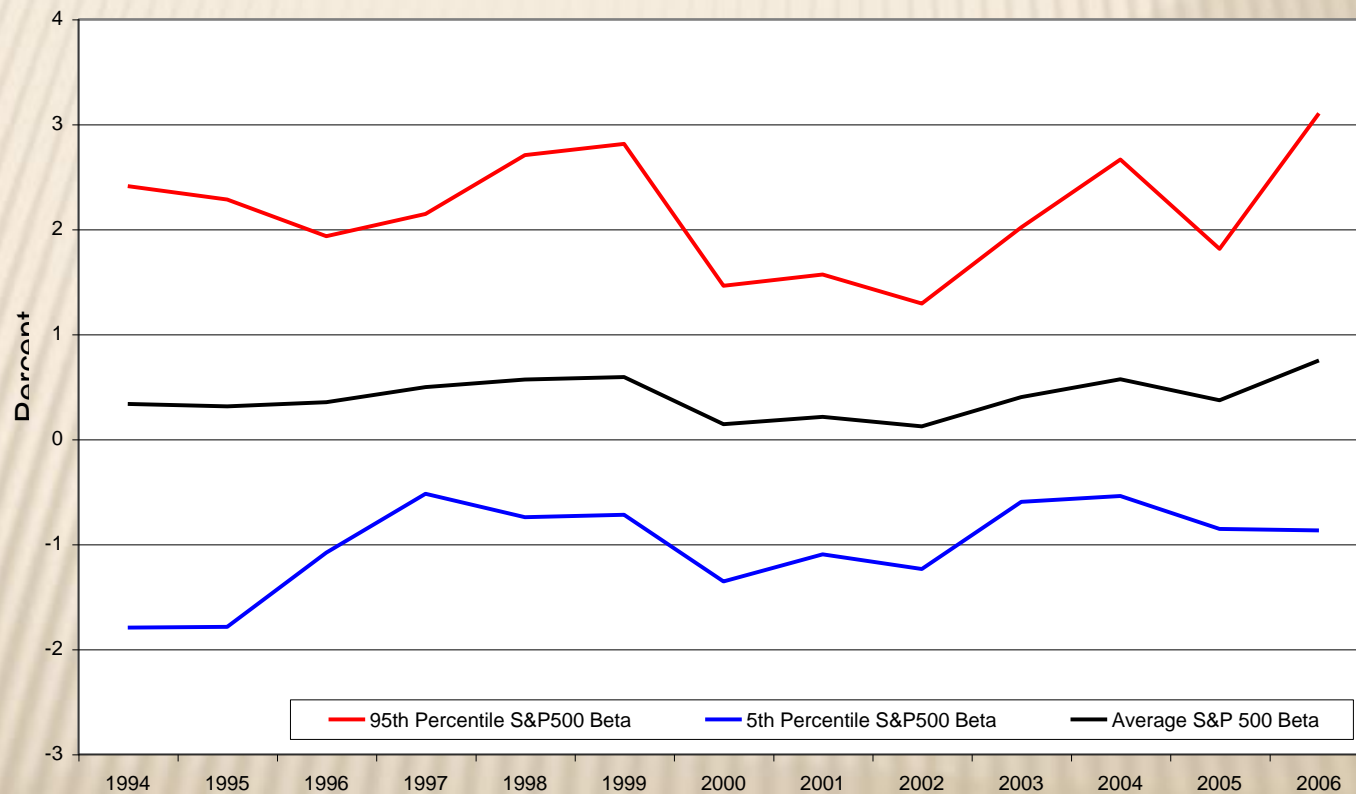
VIX-beta looks similar

Regression Of HFR Equity Hedge Index on 4-Factor Model
1994-2002

	2-Factor	3-Factor	4-Factor	Nonlinear
Intercept	**0.0102**	**0.0103**	**0.0091**	**0.0076**
	0.0011	*0.0012*	*0.0011*	*0.0022*
Mkt-RF	**0.4383**	**0.4385**	**0.4721**	**0.4426**
	0.0270	*0.0300*	*0.0273*	*0.0307*
SMB	**0.2646**	**0.2648**	**0.2496**	**0.2545**
	0.0412	*0.0399*	*0.0373*	*0.0350*
HML		0.0006	0.0232	
		0.0458	*0.0389*	
MOM			**0.0851**	
			0.0236	
|Mkt-Rf|				0.0191
				0.0519
|SMB|				0.0602
				0.0488
R^2	0.8109	0.8109	0.8374	0.8156
Adjusted R^2	0.8073	0.8055	0.8312	0.8084

(Heteroskedasticity-consistent standard errors in italics. Coefficients in bold are statistically significant at the 1% level)
Two-factor model: Rm-Rf and SMB from Fama-French (1992).
Three-factor model: Rm-Rf, SMB, and HML from Fama-French (1992).
Four-factor model: Rm-Rf, SMB, and HML from Fama-French (1992), and MOM from Carhart (1997).

- ❑ More than 80% is explained by FF-factors
- ❑ α-Intercept is still significant
- ❑ But volatility is much lower

STALE PRICES – RETURN SMOOTHING

- Investing in illiquid assets with stale prices makes
  - Correlation with factor (e.g. market) appear to be low
    - Wrongly lowers β-estimate, increase α-estimate
  - Returns appear less volatile
    - Information ratio increases

USING LAGS TO IDENTIFY STALE PRICES

Style	ER (%/mo)	a	b	a3	b3
Index	0.64	**0.46**	**0.28**	**0.36**	**0.44**
Std. errors	0.20	0.17	0.04		
Short	-0.53	0.10	-0.94	0.13	-0.99
Emerg mkts	0.39	**0.00**	**0.58**	**-0.07**	**0.69**
Event	0.61	0.46	0.22	0.38	0.37
Global Macro	0.93	0.82	0.17	0.74	0.31
Long/Short Equity	0.73	0.42	0.47	0.32	**0.65**

Not zero!

Bigger with lags

Smaller with lags

Really not zero. "Alternative asset?"

Long-short doesn't mean zero beta!

$$r_t^i = a + b r_t^{s\&p500} + \varepsilon_t^i$$

$$r_t^i = a3 + b_1 r_t^{sp} + b_2 r_{t-1}^{sp} + b_3 r_{t-2}^{sp} + b_4 r_{t-3}^{sp} + \varepsilon_t^i$$
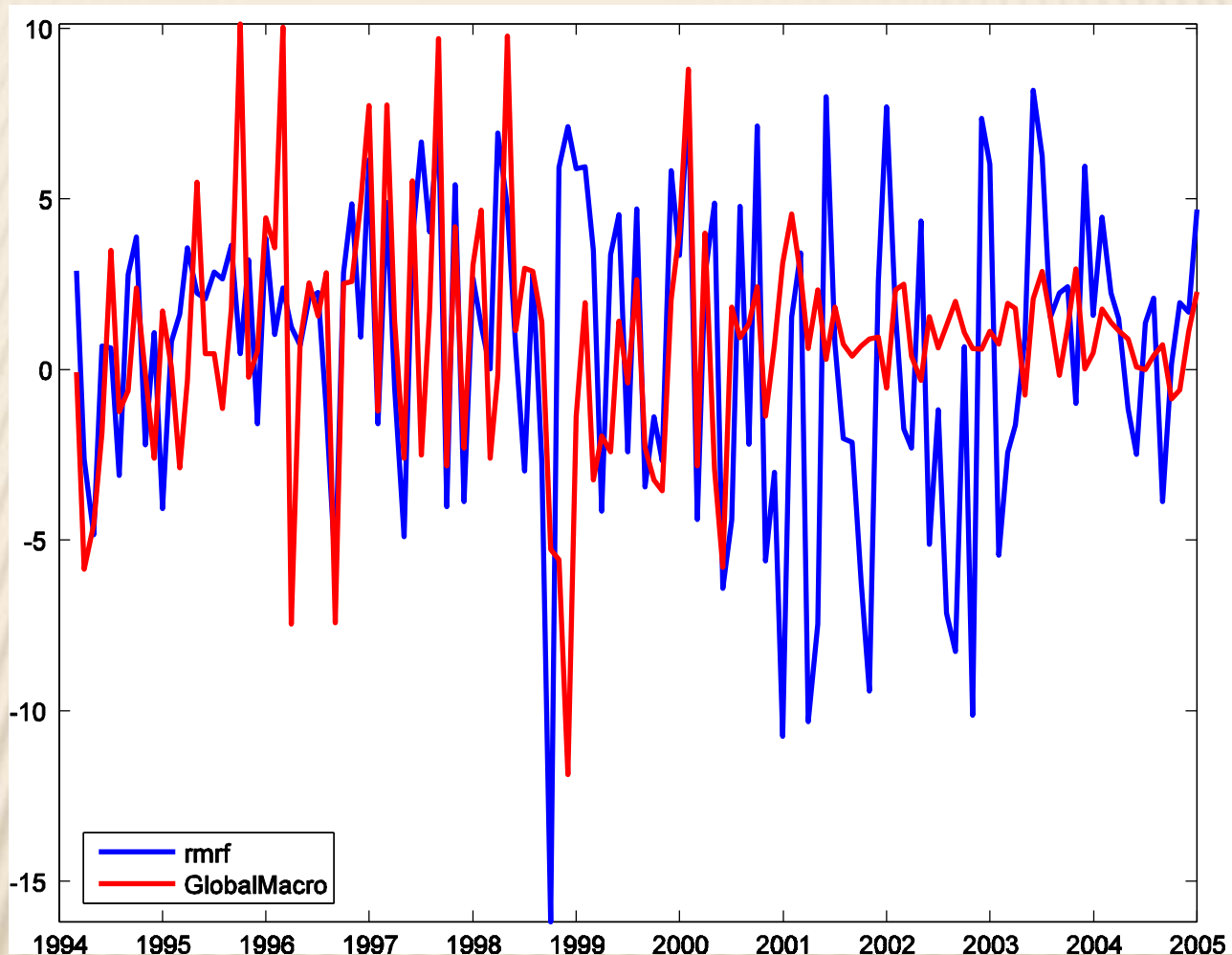
$$b3 = b_1 + b_2 + b_3 + b_4$$

Lags are important – stale prices or lookback option
Betas are big!

Source for following slides: John Cochrane's website, idea from Asness et al JPM

Annual returns -- moving average
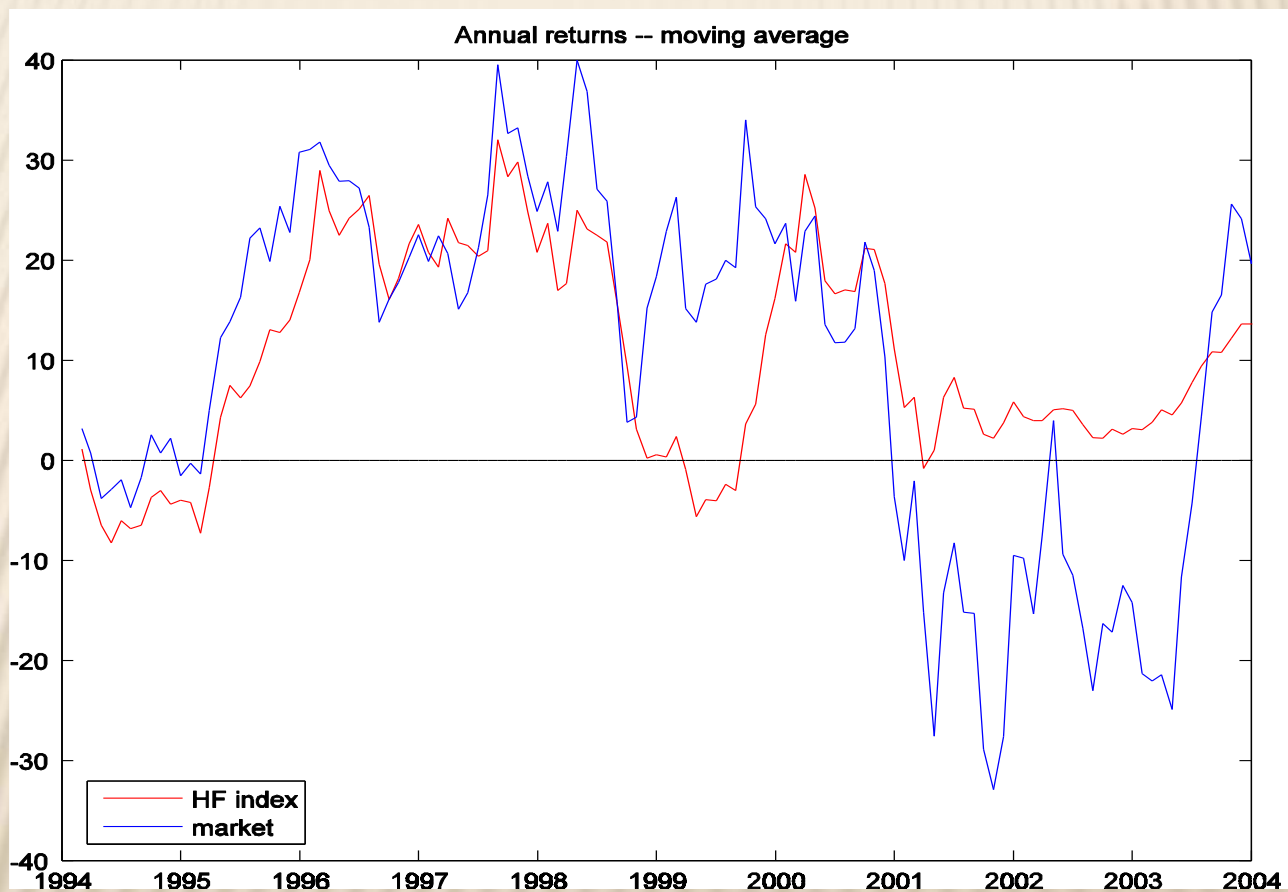
Correlation with the market is obvious.
Getting out in 2000-2003 was smart! (Mostly due to Global/Macro group)
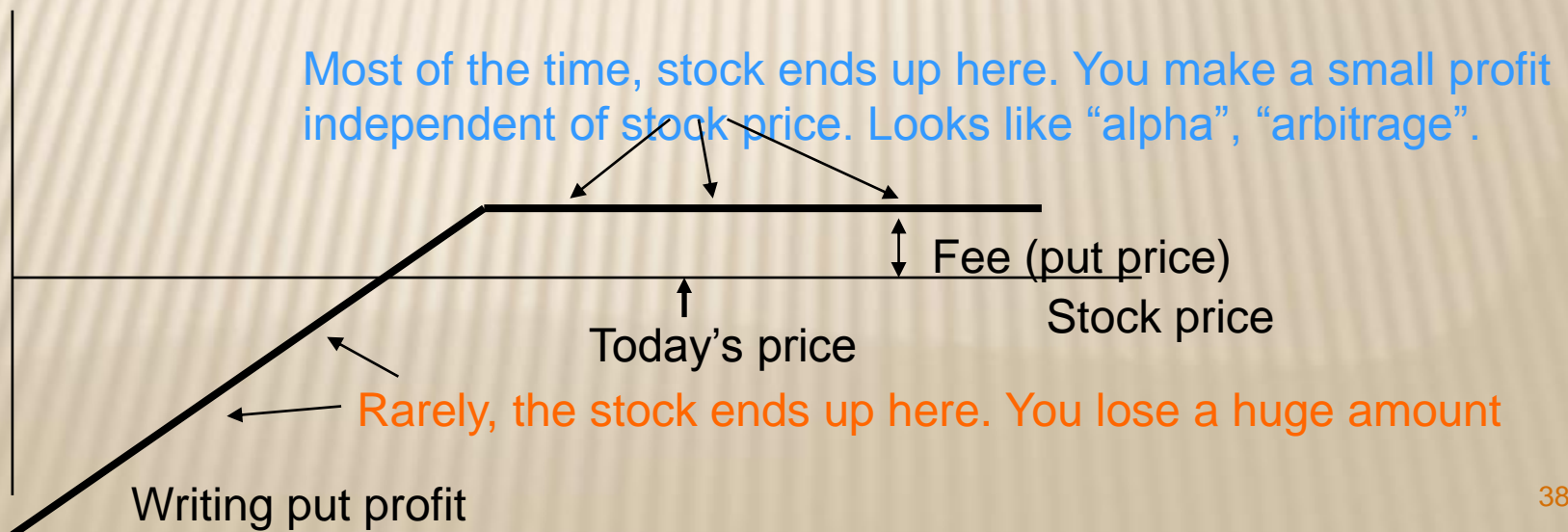
Monthly returns on Global Macro HF and US market

"Global macro" yet you see the correlation with US market
Lagged market effect is clear in 1998. Is Nov/Dec 1998 unrelated to Oct?
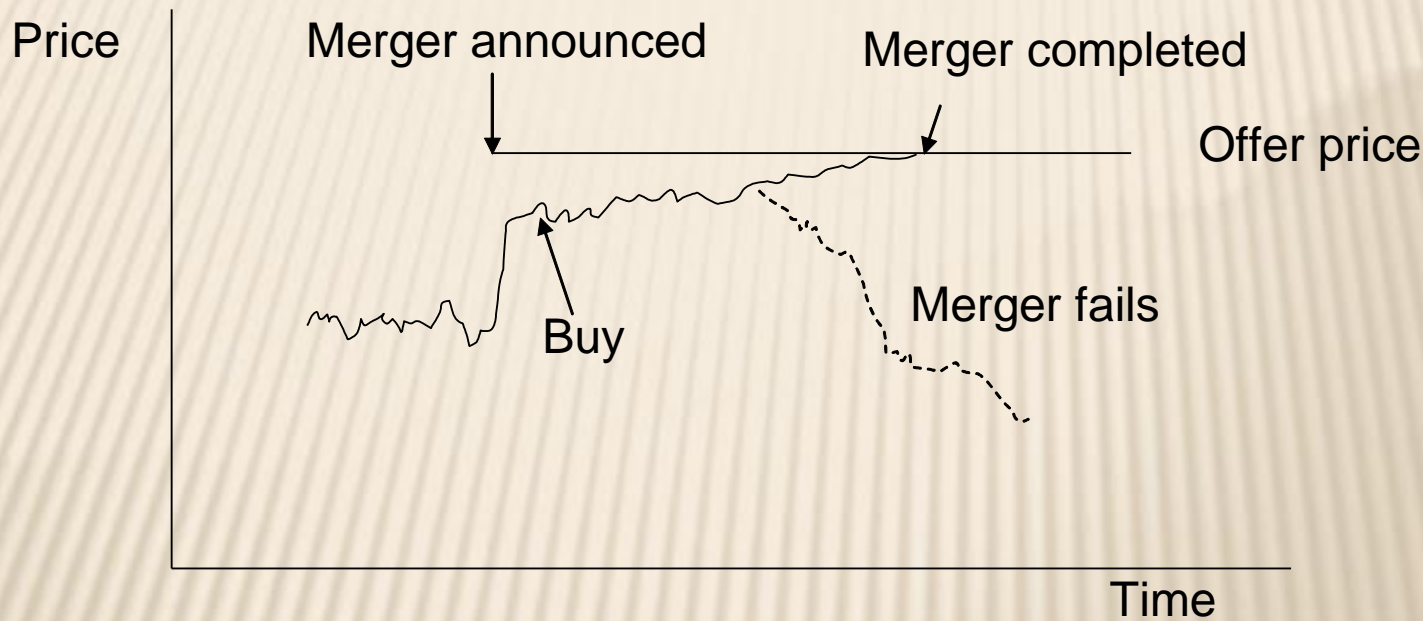Dramatic stabilization / change of strategy in mid 2000

NON-LINEAR PAYOFFS

- Linear CAPM regression cannot capture non-linear payoff structures that arise
  - From trading options
  - Replicating options with dynamic trading strategies
- Popular HF-strategy – writing put options

You collect a fee, only pay off if the market goes down a lot.
Providing "disaster insurance"

Most of the time, stock ends up here. You make a small profit independent of stock price. Looks like "alpha", "arbitrage".

Fee (put price)

Stock price

Today's price

Rarely, the stock ends up here. You lose a huge amount

Writing put profit

MERGER ARBITRAGE – OPTION LIKE RETURN

Price

Merger announced

Merger completed

Offer price

Buy

Merger fails

Time

- Cash offer. Borrow, buy target – short acquirer.
- Large chance of a small return if successful. (Leverage up)
- Small chance of a large loss if unsuccessful.
- But…offer is more likely to fail if the market falls!
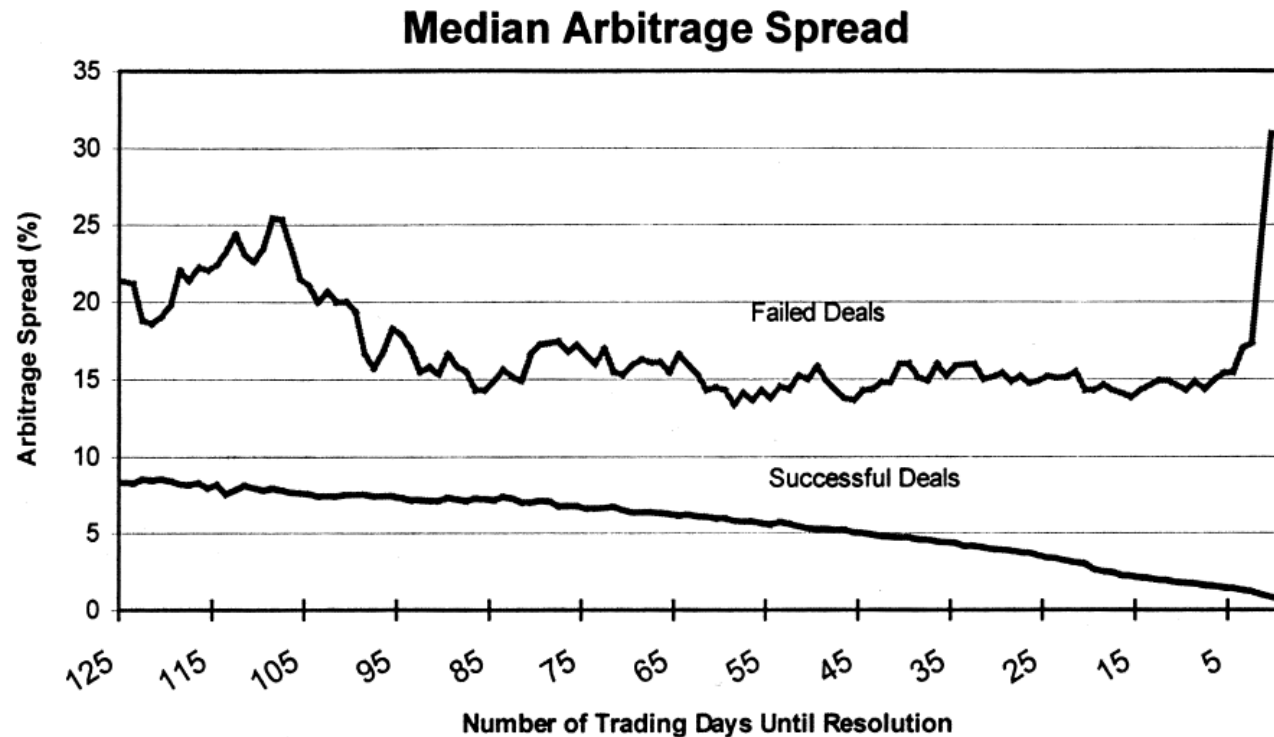- Payoff is like an index put!

ARBITRAGE SPREAD

Median Arbitrage Spread

Figure 1. This figure plots the median arbitrage spread versus time until deal resolution. The arbitrage spread is defined to be the offer price minus the target price divided by the target price. For failed deals, the deal resolution date is defined as the date of the merger termination announcement. For successful deals, the resolution date is the consummation date.
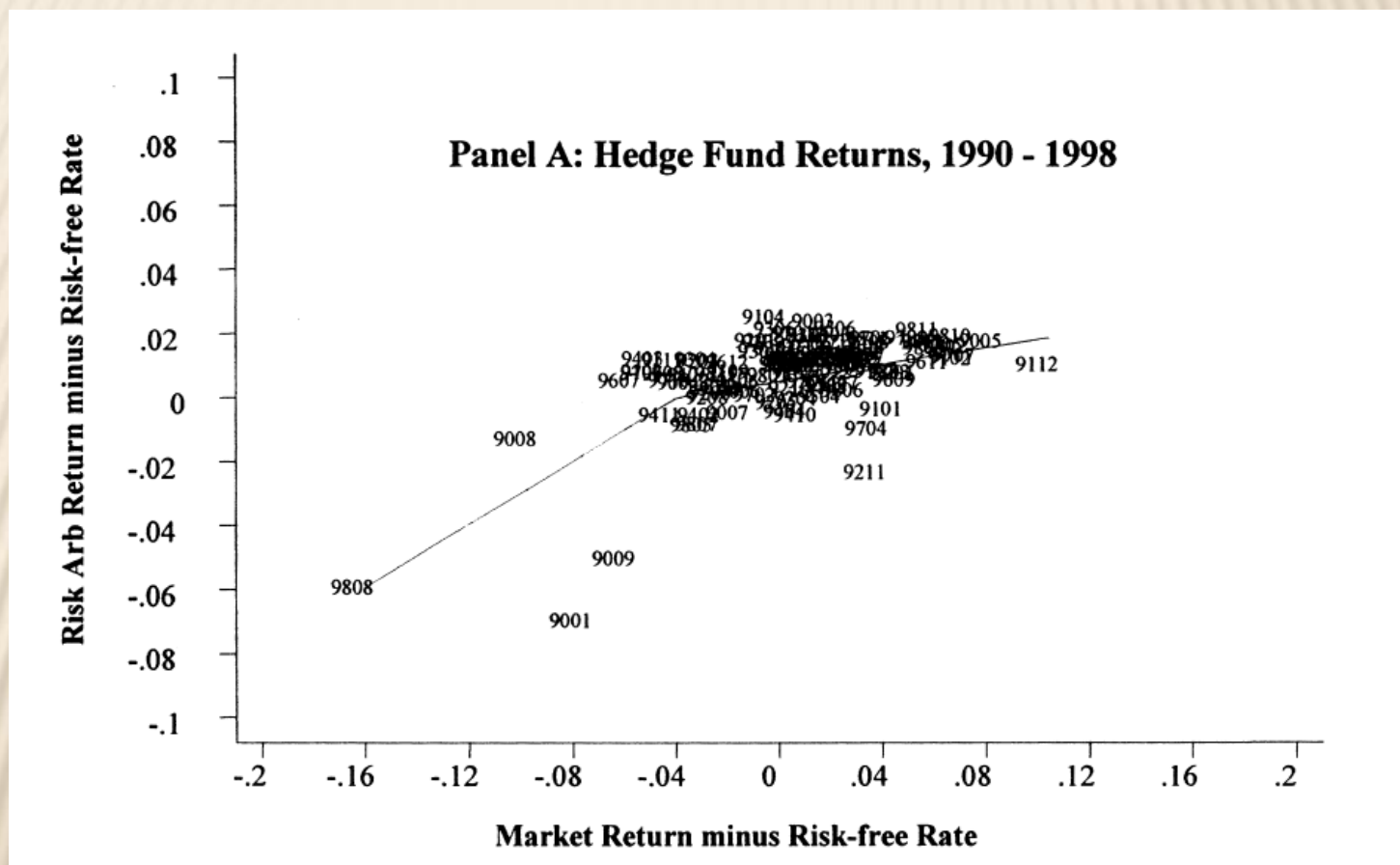
MERGER ARBITRAGE – OPTION LIKE RETURN

Panel A: 1975 - 1998
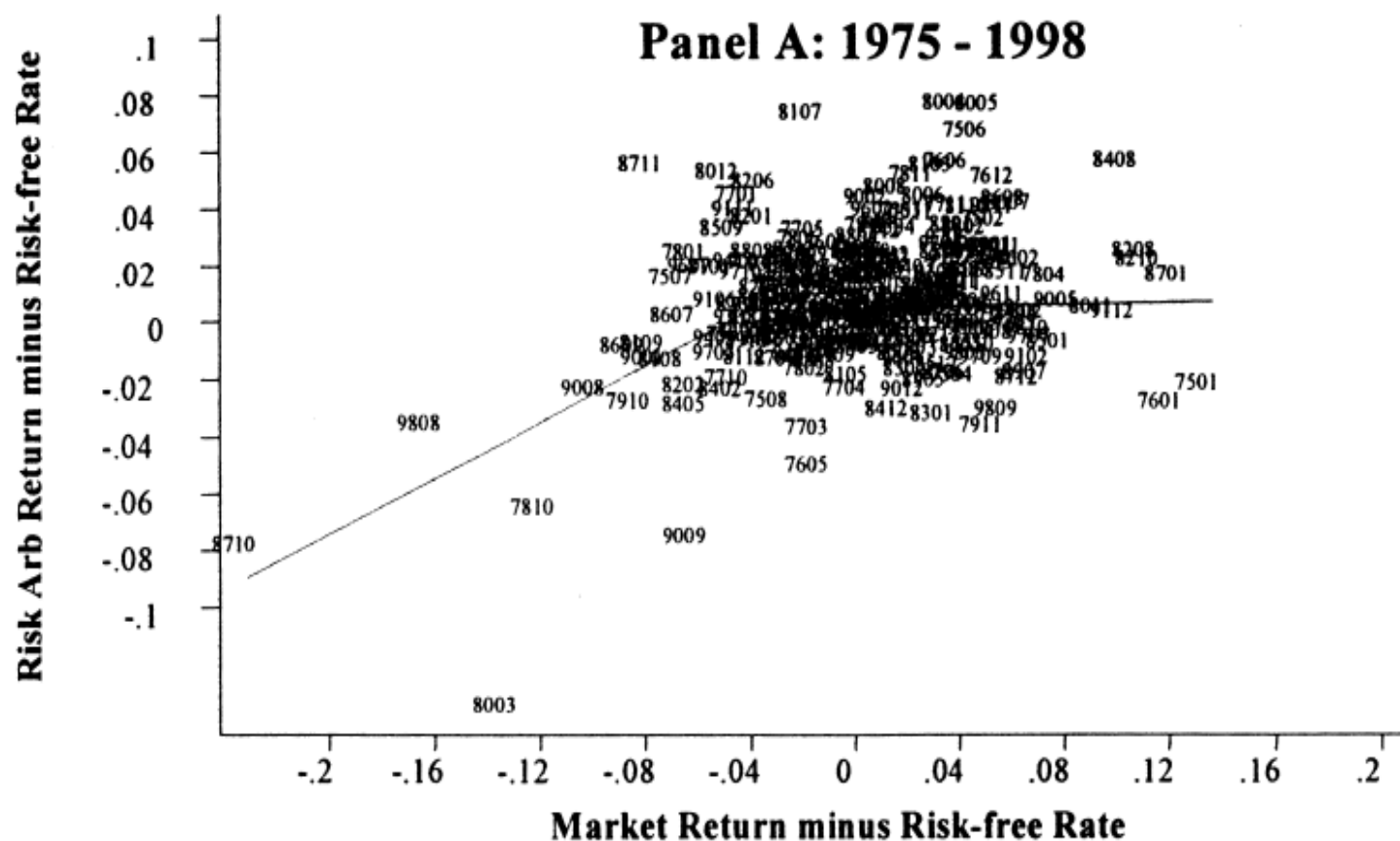
Mitchell and Pulvino, JF

* Line indicates similarity to writing index puts

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Panel A: Hedge Fund Returns, 1990 - 1998

Mitchell and Pulvino, JF

☐ Occasional catastrophes

☐ Catastrophes are more likely when market declines

UP/DOWN BETA – OPTION PAYOFF

Style	b3	b up	b down
Index	0.44	**0.08**	**0.77**
Short	-0.99	**-0.22**	**-1.82**
Emerg mkts	0.69	**0.08**	**1.16**
Event	0.37	**0.18**	**0.47**
Global Macro	0.31	**-0.08**	**0.66**
Long/Short Eqty	0.65	**0.19**	**1.18**

Example: if the market goes up 10%, the HF index goes up 0.8%. But if the market goes down 10%, the HF index goes down 7.7%!

$$r_t^i = a3 + b_1 r_t^{sp} + b_2 r_{t-1}^{sp} + b_3 r_{t-2}^{sp} + b_4 r_{t-3}^{sp} + \varepsilon_t^i$$
$$b3 = b_1 + b_2 + b_3 + b_4$$

$$r_t^i = a + b_{up}(r_t^{sp} > 0) + b_{down}(r_t^{sp} < 0) + \varepsilon_t^i$$

(Includes 3 lags)

- Betas are close to one
- Hence, need option-return benchmarks

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INCLUDE OPTION FACTORS

$$r_t^i = \alpha_i + \beta_i^{sp} r_t^{sp} + \beta_i^{SPPo} SPPo_t + s_i\, SMB_t + h_i\, HML_t + \varepsilon_t^i$$

	ER (%/mo)	alpha	SPPo (puts)	SMB (size)	HML (value)
Event Arb	1.03	0.04	-0.92	0.15	0.08
Restructure	1.29	0.43	-0.63	0.24	0.12
Event driven	1.33	0.20	-0.94	0.31	0.12
Rel. value arb	1.15	0.38	-0.64	0.17	0.08

SPPo = return from rolling over out-of-the-money puts
Source: Agarwal and Naik *RFS*, using HFR data

☐ Large market betas emerge
☐ Alphas are smaller

PROBLEM

- Lots more factors are needed
  1. Market, value, size, momentum, term, default, currency
  2. Options on all of these
  3. Time-varying coefficients …
- Problems
  1. More regressors than data points
  2. …

OVERVIEW

1. A Primer on Hedge Funds
   - History, Compensation,
   - Hedge Fund Strategies
2. Performance
   - alpha versus beta
     - stale prices
     - non-linear payoffs
   - Focus I: Merger Arbitrage
     - Mitchell and Pulvino, 2001, Characteristics of Risk and Return in Risk Arbitrage, *J of Finance*
3. Liquidity Risk and Risk Management
   - Risk spillovers
   - Focus II: 2007 Quant crisis

DISMAL RETURNS OF LIQUIDATED FUNDS

Monthly returns for liquidated funds towards liquidation (TASS)
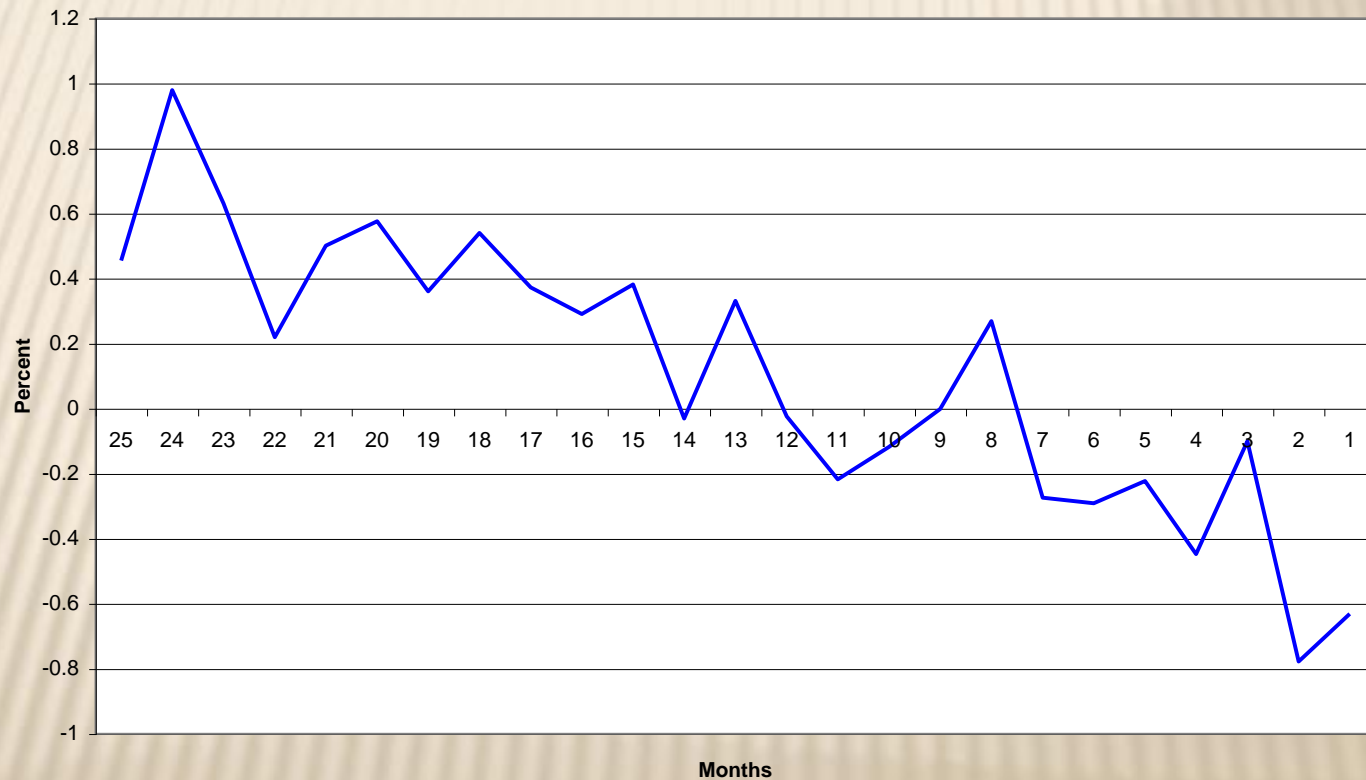
FLAVORS OF FUNDING LIQUIDITY

□ Margin funding risk   *Prime broker*
  ▫ Margin has to be covered by HF's own capital
  ▫ Margins increase at times of crisis
□ Rollover risk   *CP*
  ▫ Inability to roll over short-term commercial paper
□ Redemption risk   *Depositors, HF-investors*
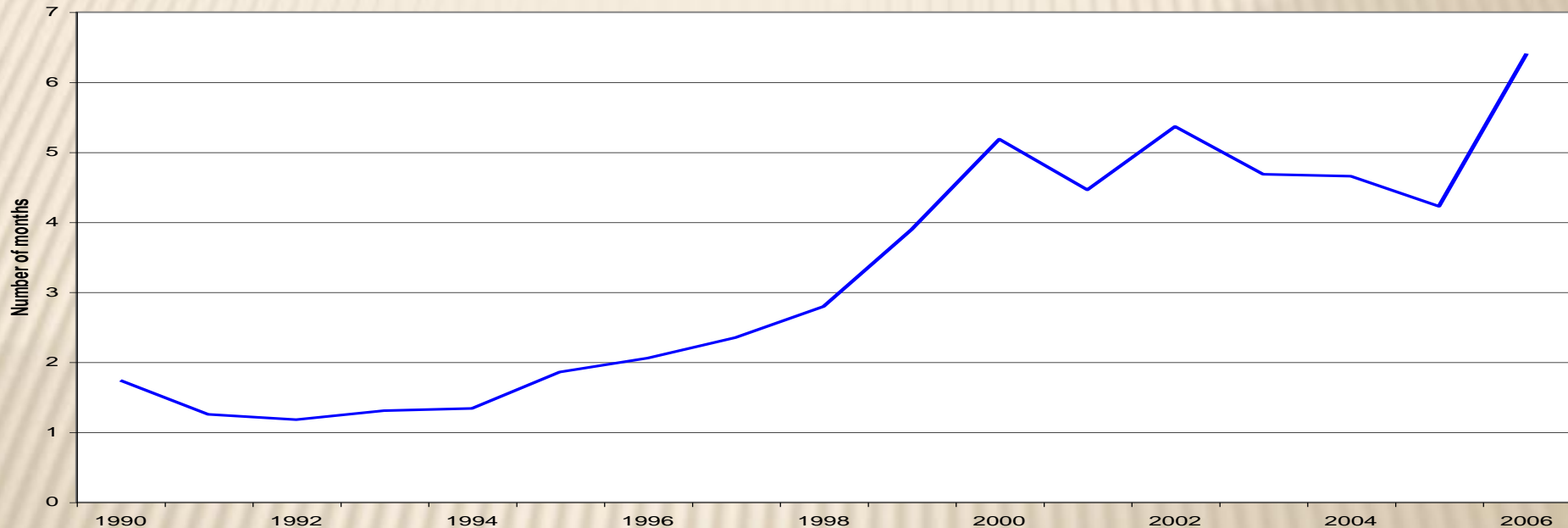 ▫ Outflow of funds for HFs and banks

Essentially the same!
Maturity mismatch:
        Long-term assets (with low market liquidity)
        Short-term borrowing

FUND OUTFLOWS FROM INVESTORS

Average Lock-up Period (TASS)

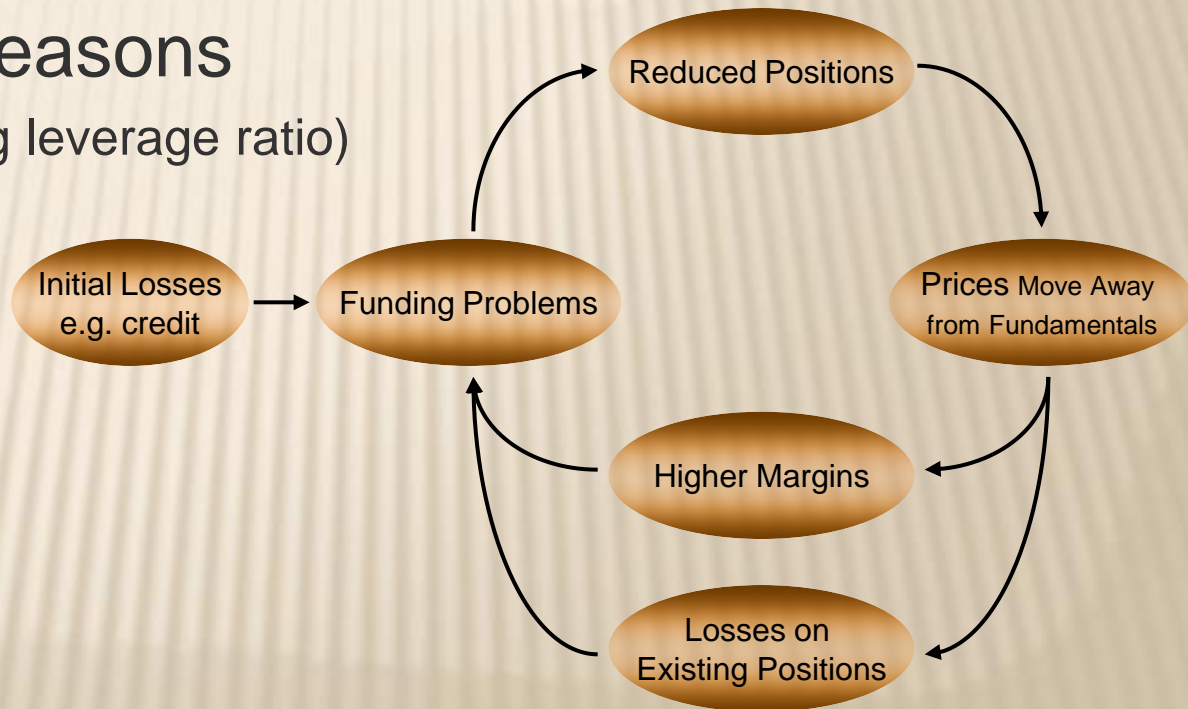- Lock up periods
- Gates
- Side pockets

FUND OUTFLOWS – MARGIN SPIRAL

× Loss spiral

   + Net wealth > α x
     for asym. info reasons

   + (constant or increasing leverage ratio)

   + Bernanke-Gertler, …

× Margin spiral
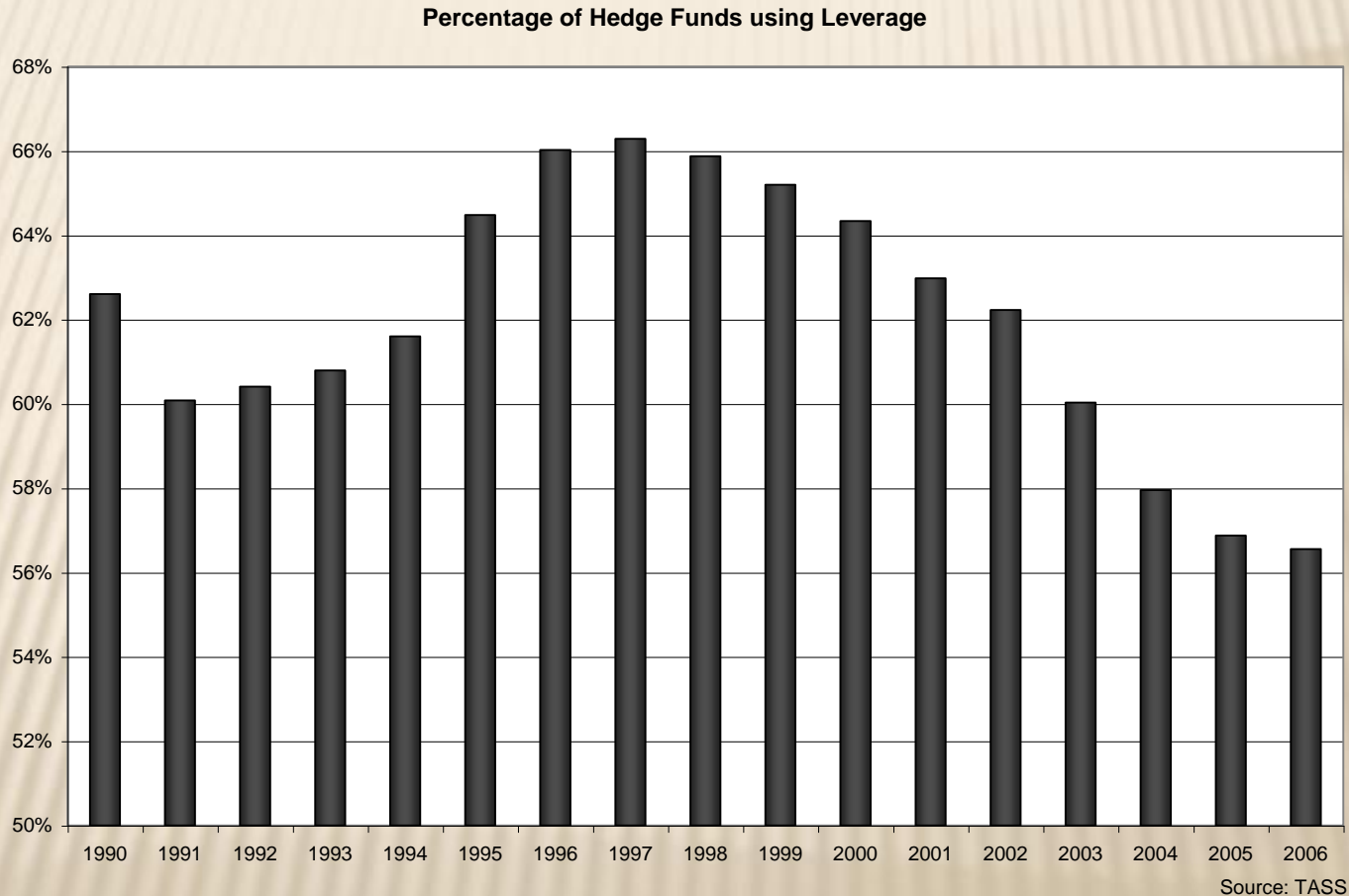
   + (forces to delever)

Reduced Positions

Initial Losses
e.g. credit

Funding Problems

Prices Move Away
from Fundamentals

Higher Margins

Losses on
Existing Positions

Source: Brunnermeier & Pedersen (2007)

• Both spirals reinforce each other

FUND OUTFLOWS – MARGIN SPIRAL

Percentage of Hedge Funds using Leverage

Source: TASS

Somewhat surprising, fraction of funds using leverage is declining

MARGIN SPIRAL – SUMMER 2007

Margins/Haircuts:

Rating	Jan-May 2007	July-Aug 2007
	Bond	
Investment grade	0-3	3-7
High yield	0-5	10+
	Leveraged Loan	
Senior	10-12	15-20
2nd lien	15-20	20-30
Mezzanine	18-25	30+
	ABS and CDO	
AAA	2-4	8-10
AA	4-7	20
A	8-15	30
BBB	10-20	50
Equity	50	100

Source: Citigroup, IMF Stability report 2007

LEVERAGE AND ALPHAS

Hedge Fund Performance and Leverage

The red boxes indicate the percentage of funds in the top 5 percentile that use leverage.
The blue boxes indicate the percentage of funds in the bottom 5 percentile that use leverage.
The black boxes indicate the percentage of funds that use average leverage.

95th Percentile Alpha   Average Alpha   5th Percentile Alpha
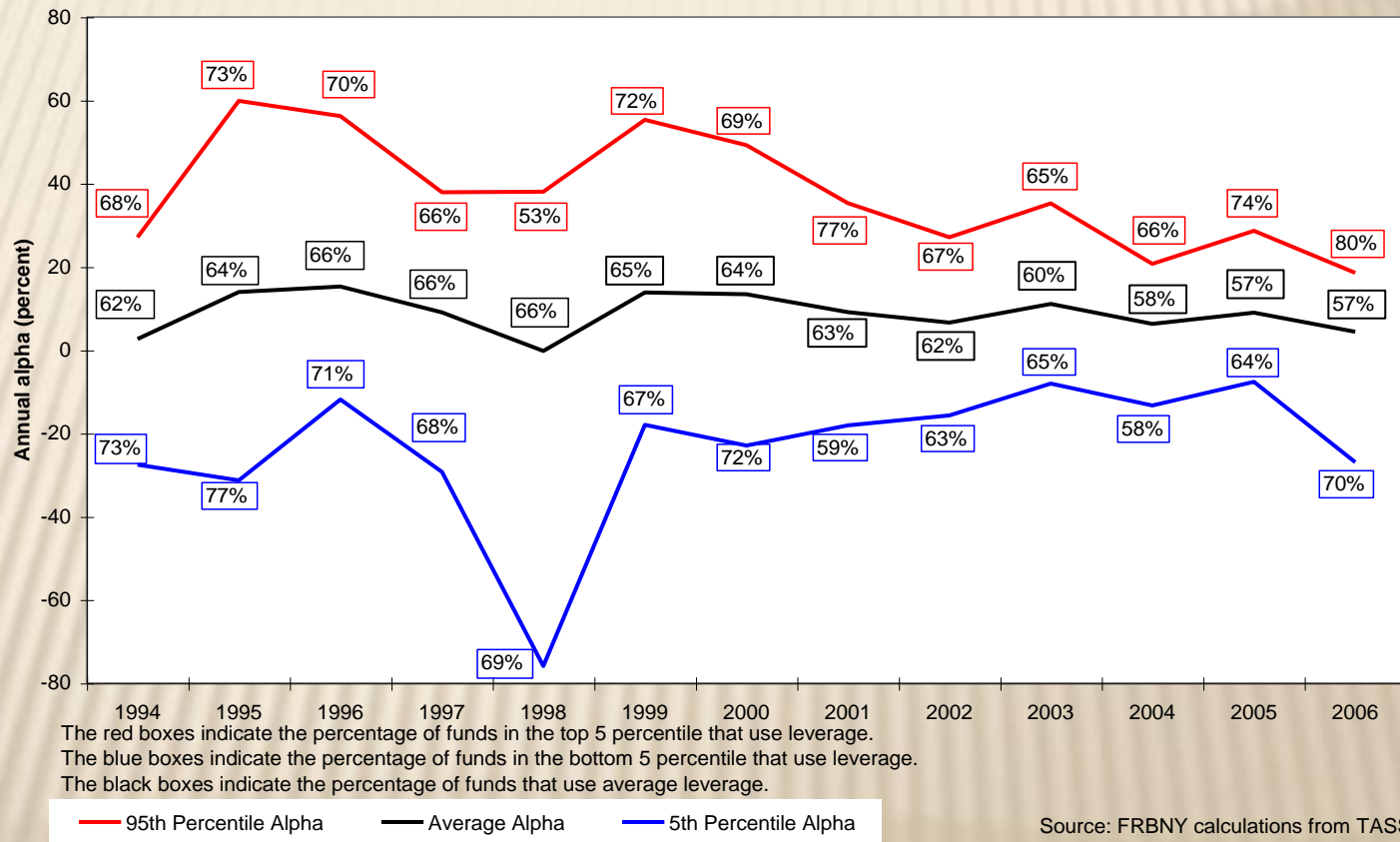
Source: FRBNY calculations from TASS

- Top and bottom performers have higher leverage
- In 2005/06 leverage is high
- In 1998 leverage is low

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MARGIN SPIRAL AND FAT TAILS

Frequency over March 1994–September 1998
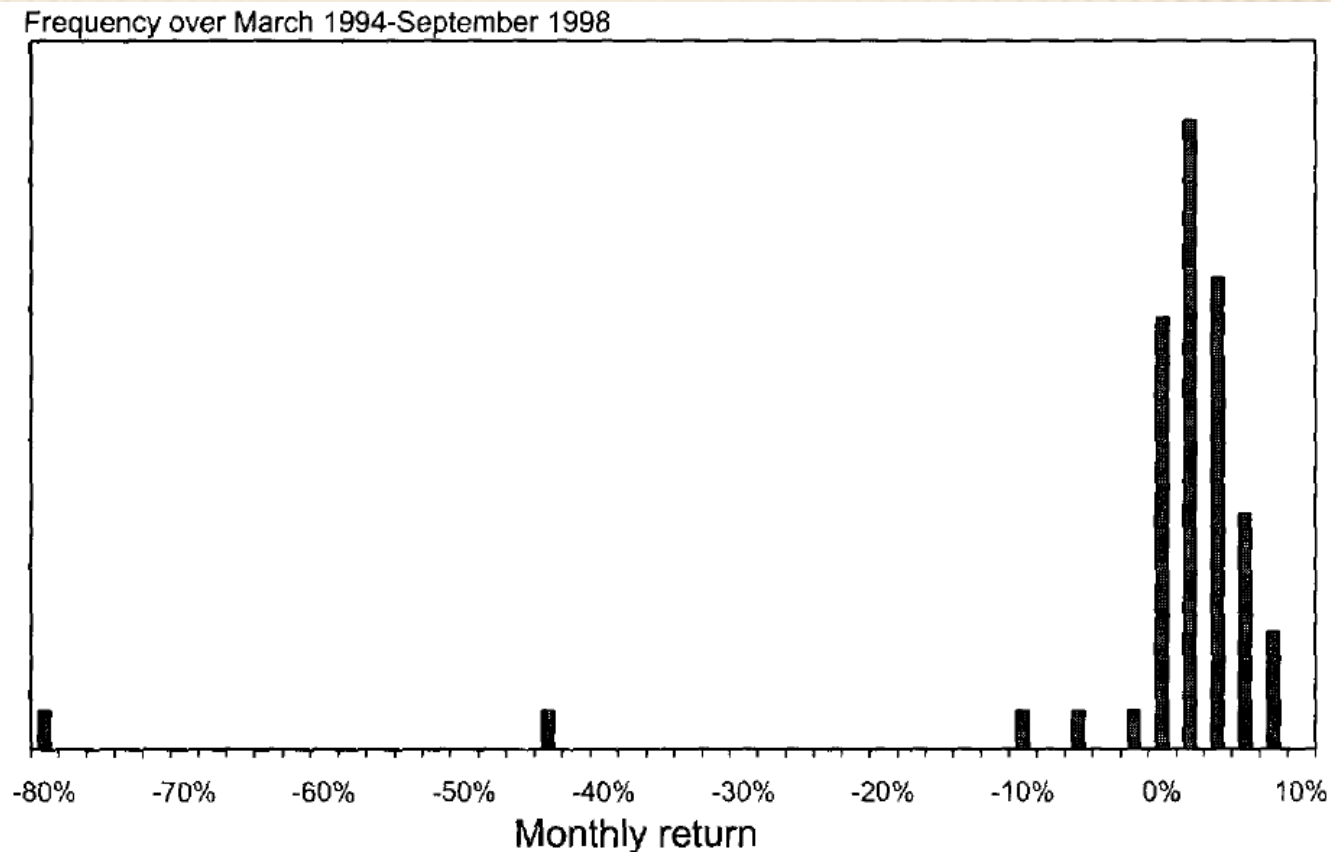
Monthly return

Fig. 12. Distribution of LTCM's monthly returns.

Source: Jorion (2000)

✖ Crowded trades?
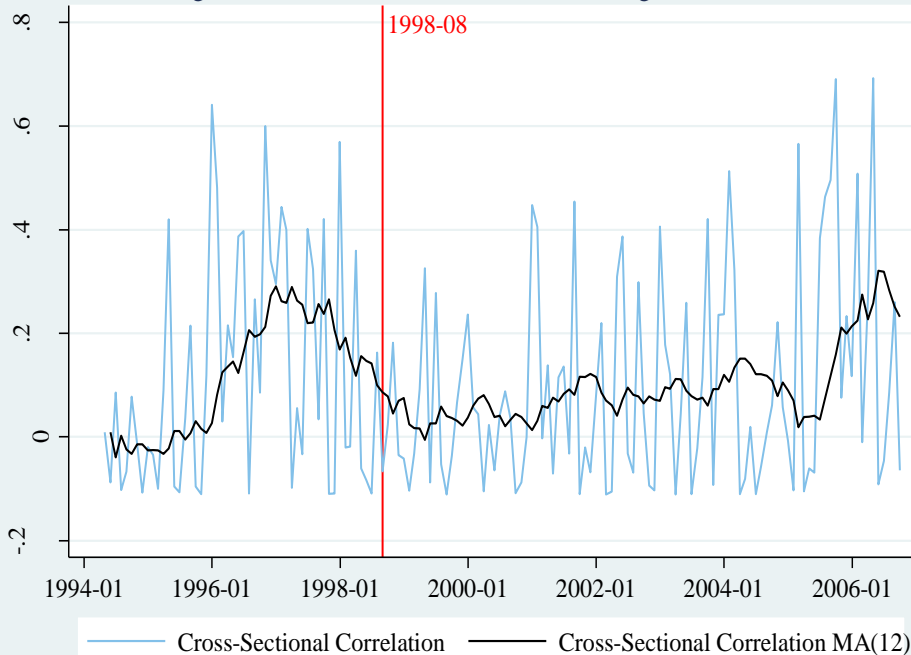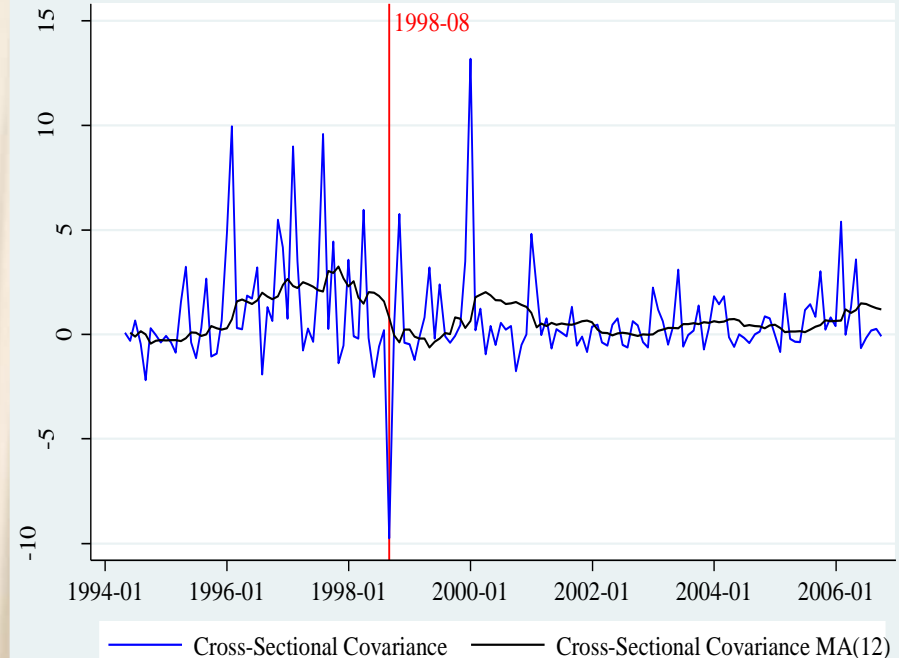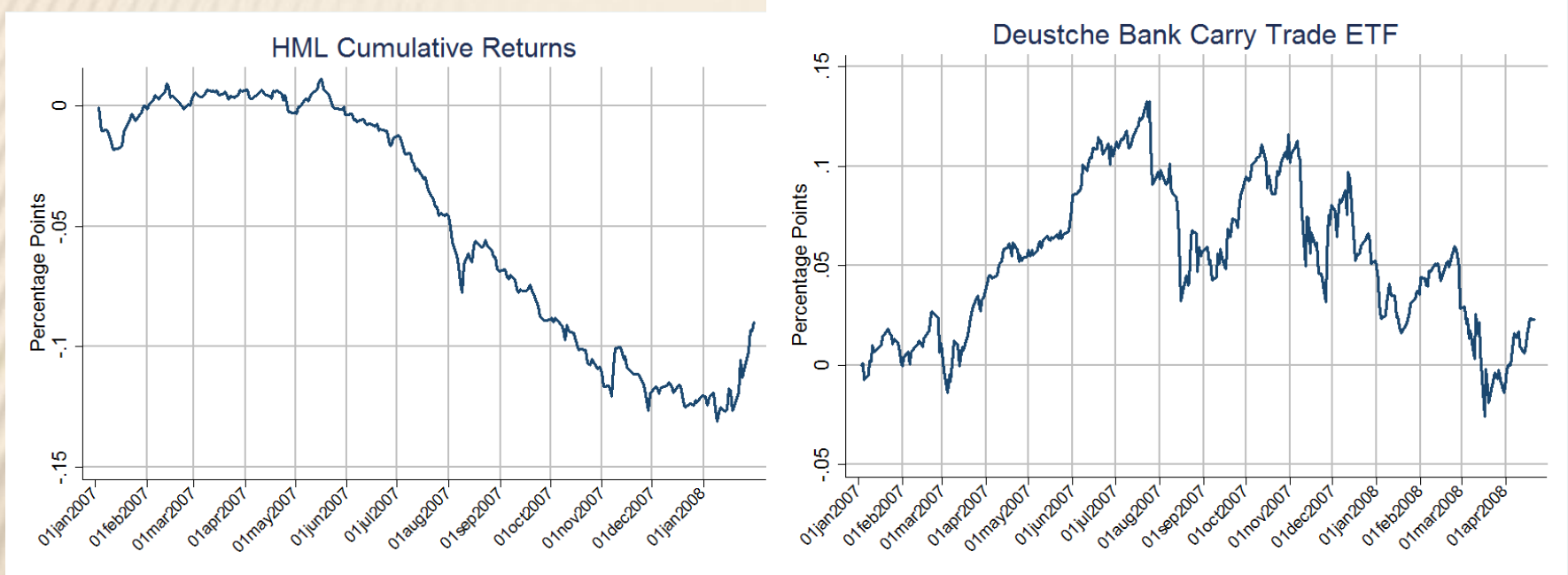

Figure 4: Cross-sectional Correlation of Hedge Fund Returns

Figure 3: Cross-sectional Covariance of Hedge Fund Returns

✖ Correlation can be misleading

➕ Vol declined – great moderation

- Why? Many (not only quant) funds liquidate "relatively" liquid positions first – "liquid HML" suffered even more
- Quant funds focus on same few "quant strategies"
- Almost all quant strategies *comoved* – "crowded trades"
  - US from 08/05/07 + sharp (correlated) rebound on 08/10/07
  - Europe/Japan from 08/08/07 onwards

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FUTURE TRENDS

- Diversify across
  - Assets
    - sovereign bonds, agencies, corporate, equity, private equity, real estate
  - Countries
    - Large impact on US Treasuries
- Financial Protection – Next Risk
  - Economic or strategic investments
  - Geopolitical dimension
- Transparency
  - Objectives, activities, performance