Mixing Hedge Funds with Traditional Investment Vehicles

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Outline

- Introduction
- The contrasted diversification properties of hedge funds
- Advanced techniques for hedge fund allocation decisions
- Hedge funds in a core-satellite-approach
- Equity market neutral strategies as portable alpha vehicles
- Conclusion

Introduction

Alpha and Beta Benefits of Hedge Fund Investing

- Hedge funds have been promoted on the basis of simple Sharpe ratio, correlation and in-sample efficient frontier analysis
- Recent research has emphasized the need to use more sophisticated approaches to appreciate the benefits of hedge fund investing
- Two reasons to invest in HFs
  - Normal returns obtained through exposure to non-market risk sources (betas)
  - Abnormal returns obtained through return enhancement (alphas)
- This talk is about optimal allocation to hedge funds given (uncertain)
  - Alpha estimates
  - Beta estimates

Diversification Properties of Hedge Funds
Low Correlation with Financial Markets Returns

	S&P 500	Lehman Bond	S&P 500 and Lehman Bond
EACM100	0.39	0.19	0.39
Relative value	0.08	-0.06	0.05
Event driven	0.48	0.09	0.44
Equity hedge	0.60	0.14	0.56
Global macro	0.10	0.25	0.15
S&P 500	1.00	0.37	0.97
Lehman Bros. Bond	0.37	1.00	0.59

Based on Monthly Data on the Time Period Jan 1990-Dec 2000

Diversification Properties of Hedge Funds
Low Conditional Correlation

→ Persistent decorrelation in periods of extreme market movement

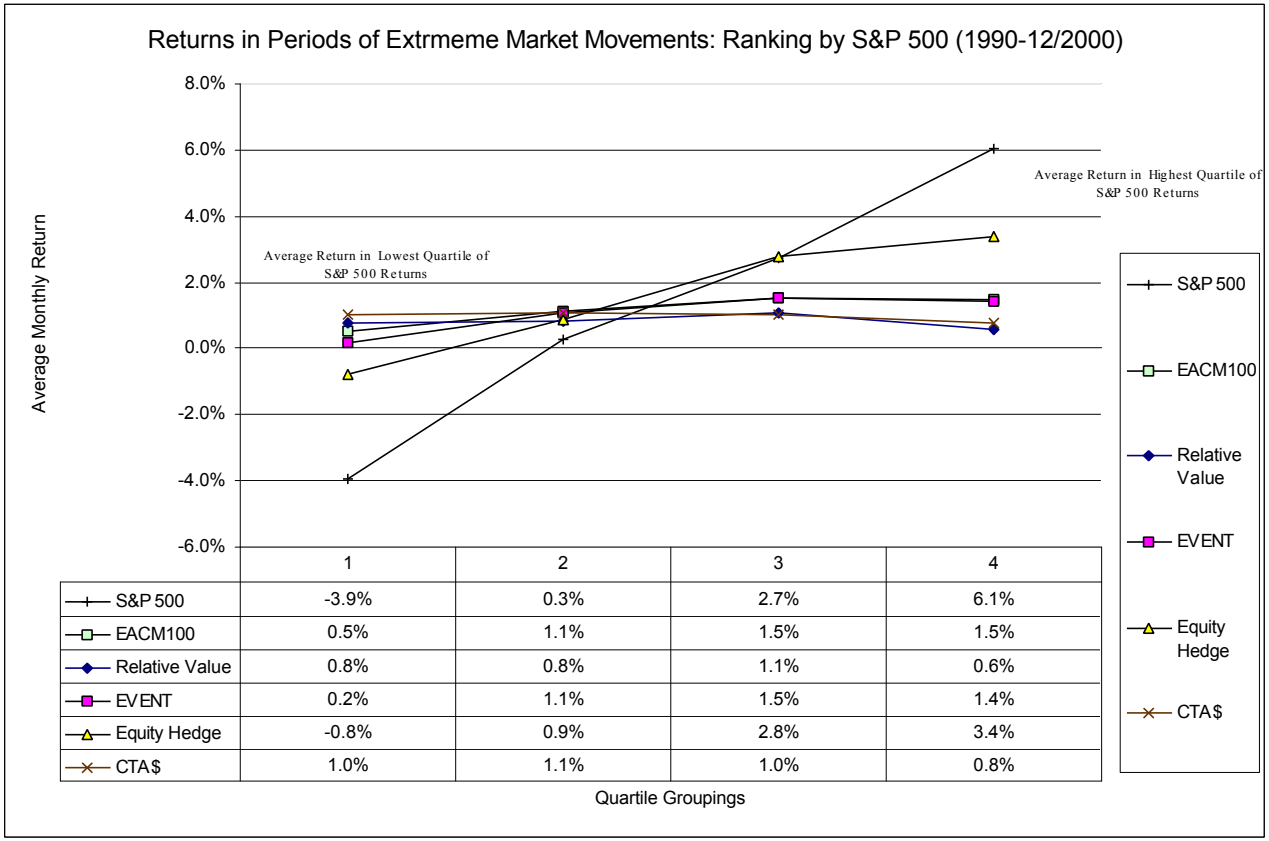
Correlations in Best and Worst Forty-Four S&P 500 Ranked Months

	All S&P Months	Worst S&P 500 44 Months	Best S&P 500 44 Months
Relative value	0.08	0.58	-0.10
Event driven	0.48	0.62	-0.13
Equity hedge	0.60	0.51	0.08
Global asset allocation	0.10	0.05	0.16
CTA$	-0.06	-0.30	0.17

Based on Monthly Data on the Time Period Jan 1990-Dec 2000

Schneeweis, Martin, 2000

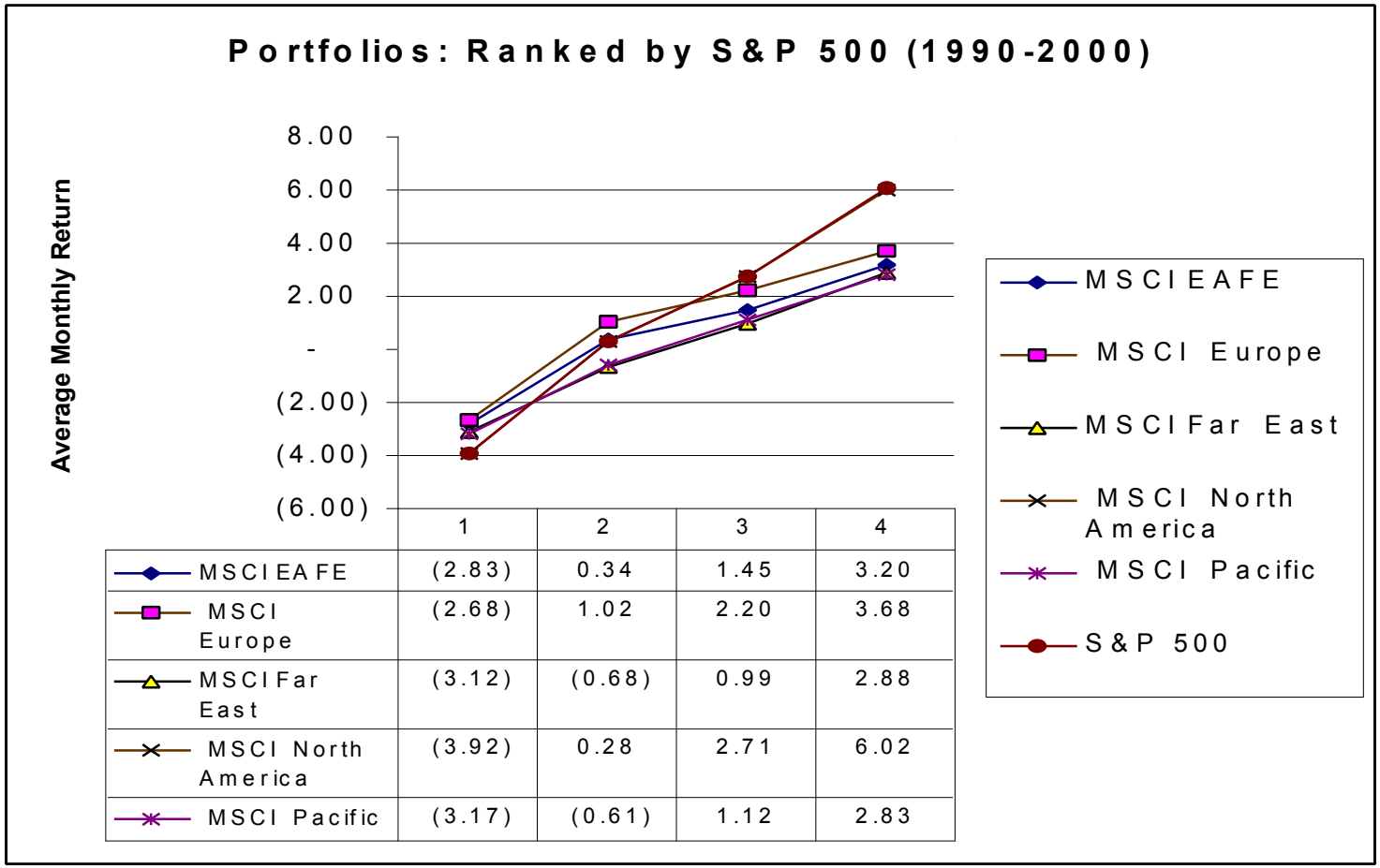
Diversification Properties of Hedge Funds
Better than Country and Industry Diversification



	1	2	3	4
S&P 500	-3.9%	0.3%	2.7%	6.1%
EACM100	0.5%	1.1%	1.5%	1.5%
Relative Value	0.8%	0.8%	1.1%	0.6%
EVENT	0.2%	1.1%	1.5%	1.4%
Equity Hedge	-0.8%	0.9%	2.8%	3.4%
CTA$	1.0%	1.1%	1.0%	0.8%

Schneeweis, Martin, 2000

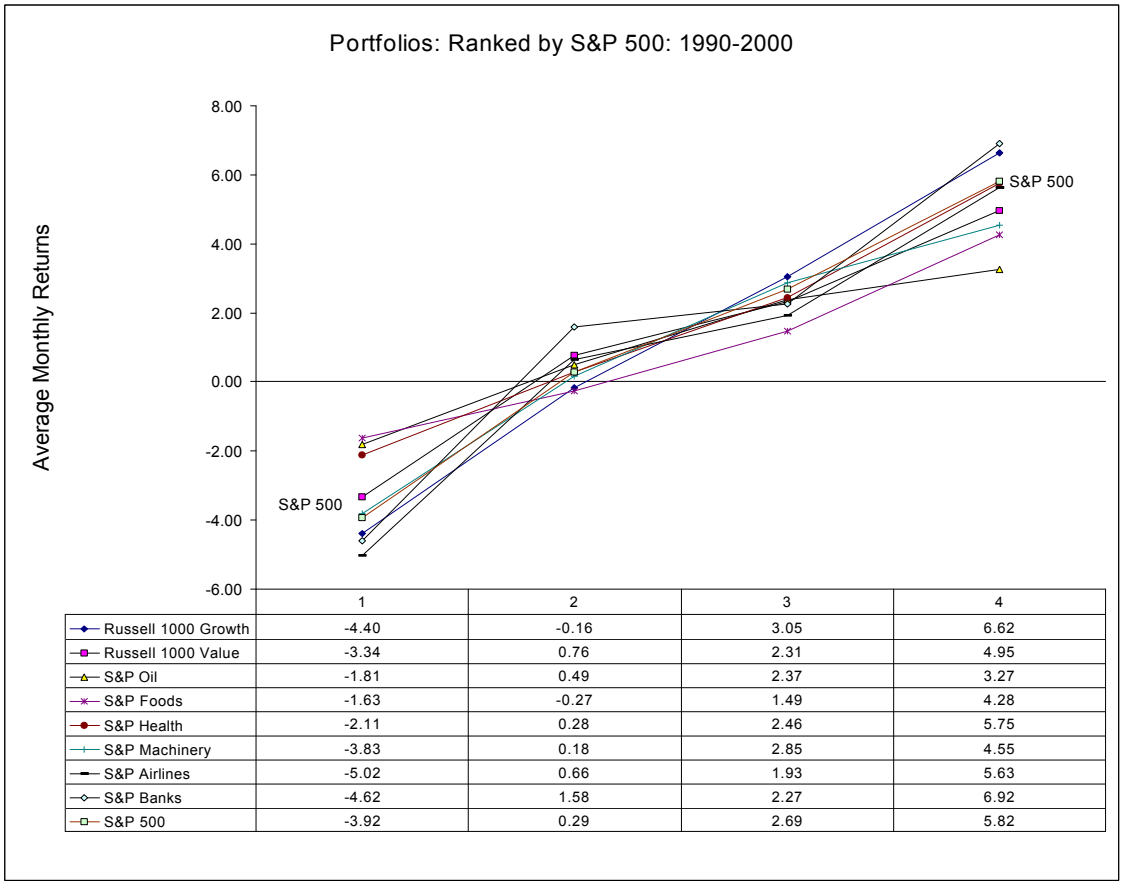
Diversification Properties of Hedge Funds
Worldwide Equity Markets are Highly Correlated



	1	2	3	4
MSCI EAFE	(2.83)	0.34	1.45	3.20
MSCI Europe	(2.68)	1.02	2.20	3.68
MSCI Far East	(3.12)	(0.68)	0.99	2.88
MSCI North America	(3.92)	0.28	2.71	6.02
MSCI Pacific	(3.17)	(0.61)	1.12	2.83

Schneeweis, 2001

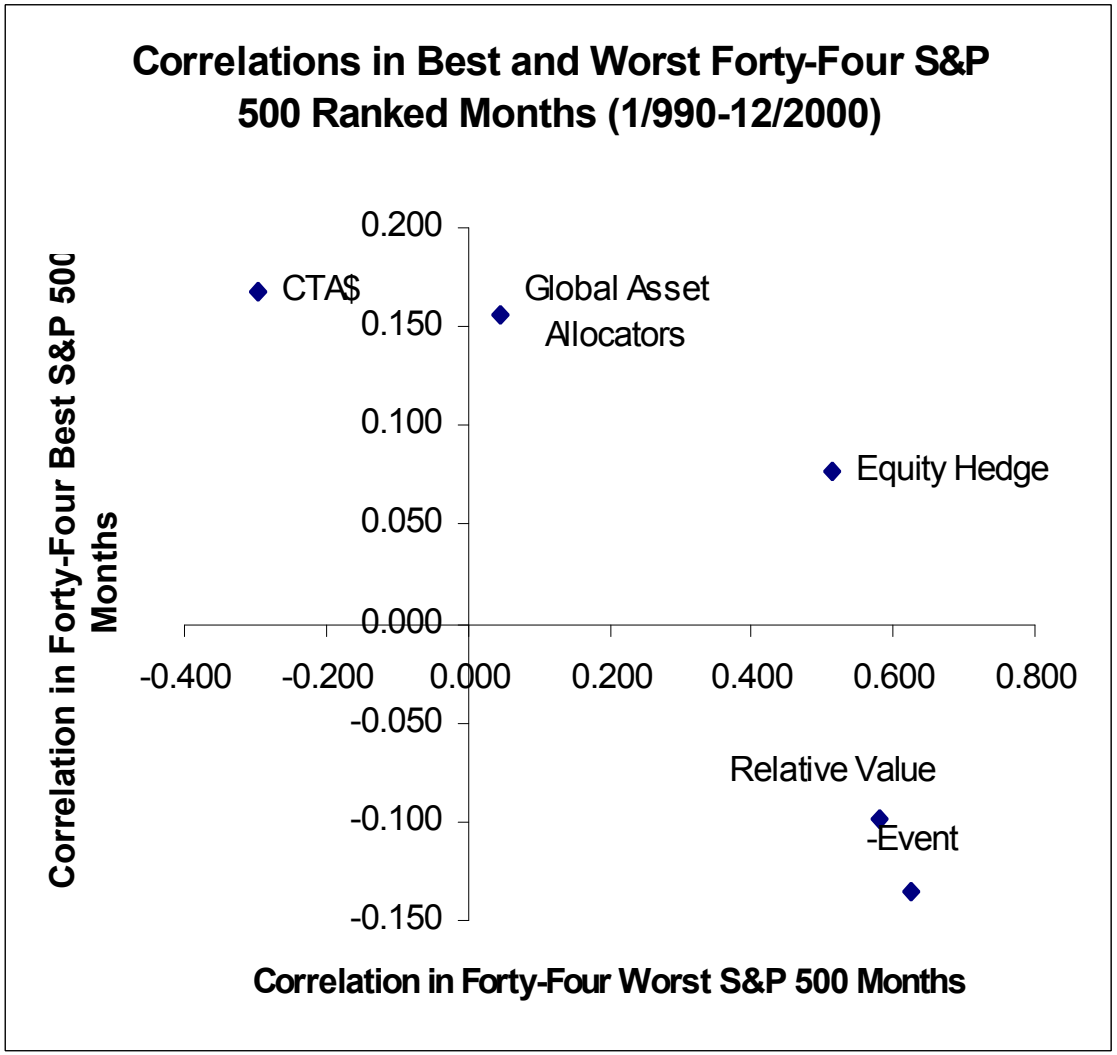
Diversification Properties of Hedge Funds
Domestic Equity Sectors are Highly Correlated



	1	2	3	4
Russell 1000 Growth	-4.40	-0.16	3.05	6.62
Russell 1000 Value	-3.34	0.76	2.31	4.95
S&P Oil	-1.81	0.49	2.37	3.27
S&P Foods	-1.63	-0.27	1.49	4.28
S&P Health	-2.11	0.28	2.46	5.75
S&P Machinery	-3.83	0.18	2.85	4.55
S&P Airlines	-5.02	0.66	1.93	5.63
S&P Banks	-4.62	1.58	2.27	6.92
S&P 500	-3.92	0.29	2.69	5.82

Schneeweis, 2001

Diversification Properties of Hedge Funds
Conditional Correlation Map



Diversification Properties of Hedge Funds
Need a Closer Look!

	Correlation With S&P 500 Ranked on S&P 500			Correlation With Lehman Ranked on Leh Bros Gov/Corp. Bnd			Correlation With Stk/Bond Port. Ranked on S&P 500/Leh. Bond Port.		
	All Months	Bottom 40	Top 40	All Months	Bottom 40	Top 40	All Months	Bottom 40	Top 40
EACM100	0.37	0.57	0.03	0.19	0.32	0.25	0.37	0.47	0.05
Equity Market Neutral	-0.11	0.08	0.08	0.15	-0.05	-0.10	-0.06	-0.04	0.16
ConvHedge	0.07	0.37	-0.18	0.05	0.05	0.00	0.08	0.24	-0.13
BondHedge	0.03	0.56	-0.23	-0.05	-0.09	-0.19	0.02	0.40	-0.19
Rotational	0.05	0.51	0.03	-0.15	0.06	-0.13	0.00	0.37	-0.08
Arb	0.48	0.64	0.00	0.13	0.25	0.08	0.45	0.61	-0.04
Bank	0.33	0.49	-0.09	0.04	0.36	0.04	0.29	0.51	-0.18
Multi	0.44	0.64	-0.14	0.06	0.41	0.06	0.40	0.55	-0.14
DomLong	0.63	0.55	-0.02	0.19	0.35	0.32	0.60	0.55	-0.06
Hedged Equity	0.20	0.20	-0.12	0.00	0.21	0.25	0.17	0.28	-0.20
GI/Int	0.61	0.63	0.23	0.15	0.34	0.24	0.56	0.53	0.19
Discretionary	0.29	0.47	-0.10	0.10	0.06	0.02	0.28	0.27	0.01
Systematic	-0.05	-0.22	0.24	0.23	0.11	0.36	0.02	-0.20	0.41
Short	-0.74	-0.61	-0.25	-0.16	-0.27	-0.34	-0.68	-0.60	-0.41

Advanced Techniques for HF Allocation

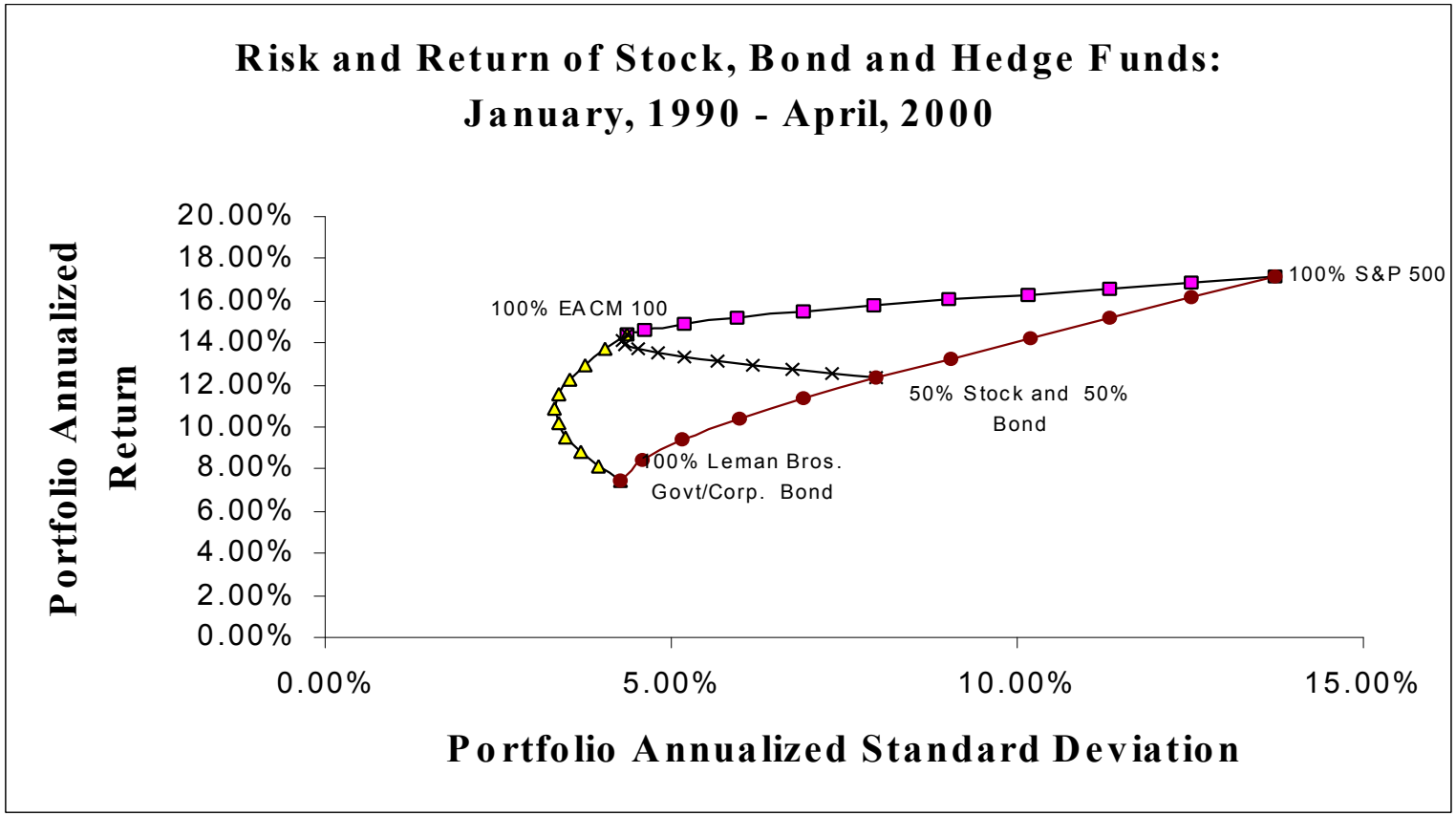
Optimal Investment in Hedge Funds

- What investors are advised to do
  - October 2000: Deutsche Bank Asset Management – Research Center – "…(we) suggest a **7% to 16%** allocation to a diversified portfolio of absolute return strategies as highly beneficial for typical plan sponsors"
  - November 2000: The Morgan Stanley Dean Witter (MSDW) Quantitative Strategies Study "Why Hedge Funds Make Sense" on hedge fund study by Peskin et al (2000) advised to make hedge fund allocations of **up to 20%**
  - December 2000: The Wall Street Journal reported that several investment banks advised clients to allocate **up to 10%** of their strategic portfolio to alternative investments
- What investors do
  - Goldman Sachs & Franck Russel 1999 Report in Alternative Investing by Tax-Exempts Organisation (189 out of the 251 largest pension funds, endowments and organizations in the US):
    - Endowments and fundations: **13.8%**
    - Corporate pension plans: **7.3%**
    - Public pension plans: **5.6%**

Advanced Techniques for HF Allocation
Optimal HF Allocation

- Main question: what is a reasonable allocation to HFs?
  - Positive answer: most people would argue for a 5 to 20% allocation to hedge funds
  - Normative answer: mainly available through static in-sample mean-variance analysis
- Problems
  - The assumptions
    - Static
    - In-sample results
    - Mean-variance
  - The predictions: tangent portfolio (highest Sharpe ratio) is close to 100% in HFs !

Advanced Techniques for HF Allocation
In-Sample Efficient Frontiers



Source: Schneeweis, Spurgin (1999)

Advanced Techniques for HF Allocation
Accounting for Uncertainty in Alpha Estimate

- Problem
  - Manager/fund selection: adjusting composition of portfolio in favor of funds with positive alphas
  - Need to account for costs of carrying specific risk
- While positive alpha HFs certainly exist, it is never easy to find them
  - Model risk: for a given fund, and a given sample, estimates around alpha vary with the model under consideration
  - Sample risk: for a given fund, and a given model, estimates of alpha vary with the sample under consideration
  - Persistence of alpha?
- Cvitanic et al. (2002) have generalized the Treynor and Black (1973) approach to the question of optimal allocation in the presence of uncertain alphas

Advanced Techniques for HF Allocation

Uncorrelated Case

- Optimal strategy reads, for uncorrelated priors

$$\begin{pmatrix} \text{HF}: \dfrac{\bar{a}_i(t)}{s_{e_i}^2\left(a-(1-a)\dfrac{d_i}{1+d_i t}(T-t)\right)} \\ \text{TI}: \dfrac{\bar{m}_0(t)-r}{s_0^2\left(a-(1-a)\dfrac{d_0}{1+d_0 t}(T-t)\right)} - \sum_{i=1}^{n} b_i p_i(t) \\ \text{Cash}: 1-p_0(t)-\sum_{i=1}^{n} p_i(t) \end{pmatrix}$$

Advanced Techniques for HF Allocation
Where should the funds come from?

- The changes in holdings due to the introduction of an investment opportunity (α_1, β_1) are

$$\Delta p_0(0) := p_0^{a_1=0}(0) - p_0^{a_1\neq 0}(0) = b_1 p_1(0)$$

$$\Delta p_B(0) := p_B^{a_1=0}(0) - p_B^{a_1\neq 0}(0) = (1-b_1) p_1(0)$$

- Implications (case of a positive alpha prior):

$$\Delta p_B(0) \geq \Delta p_0(0) \Leftrightarrow b_1 \leq \frac{1}{2}$$

  - Where should the funds come from and where should they go??
  - Low betas hedge funds serve as natural substitutes for risk free asset
  - High betas hedge funds serve as natural substitutes for equity/bond holdings

Advanced Techniques for HF Allocation

Numerical Experiment - Base Case

Strategy	Holding in Passive	Holding in Active	Relative Holding A versus P	Holding in Risk-Free	Delta Passive	Delta Risk-Free Risk-Free
Ev. Dist.	29.69%	9.31%	23.87%	60.99%	14.38%	-5.07%
Ev. Risk	24.37%	54.25%	69.00%	21.38%	19.70%	34.54%
Ev. Driven	26.51%	32.59%	55.15%	40.90%	17.57%	15.03%
FoF Div.	30.12%	7.24%	19.37%	62.64%	13.96%	-6.72%
FoF Niche	27.25%	30.59%	52.88%	42.16%	16.82%	13.76%
FoF	30.47%	6.26%	17.05%	63.27%	13.61%	-7.35%
Mkt Neutr. Arb	29.85%	35.68%	54.45%	34.47%	14.23%	21.45%
Mkt Neutr. L/S	27.72%	109.55%	79.81%	-37.27%	16.36%	93.20%
Mkt Neutr.	29.81%	82.92%	73.56%	-12.72%	14.27%	68.65%
Short Sale	38.17%	6.96%	15.42%	54.87%	5.91%	1.05%
Av. Fund	31.25%	16.86%	35.04%	51.88%	12.82%	4.04%

- We find an optimal **16.86%** allocation to alternative investments when the average hedge fund is considered
- The origin of these **16.86%** are **16.27%** from the risk-free asset versus **0.59%** from the market portfolio (the beta of the average fund is 0.03)

Advanced Techniques for HF Allocation

Impact of Biases: Mean Alpha – 4.5%

Strategy	Holding in Passive	Holding in Active	Relative Holding Aversus P	Holding in Risk-Free	Delta Passive	Delta Risk-Free Risk-Free
Ev. Dist.	33.28%	-6.24%	-23.10%	72.96%	10.79%	-17.04%
Ev. Risk	28.97%	20.87%	41.87%	50.16%	15.11%	5.76%
Ev. Driven	30.75%	6.66%	17.80%	62.59%	13.32%	-6.66%
FoF Div.	32.74%	-3.78%	-13.06%	71.04%	11.33%	-15.11%
FoF Niche	31.14%	4.68%	13.06%	64.18%	12.93%	-8.26%
FoF	33.18%	-6.08%	-22.42%	72.90%	10.90%	-16.97%
Mkt Neutr. Arb	30.66%	21.14%	40.81%	48.20%	13.41%	7.73%
Mkt Neutr. L/S	29.96%	50.12%	62.59%	19.92%	14.12%	36.00%
Mkt Neutr.	31.06%	32.05%	50.78%	36.90%	13.02%	19.03%
Short Sale	36.04%	4.62%	11.37%	59.33%	8.03%	-3.41%
Av. Fund	31.65%	5.42%	14.61%	62.93%	12.42%	-7.01%

- This is a reasonable estimate of magnitude of data base biases
  - Survivorship bias, selection bias, instant history bias
- We find that the average fund generates a **5.42%** to hedge funds (versus **16.86%** for the base case)
- Money is taken away from risk-free asset

HFs in a Core-Satellite Approach

Core-Satellite Approach

- Core and satellite portfolio construction is recognized as an effective strategy for institutions
  - that want to diversify their portfolios
  - without giving up the potential for higher returns generated by selected active management strategies
- It also provides the framework for targeting and controlling those areas where investors are willing to take more risk in a cost-efficient manner
  - Most active managers still have dominant passive exposure to their benchmark
  - Instead of paying high fees on the passively managed part of their portfolio, the core-satellite approach suggests to passively invest in a low-fee index fund (or an enhanced index product) as a core portfolio and in a variety of satellite active managers with higher tracking error
  - In the limit, invest in market-neutral managers who provide only portable alpha benefits without passive exposure to the index

HFs in a Core-Satellite Approach

Multi-Manager Context

- Excess return on satellite invested in *n* active managers $a = \sum_{i=1}^{n} w_i a_i$
- Tracking error of that portfolio

$$TE = s(a) = \left(\sum_i \sum_j w_i w_j s_{ij}\right)^{1/2}$$

- Optimal condition for max IR: ratio of return to risk contribution is the same for all managers

$$\frac{w_k a_k}{\left(w_k^2 s_{a_k}^2 + \sum_j w_k w_j s_{kj}\right) \Big/ s(a)} = \frac{w_l a_l}{\left(w_l^2 s_{a_l}^2 + \sum_j w_l w_j s_{kj}\right) \Big/ s(a)}$$

HFs as Portable Alpha Vehicles
Example

- Superior performance can be generated by market timing, style timing, and/or stock picking
- At EDHEC Risk and Asset Management Research Center, we have performed an experiment where we generate alpha through active asset allocation decisions (timing)
- In particular, we have developed a strategy aiming at delivering absolute return over the full business cycle ensured though systematic style timing and market neutrality

HFs as Portable Alpha Vehicles
Example

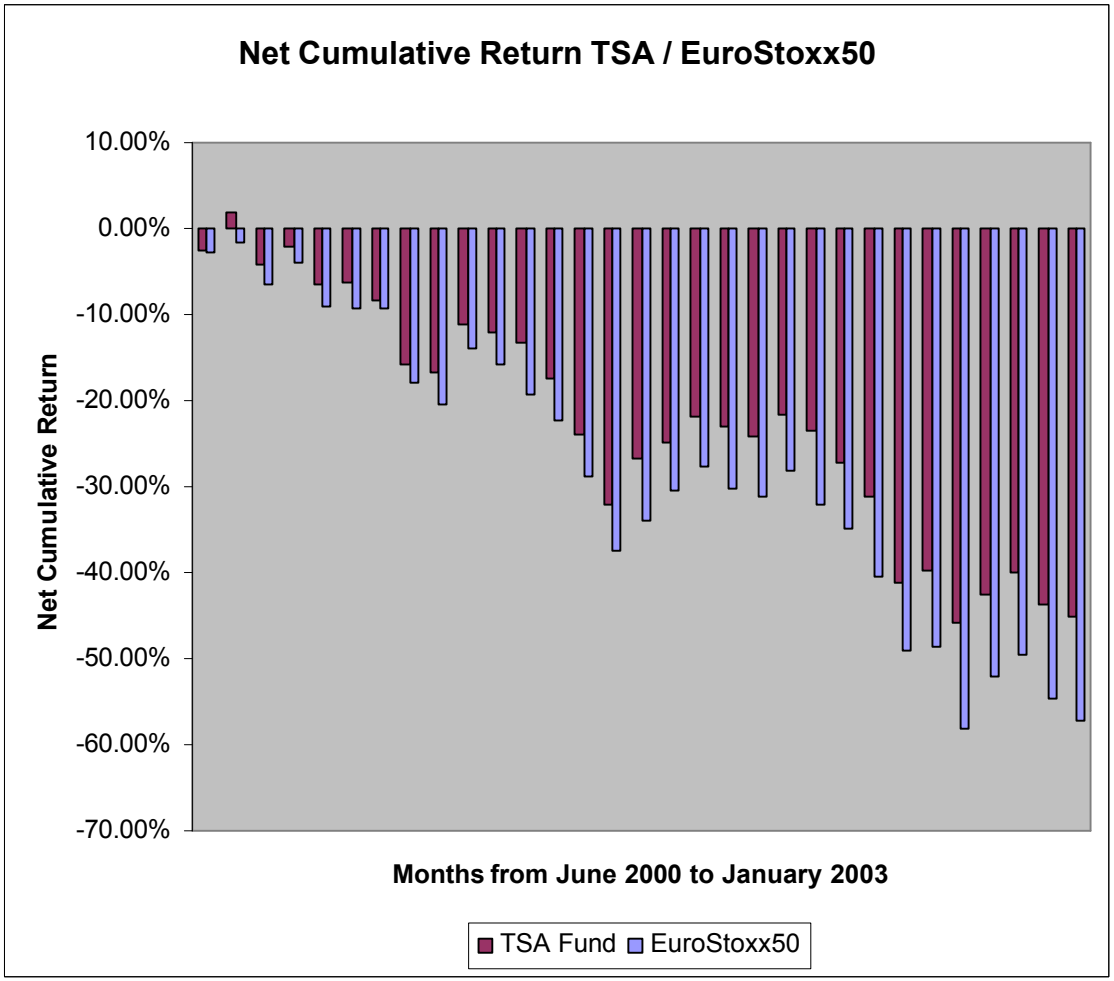
- Core portfolio: 80% of the net assets invested in EuroStoxx 50
- Satellite portfolio: approximately 20% of the net assets invested in US style-based ETFs in a market-neutral way (beta: 0.024)
- The core-satellite portfolio significantly and regularly outperforms the EuroStoxx 50 over the 31 month period of our back test (07/2000-01/2003) thanks to the positive alpha generated by the TSA satellite (about 4.5% per year)
- Outperformance can be seen from different angles
  - Annualized return: -21.20% versus –29.59%
  - Volatility: 18.80% versus 24.10%
  - Downside deviation: 12.88% versus 16.26%
  - Information ratio: .8579

HFs as Portable Alpha Vehicles

Example

end of month	Monthly Return History TSA with ETFs	EuroStoxx50
July 2000	-2.45%	-2.68%
August 2000	4.34%	1.02%
September 2000	-5.93%	-5.02%
October 2000	2.26%	2.89%
November 2000	-4.63%	-5.46%
December 2000	0.29%	-0.19%
January 2001	-2.20%	0.16%
February 2001	-8.04%	-9.64%
March 2001	-1.24%	-3.10%
April 2001	6.79%	8.12%
May 2001	-1.09%	-2.18%
June 2001	-1.26%	-4.12%
July 2001	-4.87%	-3.59%
August 2001	-7.77%	-8.49%
September 2001	-10.82%	-11.95%
October 2001	7.78%	5.52%
November 2001	2.62%	5.16%
December 2001	4.16%	4.04%
January 2002	-1.60%	-3.57%
February 2002	-1.56%	-1.24%
March 2002	3.49%	4.39%
April 2002	-2.42%	-5.54%
May 2002	-4.82%	-4.15%
June 2002	-5.35%	-8.54%
July 2002	-14.53%	-14.28%
August 2002	2.22%	0.87%
September 2002	-9.94%	-18.64%
October 2002	5.75%	14.27%
November 2002	4.66%	5.47%
December 2002	-6.15%	-10.18%
January 2003	-2.46%	-5.79%

	TSA	EuroStoxx50
Cumulative Return	-45.06%	-57.29%
Annualised Return	-21.20%	-29.59%
Annualised Std Deviation	18.80%	24.10%
Downside Deviation (3.0%)	12.88%	16.26%
Sortino (3.0%)	-1.88	-2.00
Sharpe	-1.25	-1.33
Tracking Error	9.78%	
Information Ratio	85.79%	



Conclusion

Portable Alphas - Portable Betas

- Hedge funds' alphas are potentially attractive, but rather hard to estimate
  - This is a challenge for optimal allocation models
  - Market neutral funds are ideal portable alpha vehicles
- Beta benefits of hedge funds, on the other hand, are undisputable
- Given that beta benefits are a key component, there is value in trying to improve these properties
- One can use derivatives to adjust the beta exposure of traditional + alternative portfolio in a number of ways
  - Dynamically adjust the beta of the overall portfolio using dynamic trading in futures
  - Options on equity indices can also be used to implement truncated return strategies that aim at eliminating the few extreme returns of a fund track record
- We have undertaken an ambitious large scale research project supported by Eurex to test these "portable beta" effects