University of Zurich
Institute for Empirical Research in Economics

Advanced Portfolio Theory

NHH-Bergen

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IEW
Universität Zürich

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8. Behavioral Hedge Funds: How to profit by the Folly of Others

- What are Hedge Funds?
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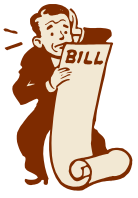
- Strategies exploiting underreaction (FTAM)
- Strategies exploiting Co-Movements (LTCM)
- Strategies exploiting Probability Weighting

Edwards (1954)

- *„Economic man is very unlike a real man“*



Pliny the Elder

„The best plan is ... To profit by the folly of others.“

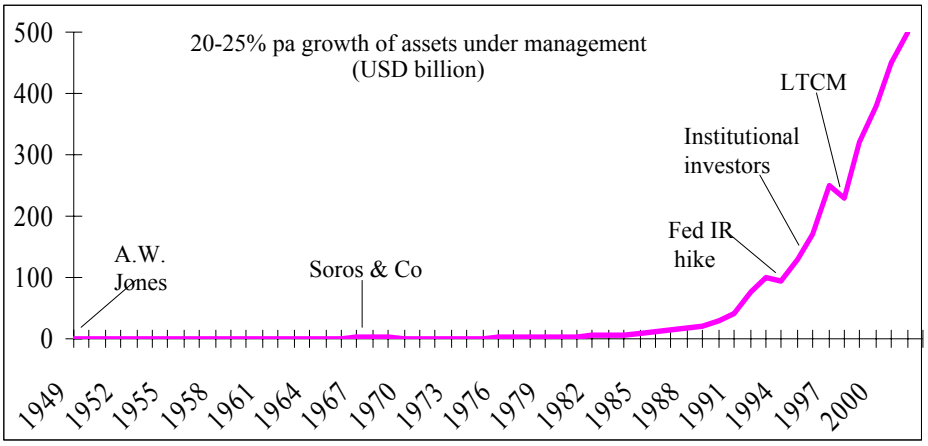
Pliny the Elder, from John Barlett, comp.
Familiar Quotations, 9th ed. 1901.

Characteristics of Hedge Funds

- Actively managed
- Flexible Investment Policies
- Unusual legal structures
- Limited liquidity
- Performance fees and high water marks
- Managers are partners not employees
- Not scaleable

Lhabitant (2002): Hedge Funds, Wiley.

Growth of Hedge Funds



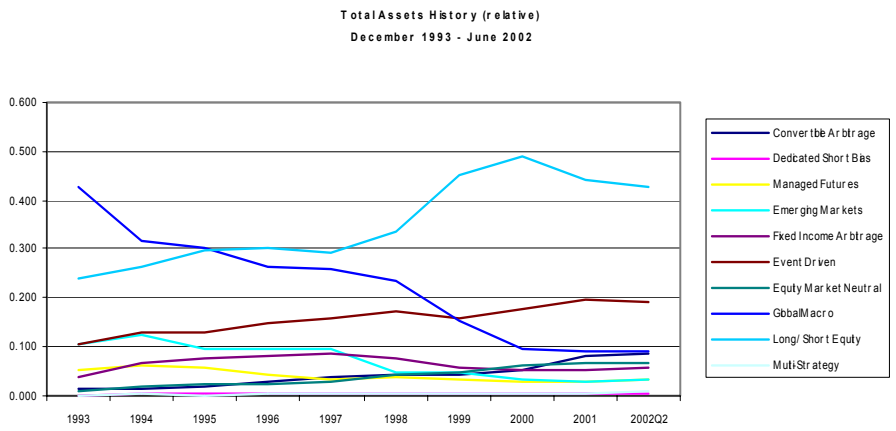
Source: Harcourt estimates, MAR, TASS, various industry sources

Hedge Fund Strategies

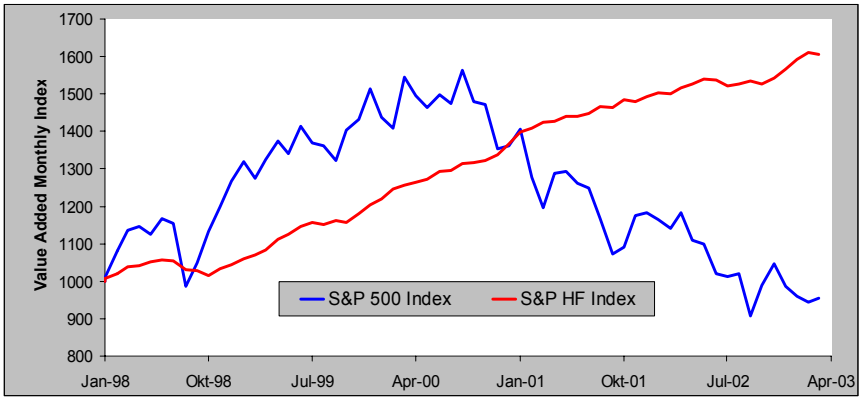
- Long Short Equity
- Arbitrage
  - Convertible Arbitrage
  - Fixed Income Arbitrage
- Event Driven
  - Distressed
  - Merger&Acquisition
- Directional
  - Global Macro
  - Emerging Markets
  - Sector Hedge Fund
  - Dedicated Short Bias
  - Managed Futures

Lhabitant (2002): Hedge Funds, Wiley.

Relative Shares of Hedge Fund Strategies: Style Drift

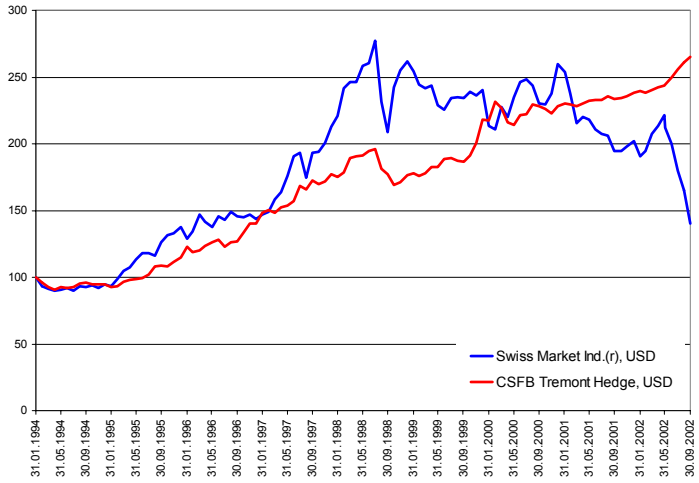


Hedge Fund Index



Monthly returns, January 1998 through September 2002. *Source*: Standard & Poor's.

Hedge Fund Index (CSFB-Tremont)



Improving Diversification with Hedge Funds

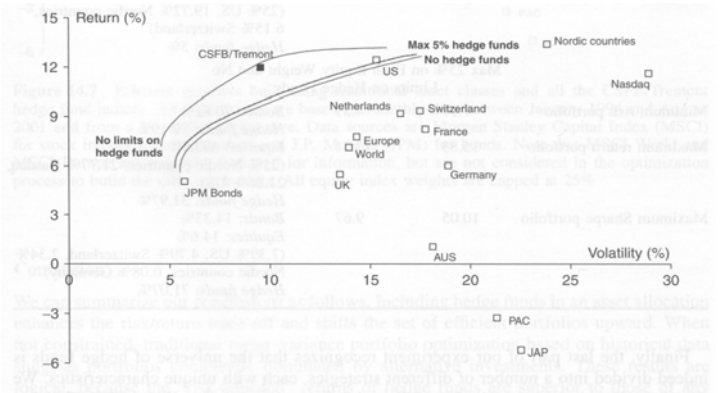


Figure 14.6 Efficient frontiers built by mixing traditional assets and the CSFB/Tremont index. All calculations are based on monthly data between January 1994 and August 2001 and from a US dollar perspective. Data sources are Morgan Stanley Capital Index (MSCI) for stock indices (except Nasdaq) and J.P. Morgan (JPM) for bonds. Note that MSCI World and MSCI Europe are uniquely displayed for information, but are not considered in the optimization process to build the efficient frontier. All equity index weights are capped at 25%

Performance Measures of HFs

Table 16.1 Risk and return of a sample of hedge funds (1994–2000)

	Average return (%)	Volatility (%)	Sharpe ratio	Skewness	Kurtosis	Maximum monthly return		Minimum monthly return		$VaR_{0.95,1M}$ (%)
						Percent	Date	Percent	Date	
Cerberus Partners LP	13.08	3.22	2.50	−0.62	1.85	3.70	Mar 93	−2.30	Aug 98	−0.39
GAM Arbitrage	10.27	2.76	1.90	−0.20	−0.07	2.75	Sep 97	−1.24	Oct 94	−0.54
GAM Japan	6.60	17.05	0.09	0.27	−0.12	13.94	Jun 97	−10.93	Jul 00	−6.60
GAM Trading USD	13.58	6.24	1.37	0.45	1.98	7.24	Dec 00	−4.87	Feb 94	−1.30
GAM US	13.35	13.58	0.61	−0.49	1.20	9.35	Oct 99	−13.78	Aug 98	−4.79
GAMut	20.12	12.29	1.23	0.25	0.47	11.99	Jul 99	−7.01	Jan 01	−3.03
III Global Ltd	12.35	9.78	0.75	−3.81	20.12	5.77	Jan 99	−16.20	Oct 98	−2.26
JMG Capital Partners LP	21.16	3.78	4.26	−0.26	3.31	5.50	Jan 01	−1.87	Aug 98	−0.08
Kingate Euro Fund Ltd	12.86	3.01	2.59	0.45	−0.48	3.30	Jan 97	−0.77	Nov 94	−0.09
Latinvest Fund Ltd	2.40	39.19	−0.07	0.05	2.24	39.01	Mar 99	−38.47	Aug 98	−15.79
Manchester Institutional Fund	11.20	9.17	0.67	0.50	0.56	8.58	Jan 96	−4.55	Jan 99	−3.27
Nestor Partners	9.37	16.51	0.26	0.14	0.74	14.90	Mar 95	−12.04	Oct 98	−6.78
P.A.W. Partners LP	19.29	8.95	1.59	0.74	2.21	10.90	Feb 00	−6.30	Aug 98	−1.91
Pactual Infinity Fund Ltd	0.67	42.59	−0.10	0.14	1.48	36.37	Mar 99	−42.33	Aug 98	−15.92
Permal Essex Media & Techno. Ltd	7.21	45.15	0.05	0.42	2.29	49.55	Feb 00	−34.06	Apr 00	−20.81
Perry Partners LP	17.00	6.72	1.78	−0.78	3.12	7.24	Mar 98	−6.31	Aug 98	−1.47
Raptor Global Fund LP (Class A)	25.90	14.92	1.40	0.87	2.32	17.90	Dec 99	−9.88	Apr 00	−3.52
Spinner Global Technology Fund	28.21	20.06	1.16	0.57	1.76	22.35	Feb 00	−11.72	Aug 98	−6.38
TQA Arbitrage Fund LP	9.29	2.36	1.80	−1.07	3.40	2.28	Jul 97	−2.27	Apr 94	−0.48
UBS Currency Portfolio Ltd	9.26	11.09	0.38	0.72	1.86	11.98	Jun 04	−5.12	Aug 94	−4.59

(*continued*)

Performance Measures of HF strategies

Table 14.5 Returns and risk statistics for hedge fund indices

	Average return (%)	Volatility (%)	Sharpe ratio	Skewness	Kurtosis	Maximum monthly return		Minimum monthly return		$VaR_{0.95,1M}$ (%)
						Percent	Date	Percent	Date	
CSFB/Tremont	11.97	9.59	0.72	0.00	0.87	8.53	Dec 99	−7.55	Aug 98	−3.82
Convertible arbitrage	11.12	4.95	1.23	−1.69	4.54	3.57	Apr 00	−4.68	Oct 98	−1.61
Dedicated short bias	0.18	18.98	−0.26	0.92	2.17	22.71	Aug 98	−8.69	Oct 98	−7.15
Emerging markets	3.99	19.51	−0.06	−0.44	2.69	16.42	Aug 94	−23.03	Aug 98	−7.87
Equity market neutral	11.85	3.31	2.05	−0.02	−0.07	3.26	Jul 97	−1.15	Mar 97	−0.88
Event driven	12.14	6.32	1.12	−3.75	24.86	3.68	Jan 94	−11.77	Aug 98	−0.91
Fixed income arbitrage	6.86	4.20	0.43	−3.42	17.19	2.02	Apr 95	−6.96	Oct 98	−1.52
Global macro	14.03	13.80	0.65	−0.02	0.97	10.60	Aug 95	−11.55	Oct 98	−5.23
Long/short	14.00	12.33	0.73	0.10	2.37	13.01	Dec 99	−11.43	Aug 98	−3.80
Managed futures	5.12	11.38	0.01	0.17	1.30	9.95	Aug 98	−9.35	Sep 95	−4.75

All calculations are based on monthly data between January 1994 and August 2001 and from a US dollar perspective
Average returns, volatility and Sharpe ratio are annualized, while all other statistics are expressed on a monthly basis
Value at risk is calculated at the 95% confidence interval and using a one-month holding period

Value at Risk (VaR)

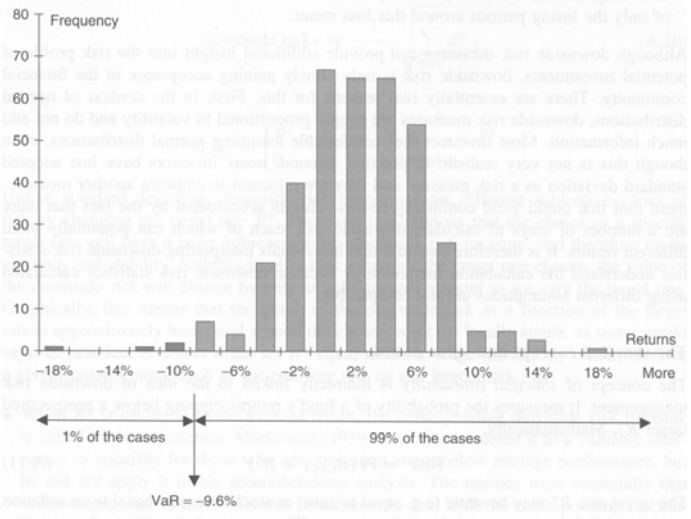


Figure A.3 Graphical interpretation of value at risk

VaR for Hedge Funds strategies

Table 18.2 Back-testing the VaR and exception rate: as a percentage of the number of tested funds

	Exception rate (%)							
	1997	1998	1999	2000	All	1998*	All*	Aug 98
Convertible arb.	0.11	3.43	0.12	0.31	1.10	1.36	0.49	23.64
Emerging	1.96	3.70	0.00	0.00	0.67	0.00	0.27	60.00
Event driven	0.63	4.46	0.25	0.15	1.47	0.56	0.39	41.49
Long/short equity	0.10	2.75	0.03	0.38	0.79	0.19	0.16	36.73
Managed futures	0.00	0.28	0.17	0.10	0.16	0.30	0.16	0.00
Market neutral	0.59	3.20	0.13	0.22	0.68	0.59	0.29	33.33
Multistrategy	0.46	2.69	0.11	0.63	1.00	0.58	0.43	26.24
Fixed income arb.	0.78	5.40	0.03	0.65	1.84	2.19	0.92	36.60
Global macro	0.00	2.50	0.00	0.53	0.62	1.37	0.38	14.29
Dedicated short	0.00	0.61	2.13	0.00	0.83	0.68	0.85	0.00
All sample	0.45	3.34	0.13	0.39	1.06	0.86	0.43	30.13

*Excluding August 1998
Source: Lhabitant (2001a)

Hedge Funds exploiting Underreaction

- Self-test
  - 100 urns with 1000 balls each
  - 45 of those have 700 black and 300 red balls
  - 55 of those have 300 black and 700 red balls

  - ***Question 1: Probability that a randomly selected urn has more black balls?***

Experiment 2

  - Then 12 balls are drawn (with returning) from the randomly selected urn
  - Result of this drawing: 8 black and 4 red

  - ***Question 2: Probability that the randomly selected urn has more black balls?***

Experiment 2

- Then 12 balls are drawn (with returning) from the randomly selected urn
- Result of this drawing: 8 black and 4 red
- ***Question 2: Probability that the randomly selected urn has more black balls?***
- Typical Answers: 45% and 67%

  Underreaction to new information!
- Correct answer: 96.04%

Bayes‘sche Formula

- We look for:

$$p(s/*)=\frac{p(s)\ p(*/s)}{p(s)p(*/s)+p(r)p(*/r)}$$

where $p(s)=45\%$ $p(r)=55\%$

Binomial distribution

$$p(*/s) = \binom{12}{8} (0.7)^8 (0.3)^4$$

$$p(s/*) = \frac{1}{1 + \dfrac{p(r)p(*/r)}{p(s)p(*/s)}}$$

$$p(r)p(*/r) = \frac{55}{45} \frac{\binom{12}{8}(0.3)^8(0.7)^4}{\binom{12}{8}(0.7)^8(0.3)^4} = \frac{11}{9}\left(\frac{0.3}{0.7}\right)^4 = 0.027$$

$$\approx \frac{1}{1.027} \approx 96.04\%$$

Underreaction

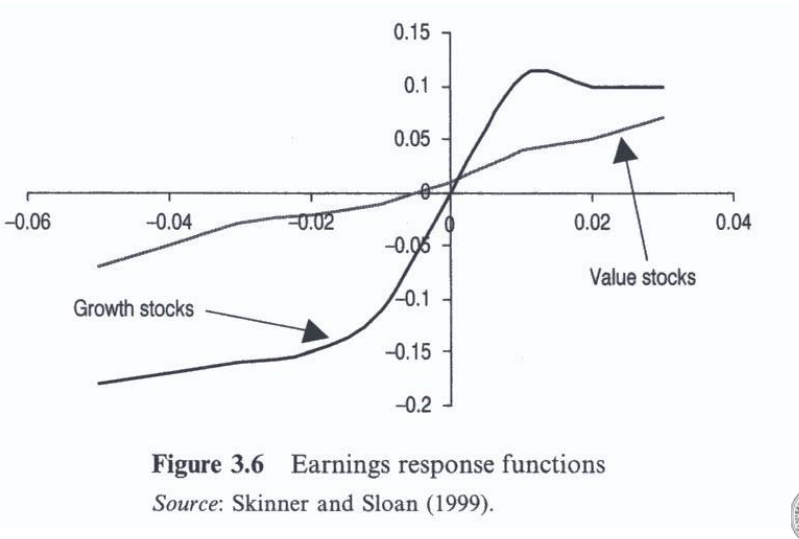


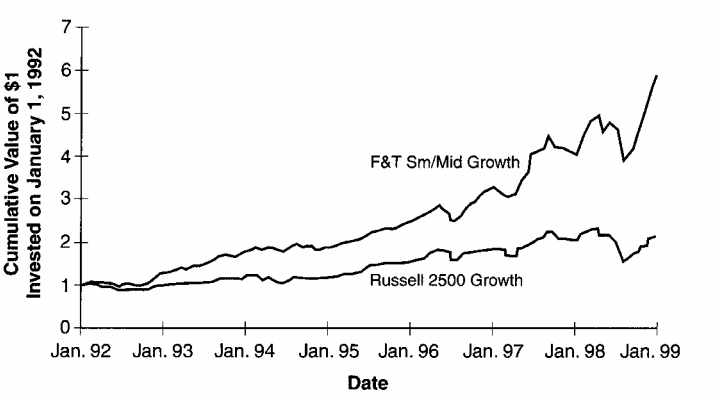
Figure 3.6 Earnings response functions

Source: Skinner and Sloan (1999).

Hedge Funds Exploiting Underreaction

Fuller and Thaler Asset Management (FTAM)

Buy stocks of companies with SUE because there will be the "post earnings announcement drift".

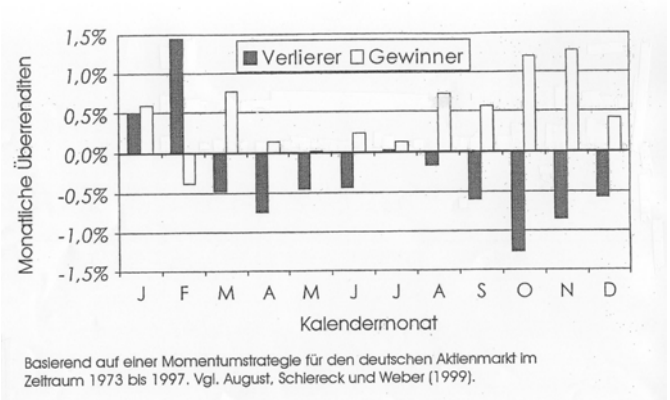


Short Run Momentum (1)

Formation Period: 3-12 Months

Holding Period: 3-12 Months

Strategy: Buy Winner, (Short)-Sell Losers

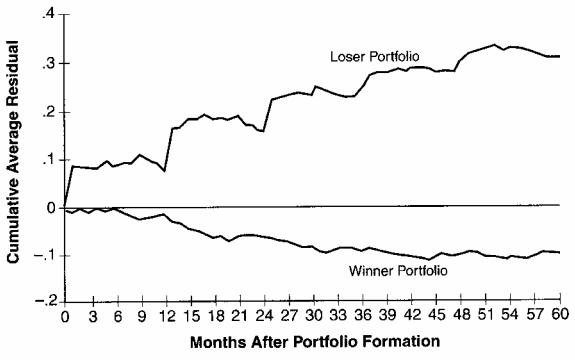


Strategies Exploiting Mean Run Reversal

DeBondt und Thaler (1985): Contrarian Strategy

(Formation Period: Last 3 Years.

Holding Period: The next 3-5 Years.)



Combining Momentum and Reversal

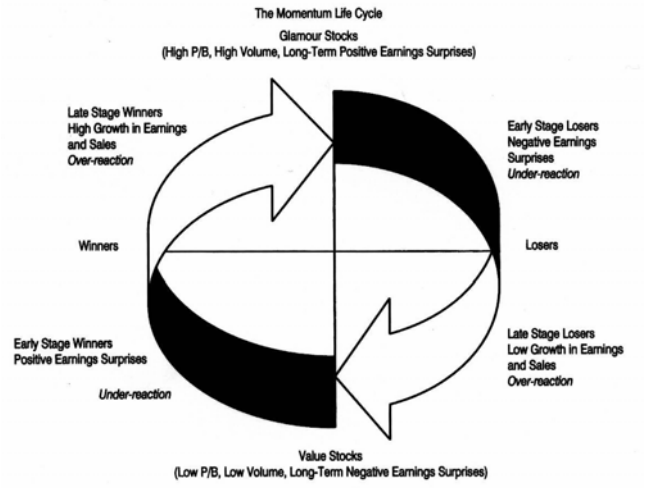
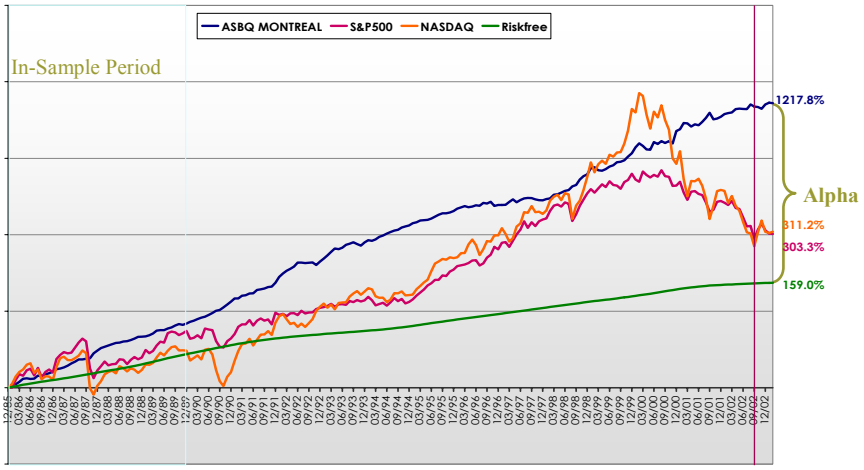


Figure 3.8 The momentum life cycle
Source: Swaminathan and Lee (2000).

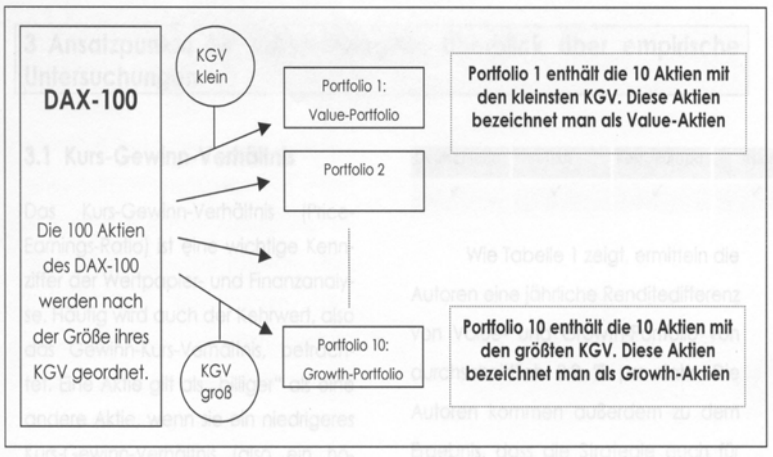
The AlphaSwiss MONTREAL-Index: short run momentum and medium run reversal



The AlphaSwiss MONTREAL-Index describes the backtest of the MONTREAL-model.

Long Run Reversal: Value Investment

Classify according to Price/Earnings-Ratio:



Reversal (2): Value Investment pays

Autoren	Untersuchte Länder	Zeitraum	Ergebnis
Lakonishok, Shleifer und Vishny (1994)	USA	4/1963 bis 4/1990	Renditedifferenz zwischen Value- und Growth-Aktien von 3,9 % p.a.
Fama und French (1992)	USA	6/1963 bis 12/1990	Renditedifferenz zwischen Value- und Growth-Aktien von 8,16 % p.a.
Chan, Hamao und Lakonishok (1991)	Japan	1/1971 bis 12/1988	Renditedifferenz zwischen Value-und Growth-Aktien von 4,92 % p.a.
Brouwer, van der Put und Veld (1996)	Deutschland, Frankreich, Niederlande, Großbritannien	6/1982 bis 6/1993	Renditedifferenz zwischen Value- und Growth-Aktien von 5 % p.a.
Wallmeier (2000)	Deutschland	1967 bis 1994	Renditedifferenz zwischen Value- und Growth-Aktien von 7,24 % p.a.

Tabelle 1: Identifikation von Value-Aktien anhand des Kurs-Gewinn-Verhältnisses

Reversal (3): Value Investment Pays

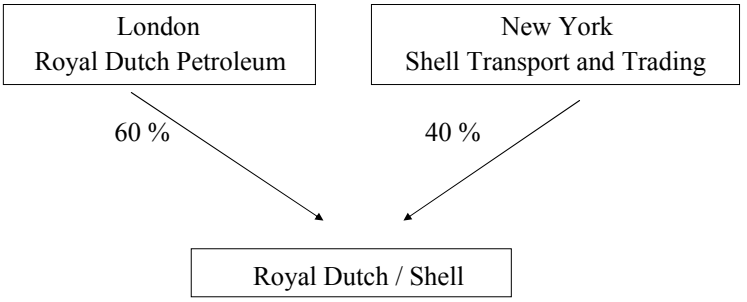
Autoren	Untersuchte Länder	Zeitraum	Ergebnis
Lakonishok, Shleifer und Vishny (1994)	USA	4/1963 bis 4/1990	Renditedifferenz zwischen Value- und Growth-Aktien von 9,9 % p.a.
Hawawini und Keim (1995)	USA	4/1962 bis 12/1989	Renditedifferenz zwischen Value- und Growth-Aktien von 10,68 % p.a.
Chan, Hamao und Lakonishok (1991)	Japan	1/1971 bis 12/1988	Renditedifferenz zwischen Value- und Growth-Aktien von 9,48 % p.a.
Brouwer, van der Put und Veld (1996)	Deutschland, Frankreich, Niederlande, Großbritannien	6/1982 bis 6/1993	Renditedifferenz zwischen Value- und Growth-Aktien von 20,8 % p.a.
Wallmeier (2000)	Deutschland	1967 bis 1994	Renditedifferenz zwischen Value- und Growth-Aktien von 7,22 %
Keppler (1991b)	Weltweit	1/1979 bis 12/1989	Das Value-Portfolio schlägt den Index um 3,65 % p.a. und das Growth-Portfolio um 14,8 % p.a.

Tabelle 2: Identifikation von Value-Aktien anhand des Kurs-Cashflow-Verhältnisses

Strategies Exploiting Co-Movements (1)

Stock market prices are determined in part by the market on which the stock is listed.

Co-Movements (2)



Fundamental:

RDP : STT = 3 : 2

Co-Movements (3)

According to [Froot&Debora] the prices of STT move with the US-Markt and those of RDP with the London market!

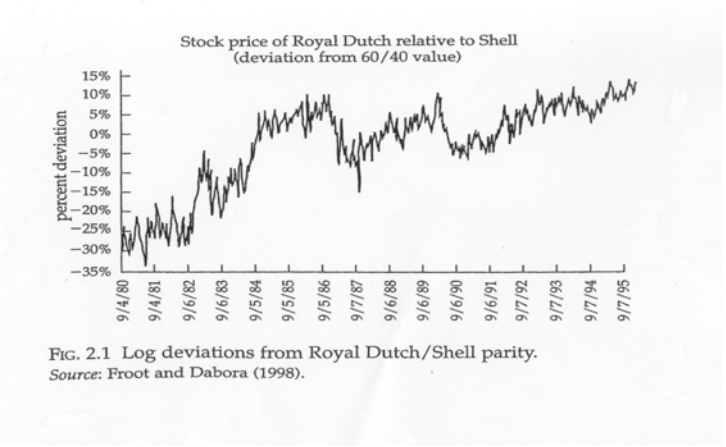


FIG. 2.1 Log deviations from Royal Dutch/Shell parity.
Source: Froot and Dabora (1998).

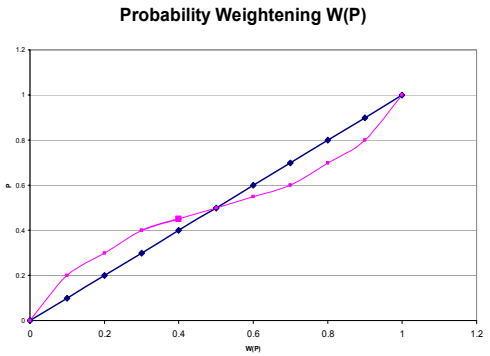
Exploit Probability Weighting

giving rise to the Favorit Longshot-bias

with Stock Index Options

Hodges, Tompkins and Ziemba (2003)

Probability Weighting



People give too much weight to small probabilities

Kahneman and Tversky (1979) (1992)

The Favorite Longshot-Bias

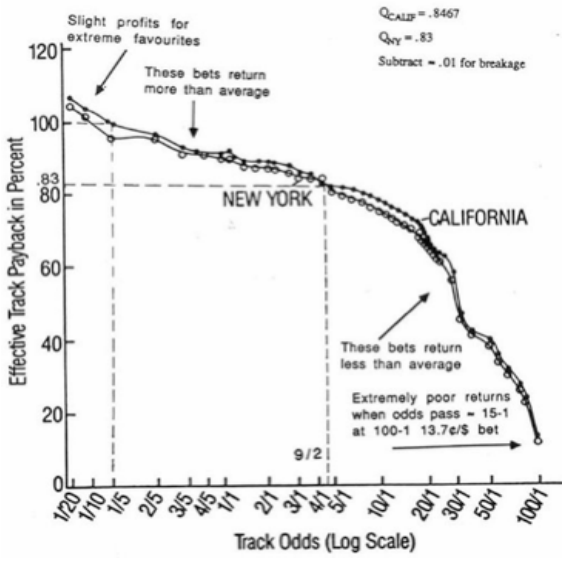
Question:

Would you rather bet on a 2 to 5 shot and receive 40% profit if you win or on a 20 to 1 shot where you receive 2000% profit if you win?

Answer:

The public prefers the latter but the expected returns are much higher for the favorites.

The Favorite Longshot-Bias on Horse Racetracks



The Favorite Longshot-Bias on Stock Index Options

The Results for 3 Month Options on the S&P 500 and FTSE 100 Futures

Calls

- the favorite deep in the money calls have positive expected value just like the favorites at the racetrack
- the longshots used for covered call and other strategies in high demand have expected losses
- the shape is similar to the racetrack graphs

Puts

- Insurance costs imply that there are losses on all the puts.
- There are only small profits on the deepest in the money puts.
- The losses are more and more as the puts get more and more out of the money just like the racetrack.
- This is consistent with the contentions of Rubinstein and Jackwerth (1996) and Dumas, Fleming and Whaley (1996) that investors view put options as insurance policies and are willing to accept an expected loss to protect their equity holdings.

Expected Returns on Options

Table 3.2: Expected return per $1 bet vs. odds levels: three month options on S&P500 Futures, March 1985 to September 2002, Source: Hodges, Tompkins and Ziemba, 2002

Call Options on the S&P 500 Futures					Put Options on the S&P 500 Futures				
Odds (%)	# Obs	Average Payoff	Std. Dev of Payoff	T-test vs. 1$	Odds (%)	# Obs	Average Payoff	Std. Dev of Payoff	T-test vs. 1$
.95 -1.00	47	1.0010	0.3204	0.02	.95 -1.00	37	0.8998	0.4493	**-1.35***
.90 - .95	60	1.0561	0.4605	0.95	.90 - .95	44	0.8662	0.5872	**-1.50***
.85 - .90	66	1.1231	0.5704	**1.76****	.85 - .90	50	0.8426	0.7265	**-1.53***
.80 - .85	67	1.1407	0.6990	**1.66****	.80 - .85	54	0.7937	0.8120	**-1.86****
.75 - .80	63	1.0938	0.5953	1.25	.75 - .80	53	0.8137	0.8950	**-1.51***
.70 - .75	64	1.1366	0.7732	**1.41***	.70 - .75	51	0.7879	0.9979	**-1.51***
.65 - .70	62	1.1461	0.8648	**1.33***	.65 - .70	53	0.7702	0.9648	**-1.73****
.60 - .65	59	1.1311	0.9972	1.01	.60 - .65	54	0.6215	1.0258	**-2.70*****
.55 - .60	58	1.1727	1.1154	1.18	.55 - .60	50	0.8225	1.2458	-1.01
.50 - .55	54	0.9890	1.0410	-0.08	.50 - .55	56	0.5807	1.1377	**-2.76*****
.45 - .50	56	1.1365	1.3925	0.73	.45 - .50	51	0.7344	1.4487	**-1.31***
.40 - .45	58	1.2063	1.6012	0.98	.40 - .45	56	0.6785	1.5367	**-1.57***
.35 - .40	51	0.9770	1.7015	-0.10	.35 - .40	56	0.4744	1.2383	**-3.19*****
.30 - .35	54	0.9559	1.6041	-0.20	.30 - .35	62	0.6257	1.6791	**-1.76****
.25 - .30	59	1.2923	2.7539	0.81	.25 - .30	64	0.6316	1.8231	**-1.62***
.20 - .25	53	1.1261	2.5378	0.36	.20 - .25	65	0.6426	1.9854	**-1.45***
.15 - .20	55	0.8651	2.0742	-0.48	.15 - .20	64	0.6696	2.2441	-1.18
.10 - .15	56	1.2262	3.6982	0.46	.10 - .15	66	0.6602	2.6359	-1.05
.05 - .10	53	1.5085	5.3370	0.69	.05 - .10	66	0.6432	3.4256	-0.85
.00 - .05	39	0.0123	0.1345	**-44.89******	.00 - .05	57	0.7525	5.6025	-0.33
All Options	69	1.1935	2.4124	0.67	All Options	69	0.6212	2.5247	-1.25

Expected Returns on Options

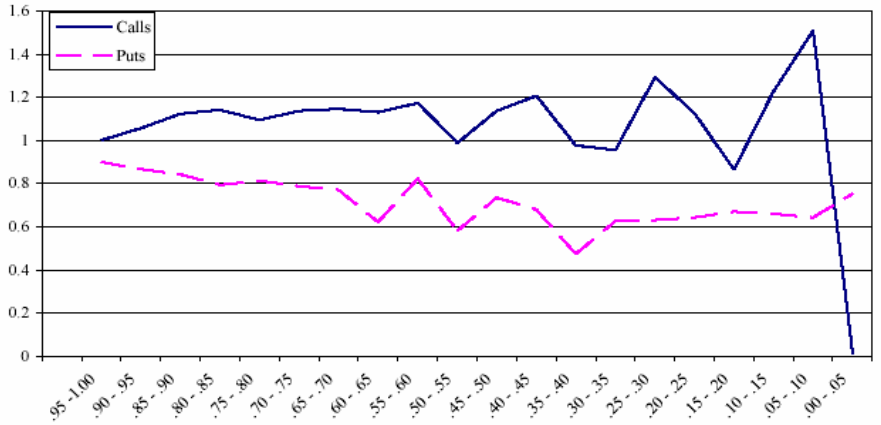


Figure 3.2: Expected return per $1 bet versus odds levels: 3-month calls and puts on S&P500 Futures, March 1985 to September 2002, Source: Hodges, Tompkins and Ziemba, 2002

Expected Return from Skew trading

Sell overpriced puts hedge them with short futures and use the proceeds of the put sale to buy calls.

Conclusion and Outlook

- Investing in stock markets is a lot more complicated than classical Finance has suggested us
- There exist a number of psychological proven market anomalies, which can be exploited by suitable behavioral Hedge Funds
- Since the market is not always fully efficient it‘s absolutely possible to outperform the market

Anomalies change continuously

- A good portfolio management
  - has to stand up to the continuously changing process of existing anomalies
  - is based on solid empirical analysis
  - recognizes profitable market anomalies on time