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**Behavioral Finance
and Wealth Management**

Fundamental Research Session

Thorsten Hens, University of Zurich

Agenda

1. A Short History of Finance
2. Behavioral Biases
3. Behavioral = Irrational?
4. Wealth Management Process (WMP)
5. Theoretical Foundation of the WMP
6. What Next?
7. References

Colaborators

- Kremena Damianova
- Enrico De Giorgi
- Janos Mayer
- Peter Wöhrmann

1. A short history of finance

Old Finance



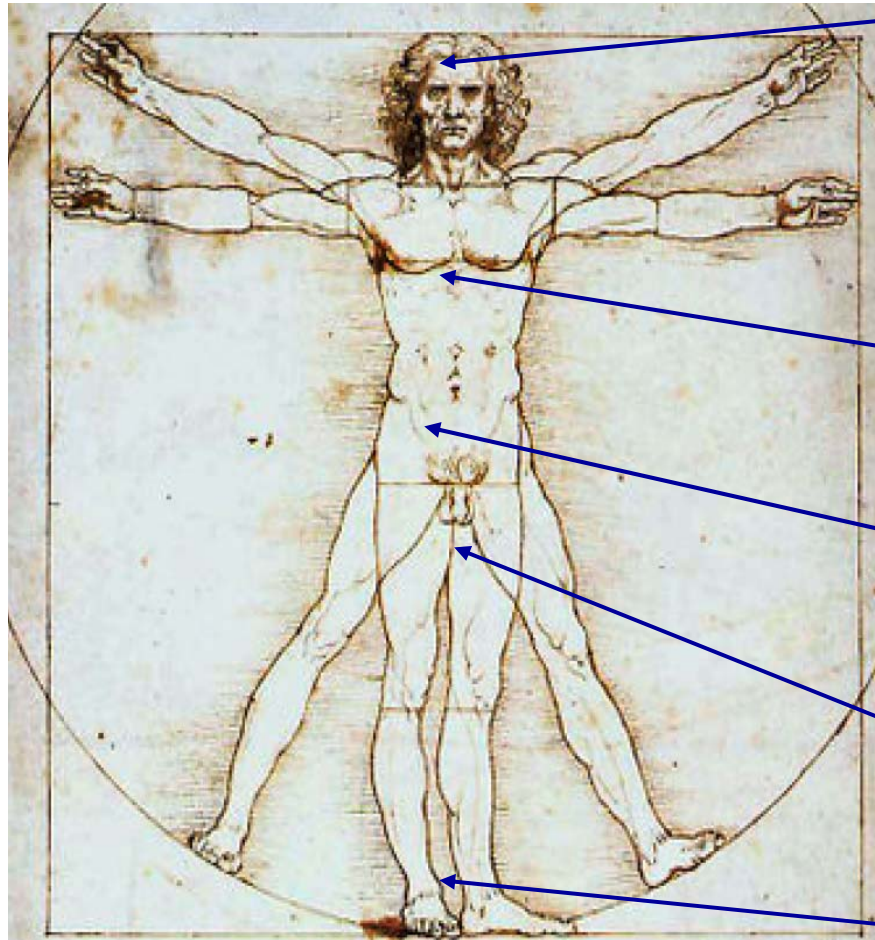
1930 1940 1950 1960 1970 1980 1990 2000

Modern Portfolio Theory (MPT)

"New Finance"

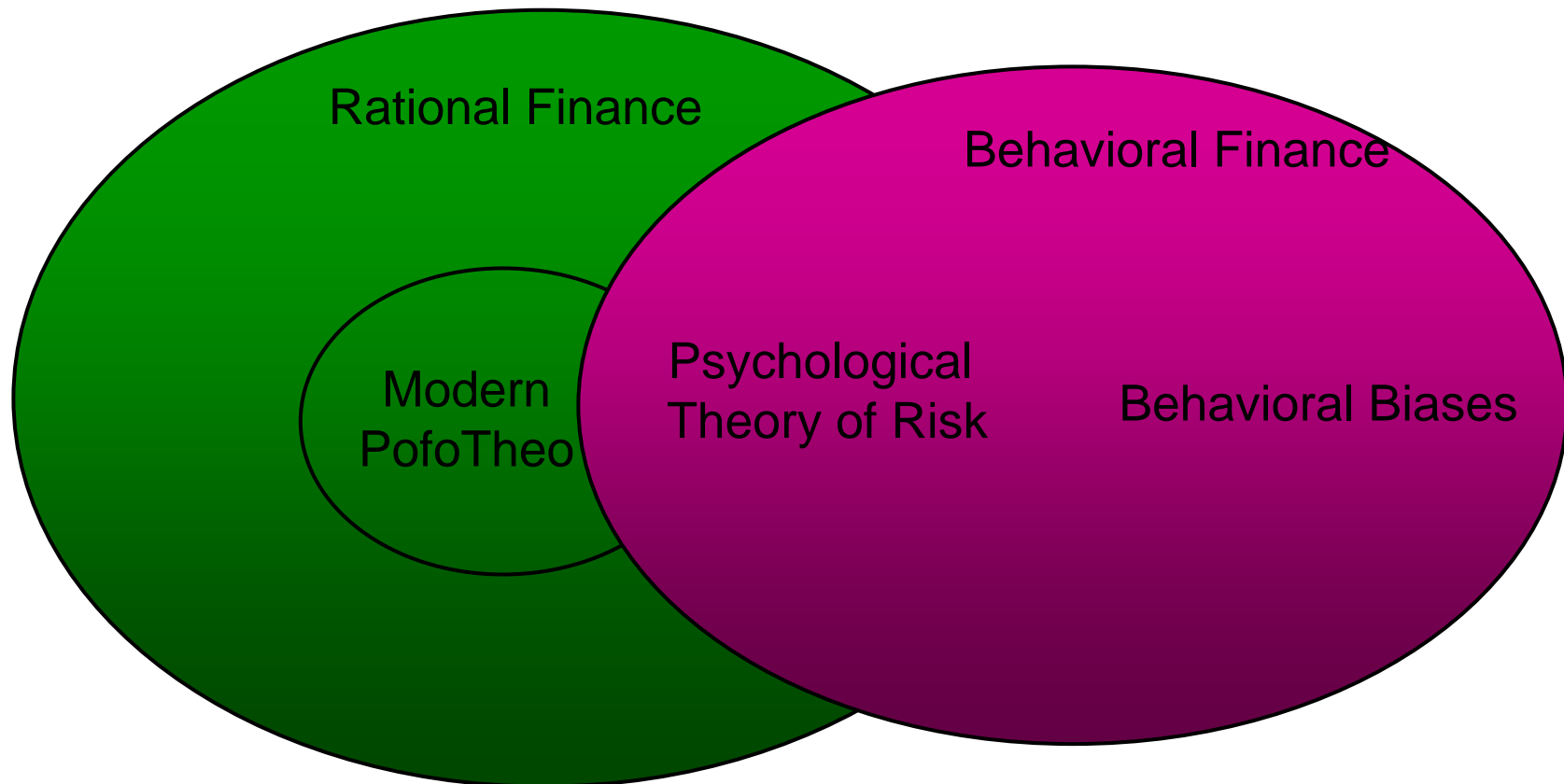
- Old Finance (e.g. Graham/Dodd):
Basics of financial analysis, accounting, stock picking (value and growth); active, non-benchmark investing
- MPT (e.g. Markowitz/Sharpe/Fama)
Efficient markets, risk/return analysis, portfolio optimization, CAPM, benchmark orientation
- "New Finance" (e.g. Kahnemann/Tverski/Shleifer)
Behavioral finance, inefficient markets; active and non-benchmark investing

2. Behavioral Biases



- Cognitive Biases
 - Mental Accounting
 - Over&Under-reaction
 - Attention Bias
 - Trend Chasing Bias
- Emotions and Investing
 - Greed and Fear
 - Proud, Regret, Surprise
- Intuition
 - Trust (home bias)
 - Gut feeling
- Gender Differences
 - Overconfidence
 - Self Attribution Bias
- Herding, Conformism, Panics

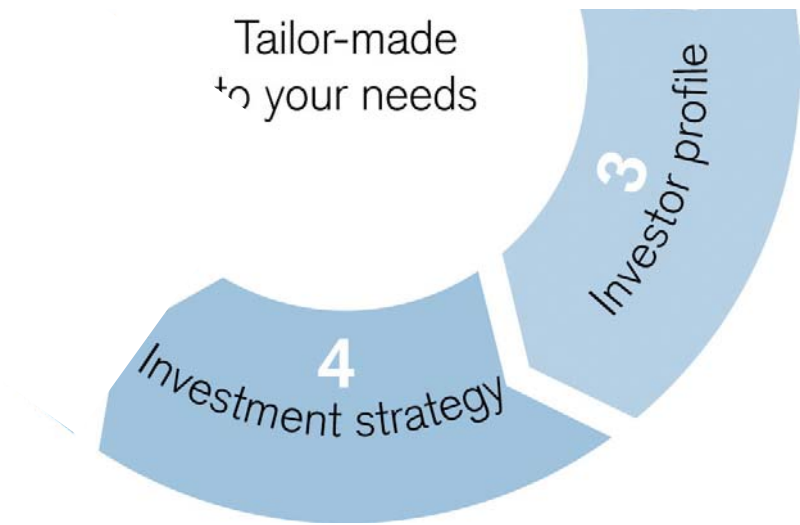
3. Behavioral = Irrational?



4. Wealth Management Process in Private Banking



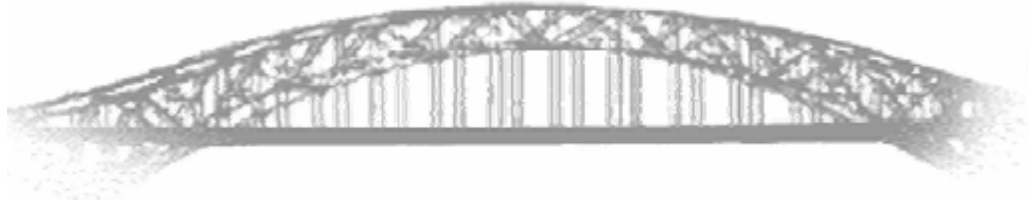
Focus of this Presentation



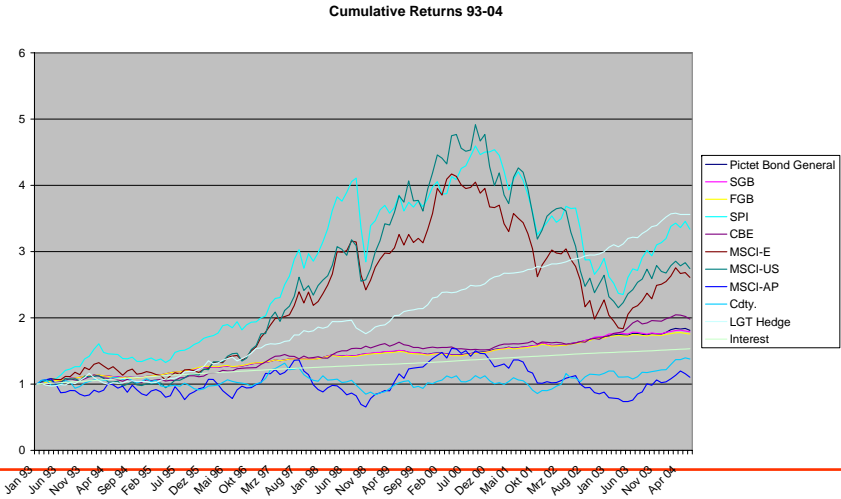
Agenda

1. A Short History of Finance
2. Behavioral Biases
3. Behavioral = Irrational?
4. Wealth Management Process (WMP)
- 5. Theoretical Foundation of the WMP**
 - a. Mean-Variance Approach**
 - b. Prospect Theory**
6. What Next?
7. References

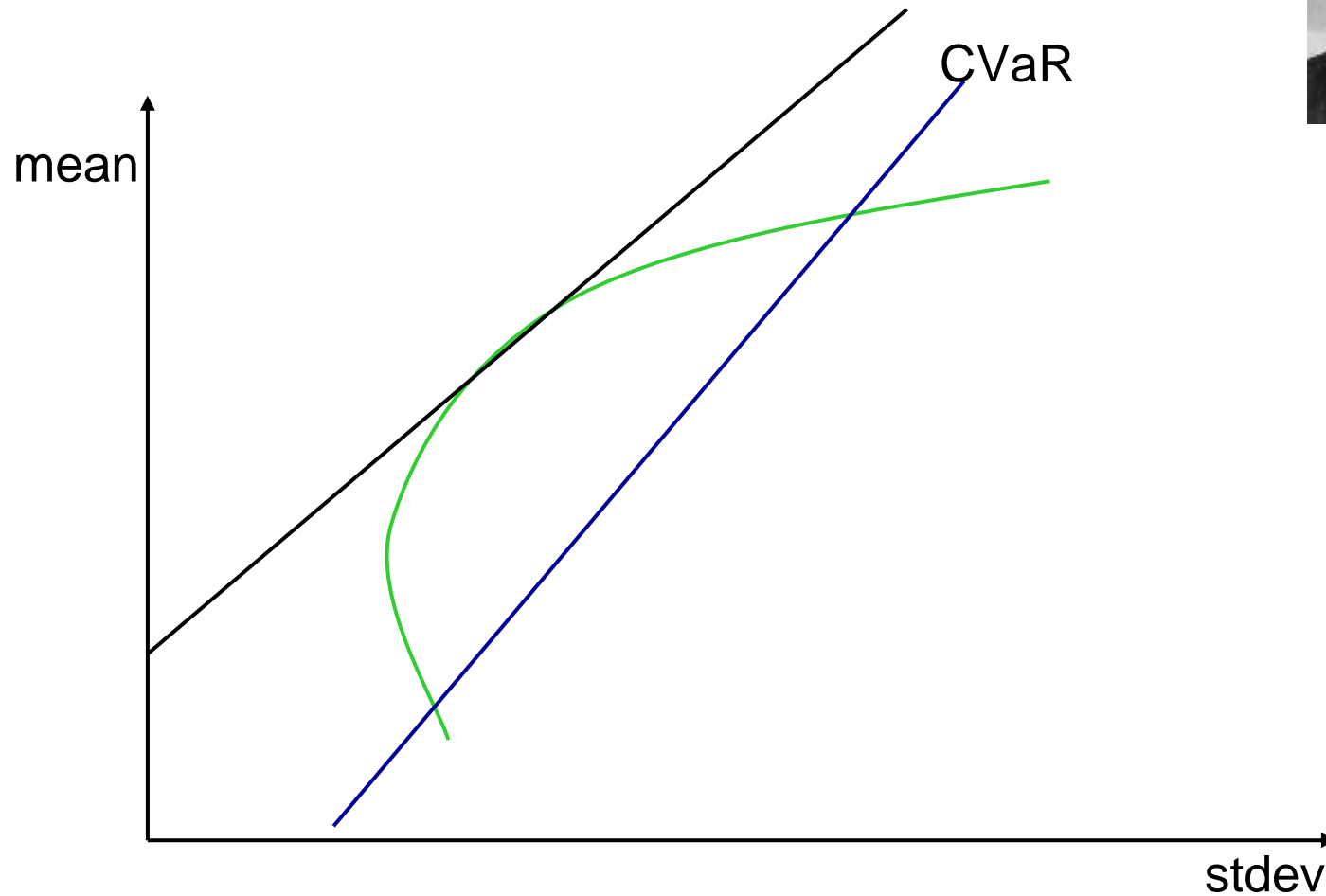
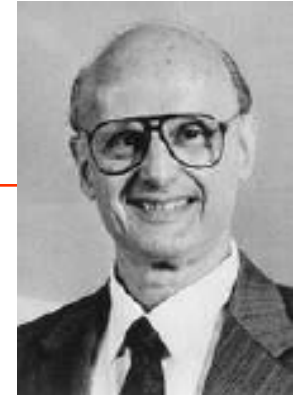
Giving Advice to Clients in Private Banking



THEORY



a. Mean-Variance Approach



Markowitz (1952): Portfolio Selection, Journal of Finance.

Investor Profile: Mean-Variance: Volatility Aversion α

❖ Risk Ability

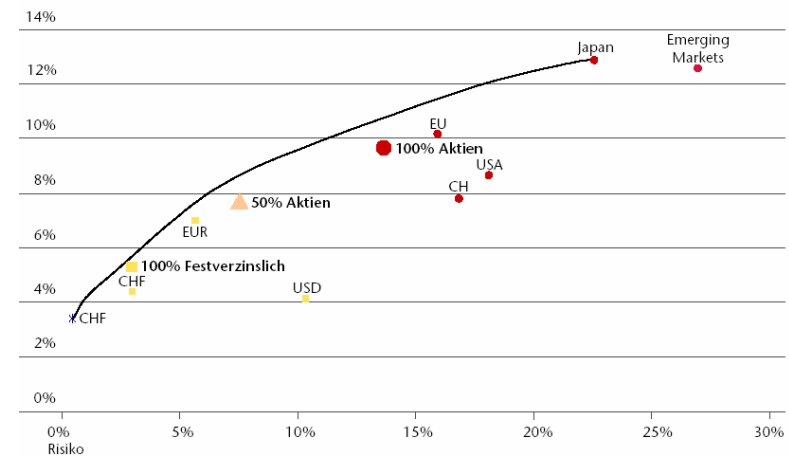
- Financial strength
- Financial stamina
- Financial flexibility

❖ Risk Tolerance

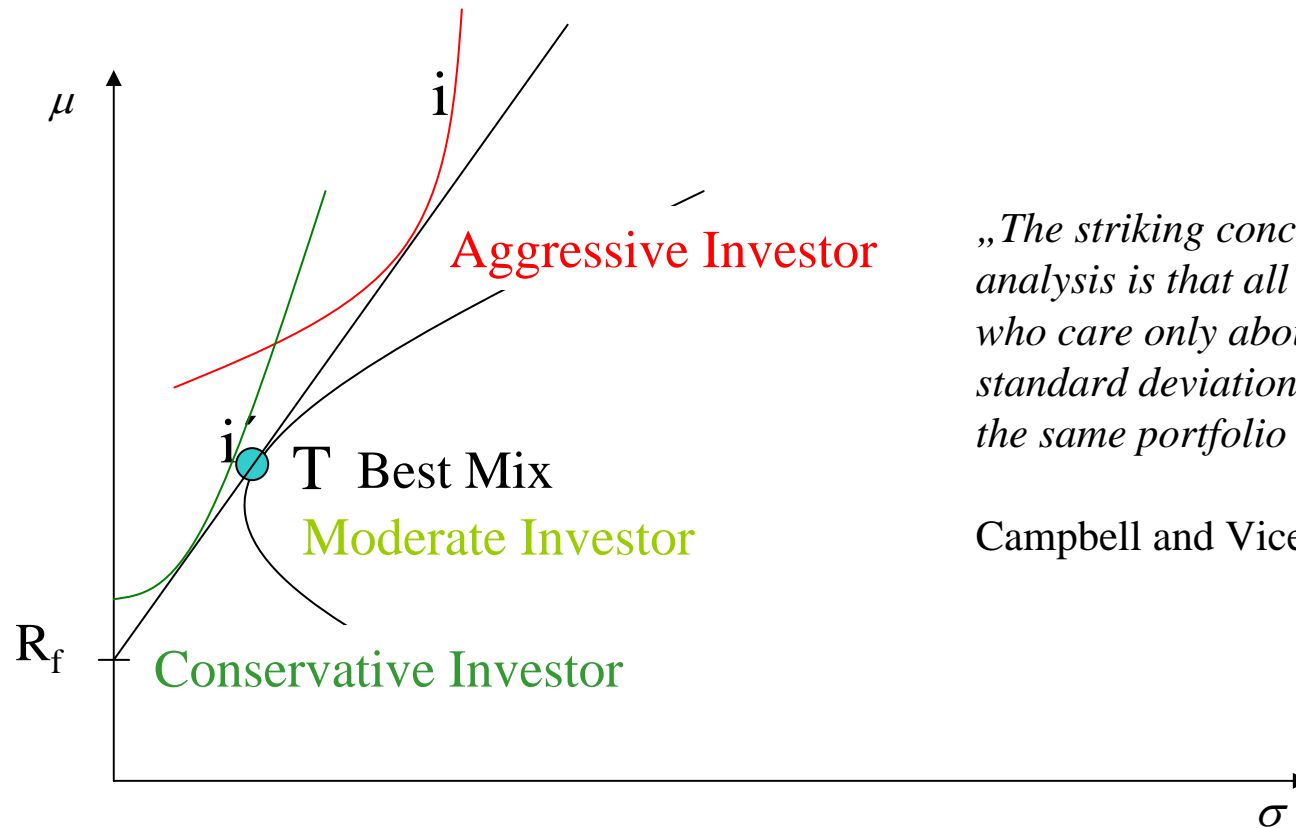
- Experience
- Interest
- Expectations
- Risk Awareness
- Comfort

α

- 1 Fixed Income
- 2 Income
- 3 Balanced
- 4 Growth
- 5 Stocks



Two Fund Separation: A Disturbing Property



„The striking conclusion of Markowitz analysis is that all investors who care only about mean and standard deviation will hold the same portfolio of risky assets.“

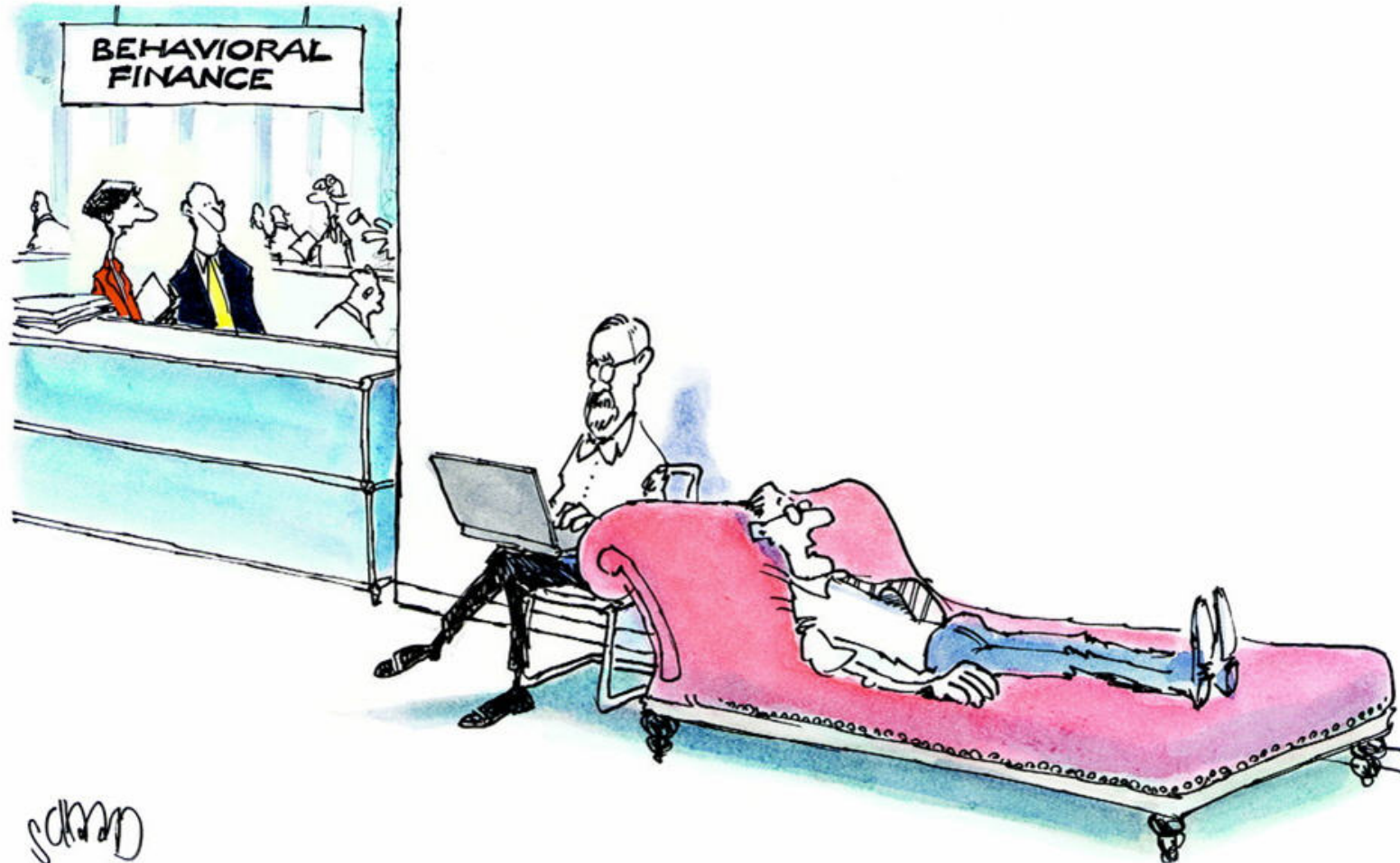
Campbell and Viceira (2002), p.3.

The Asset Allocation Puzzle: Two-Fund-Separation Ignored

Advisor Investors Type	% of Portfolio			Ratio Bonds to Stocks
	Cash	Bonds	Stocks	
Fidelity				
Conservative	50	30	20	1.50
Moderate	20	40	40	1.00
Aggressive	5	30	65	0.46
Merrill Lynch				
Conservative	20	35	45	0.78
Moderate	5	40	55	0.73
Aggressive	5	20	75	0.27
New York Times				
Conservative	20	40	40	1.00
Moderate	10	30	60	0.50
Aggressive	0	20	80	0.25

Canner Mankiw and Weil (1997), AER.

Asset Allocation based on Behavioral Finance



«Wir können sie jetzt nicht stören. – Sie sind mitten in der neuen Anlagestrategie!»

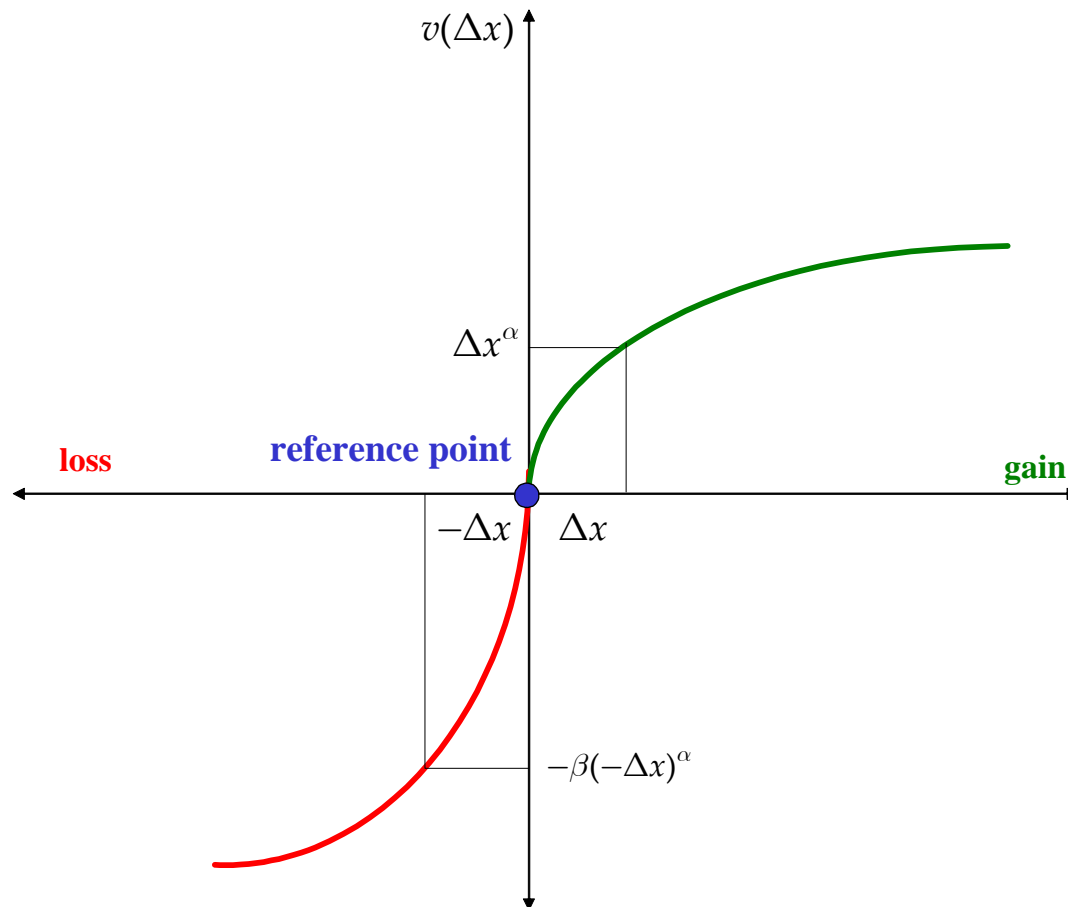
b. Behavioral Finance: Prospect Theory



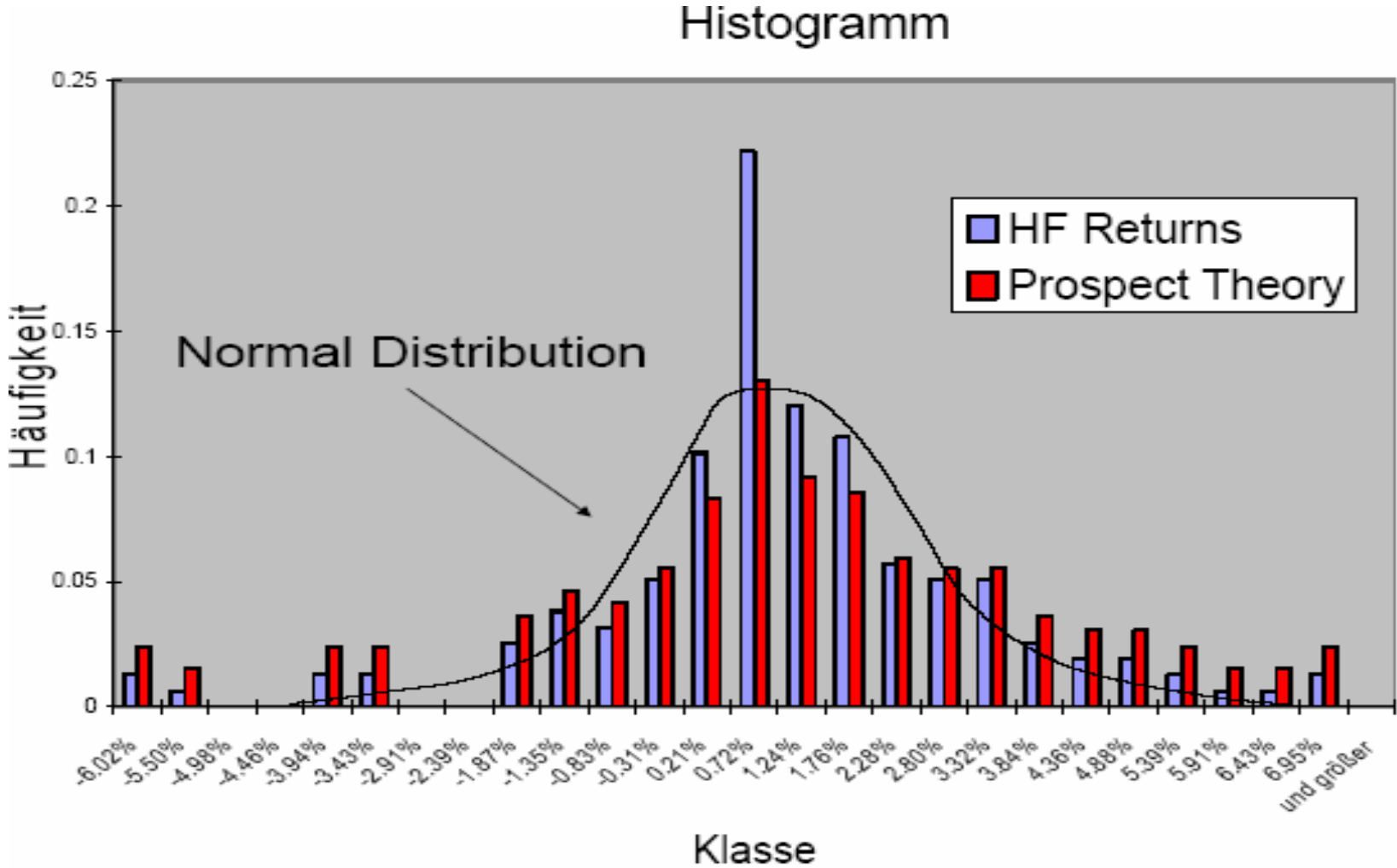
- Reference Points
- Gains and Losses
- Loss Aversion
- Decreasing Marginal Utility from Gains
- Decreasing Marginal Suffering from Losses
- Exaggeration of Small Probabilities

Kahneman and Tversky (1979): Prospect Theory, Econometrica, 17, 263-291.

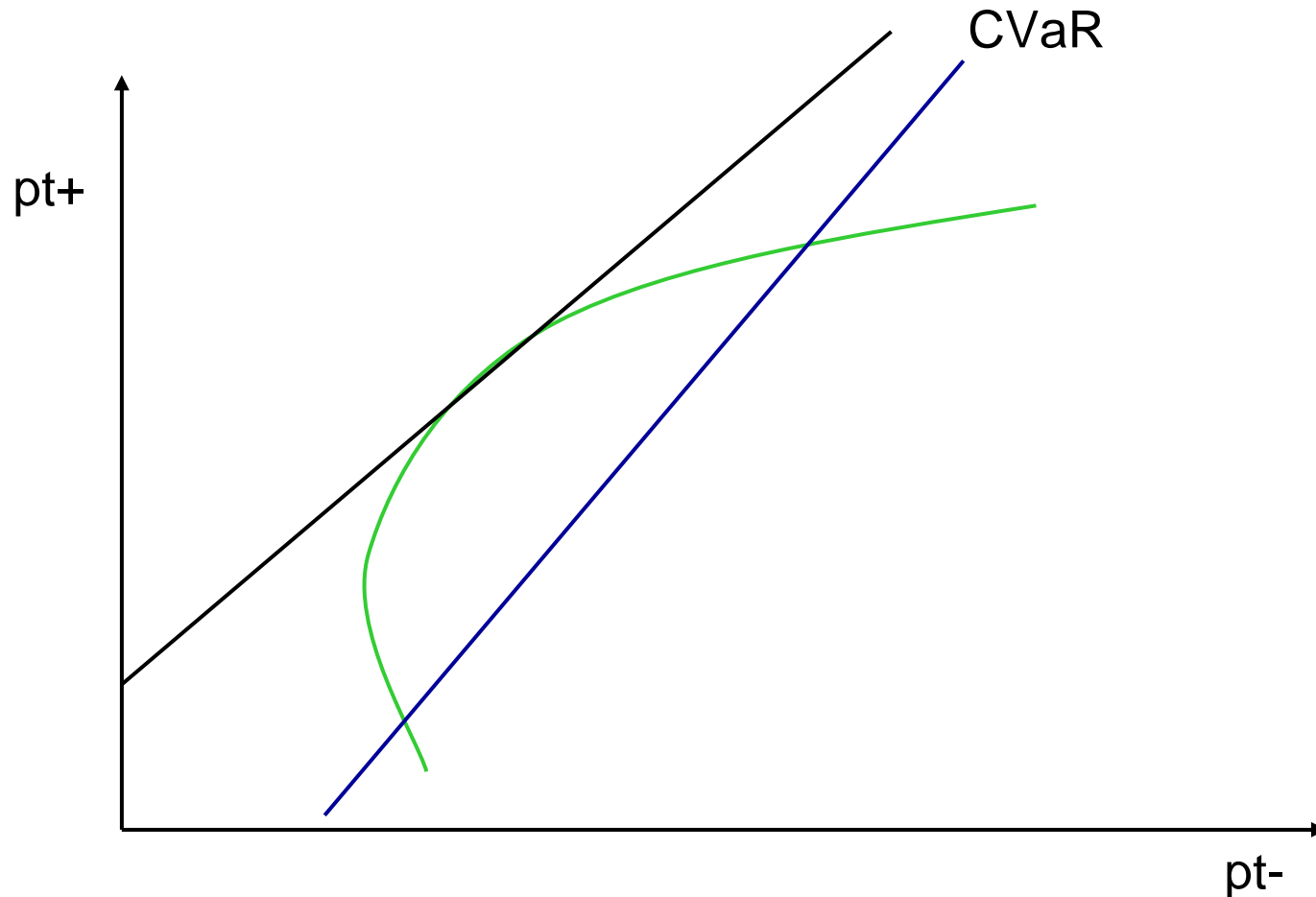
Prospect Theory Utility Function



Exaggeration of Small Probabilities

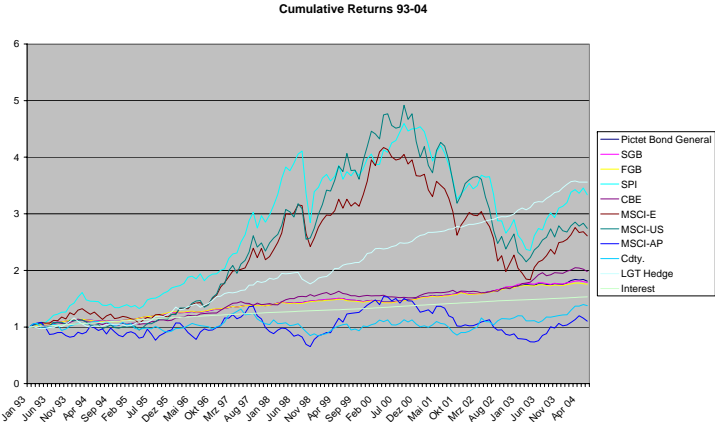
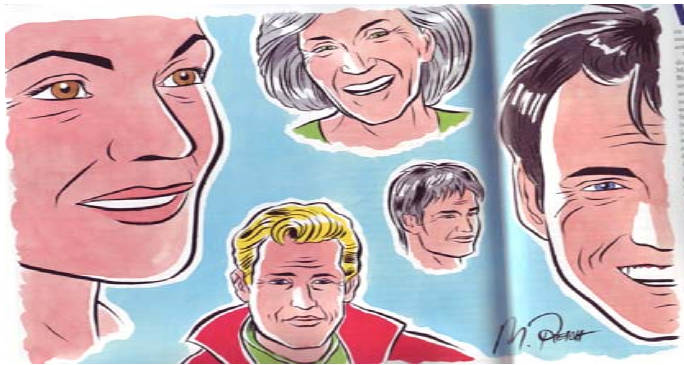
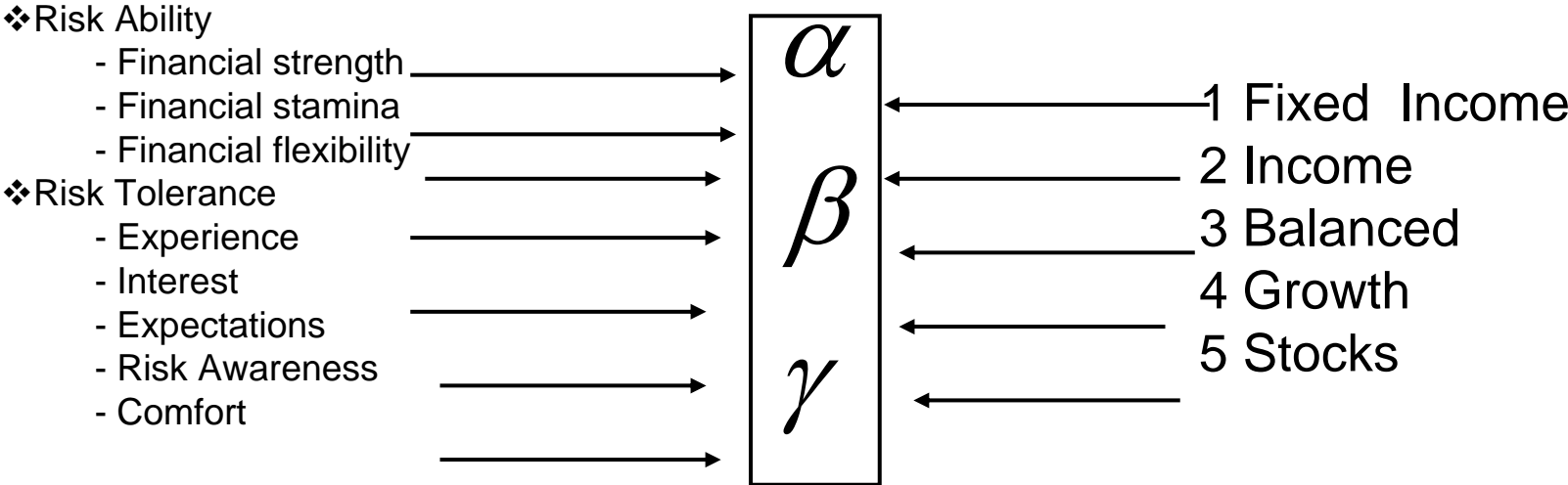


A Reward Risk Perspective on Prospect Theory



DeGiorgi, Hens and Mayer (2006), NCCR-Working Paper No.286

Risk Profile based on Prospect Theory



A General Two-Fund-Separation Theorem

In the reward-risk approach based on prospect theory two-fund separation holds if and only if the reference point is positively homogeneous, e.g. equal to the risk-free rate or the mean return.

Proof: Based on an axiomatic foundation of reward-risk.

Key properties of the reward-risk measures that give two-fund separation:

- Translation invariance, i.e. adding a risk-free payoff does not change the risk measure.
- Positive homogeneity, i.e. scaling of all payoffs in the same way does not change the relative attractiveness of the assets.

For details see De Giorgi, Hens and Mayer (2006).

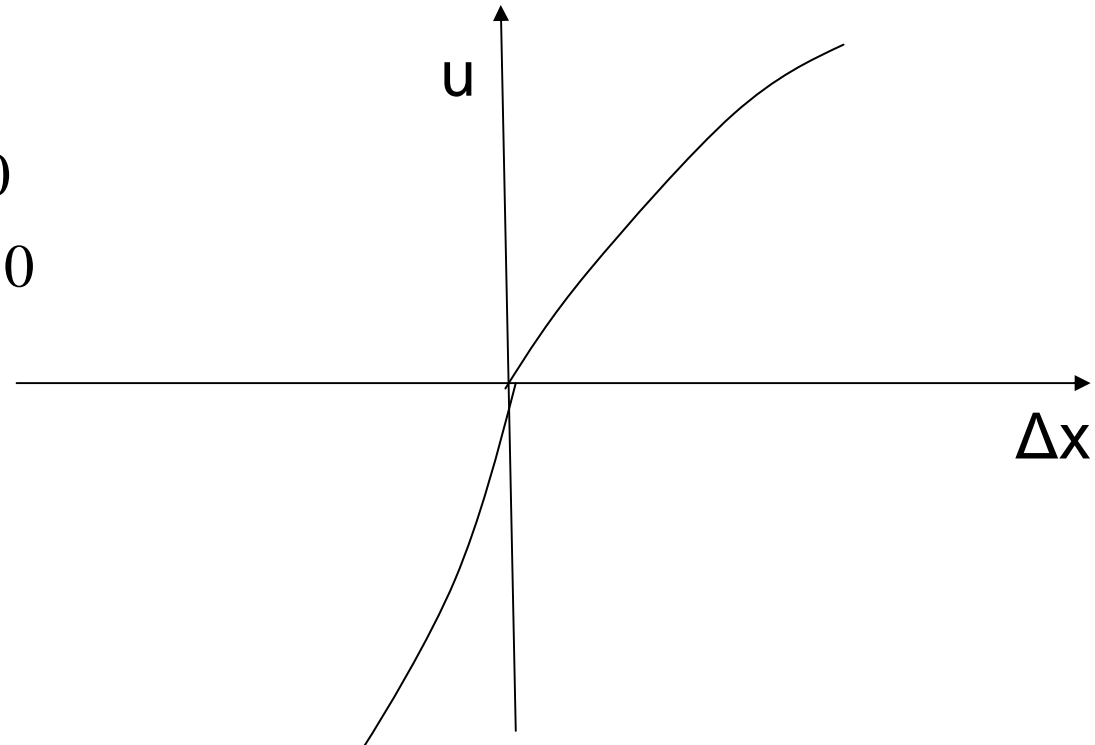
Mathematical Modelling of Prospect Theory

- Properties
 - Psychologically founded
 - Robustness of asset allocation
 - Compatibility with mean-variance
 - Two-Fund-Separation
- Suggestions
 - Kahneman and Tversky
 - Barberis, Huang and Santos
 - De Giorgi, Hens and Levy
 - Damianova, Hens and Mayer

Kahneman and Tversky

Piecewise power function

$$u(\Delta x) = \begin{cases} (\Delta x)^\alpha & \text{if } \Delta x > 0 \\ -\beta(-\Delta x)^\alpha & \text{if } \Delta x < 0 \end{cases}$$

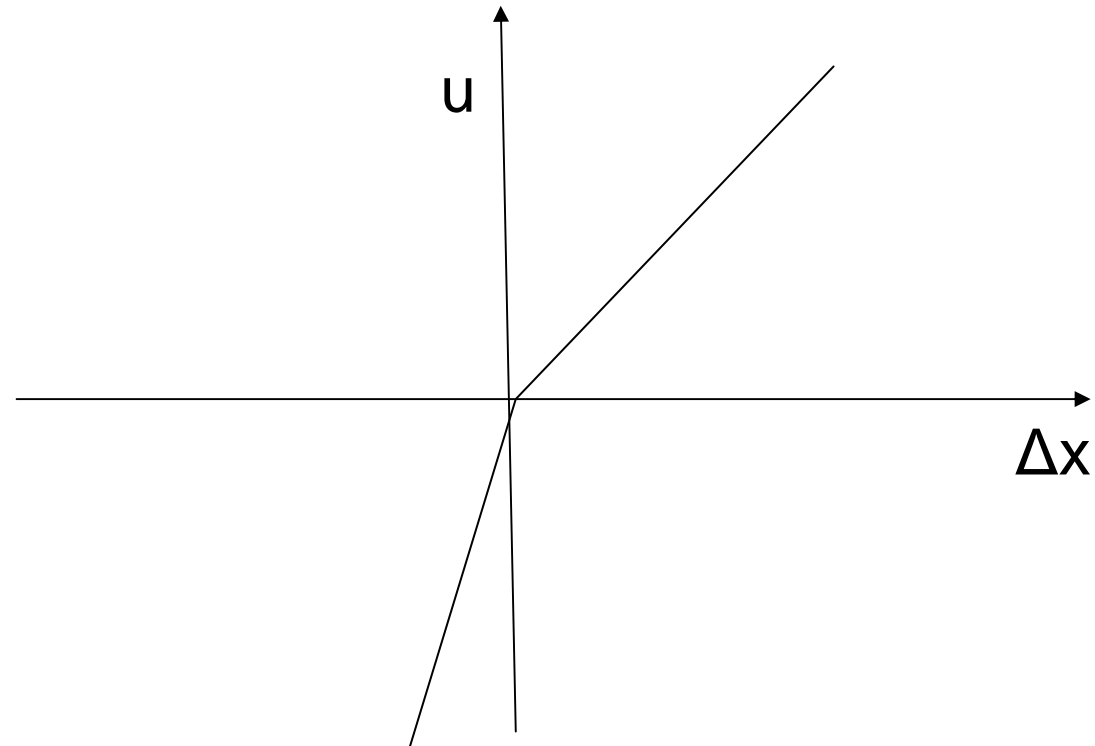


Kahneman and Tversky (1979), Em.

Barberis, Huang and Santos

Piecewise linear function

$$u(\Delta x) = \begin{cases} \Delta x & \text{if } \Delta x > 0 \\ \beta \Delta x & \text{if } \Delta x < 0 \end{cases}$$

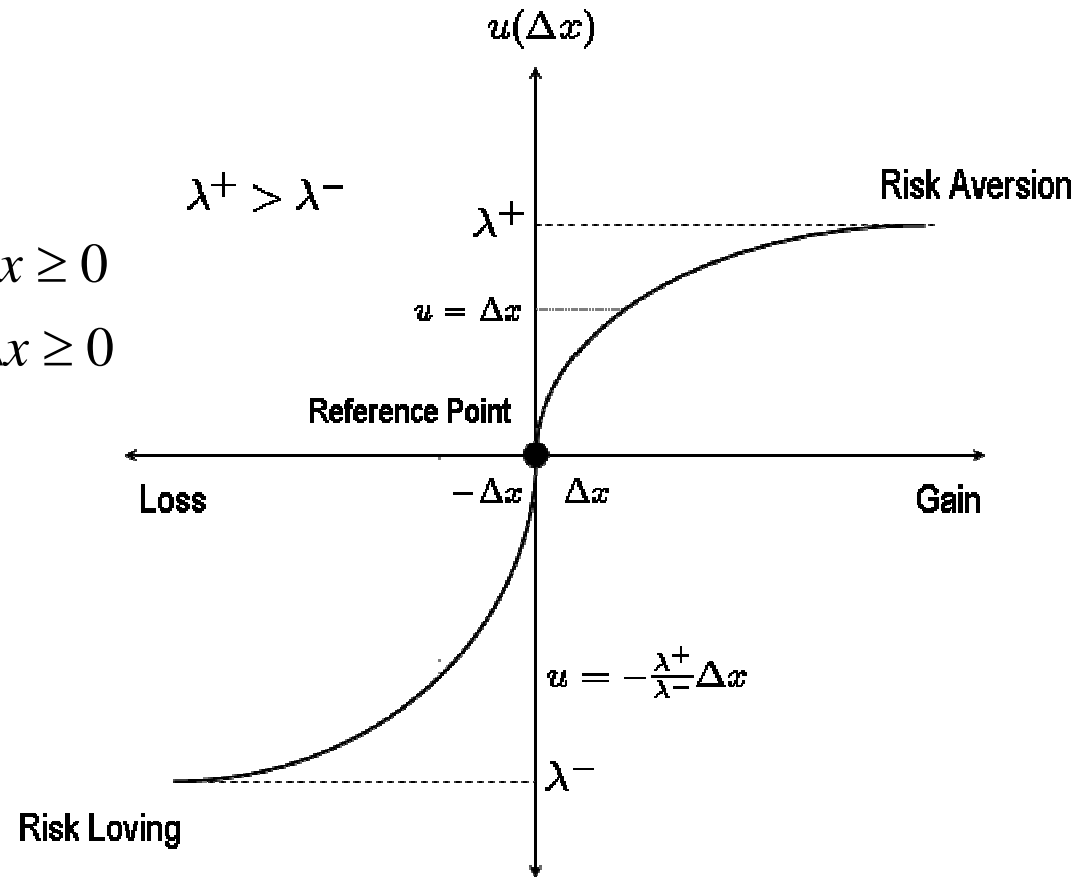


Barberis, Huang and Santos (2001), QJE.

De Giorgi, Hens and Levy

Piecewise exponential function

$$u(\Delta x) = \begin{cases} -\lambda^+ \exp(-\alpha\Delta x) + \lambda^+ & \text{if } \Delta x \geq 0 \\ \lambda^- \exp(\alpha\Delta x) - \lambda^- & \text{if } \Delta x < 0 \end{cases}$$

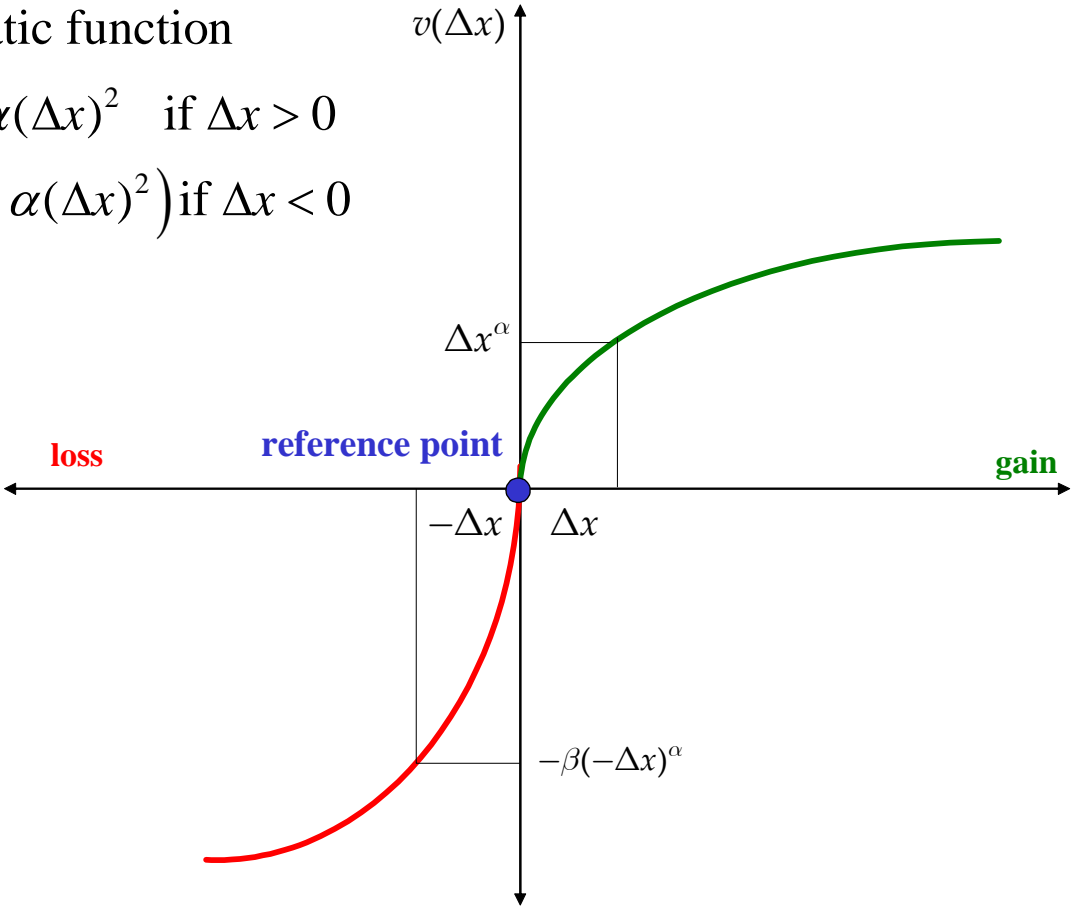


De Giorgi, Hens and Levy (2005): Prospect Theory and the CAPM.

Damianova, Hens and Mayer

Piecewise quadratic function

$$u(\Delta x) = \begin{cases} \Delta x - \alpha(\Delta x)^2 & \text{if } \Delta x > 0 \\ \beta(\Delta x - \alpha(\Delta x)^2) & \text{if } \Delta x < 0 \end{cases}$$



Mathematical Modelling of Prospect Theory

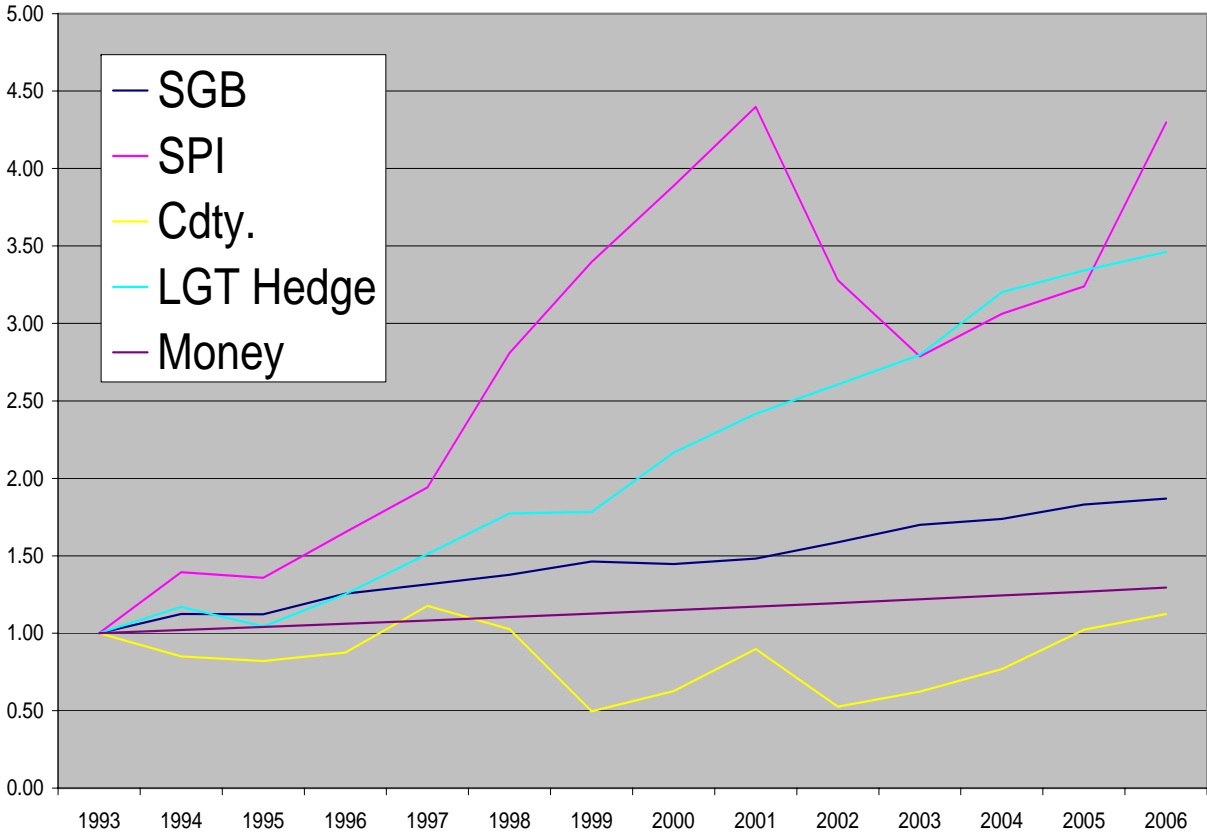
	Psychology	Robustness	Compatibilty	Two-Fund-S
KT	YES	NO	NO	If $RP = R_f$ or $RP = \text{mean}$
BHS	Partially	YES	NO	NO
DHL	YES	For Normal distribution	For Normal Distribution	NO
DHM	YES	If close to MVA	If $RP = \text{mean}$	If $RP = R_f$ or $RP = \text{mean}$

A numerical Example (DHM)

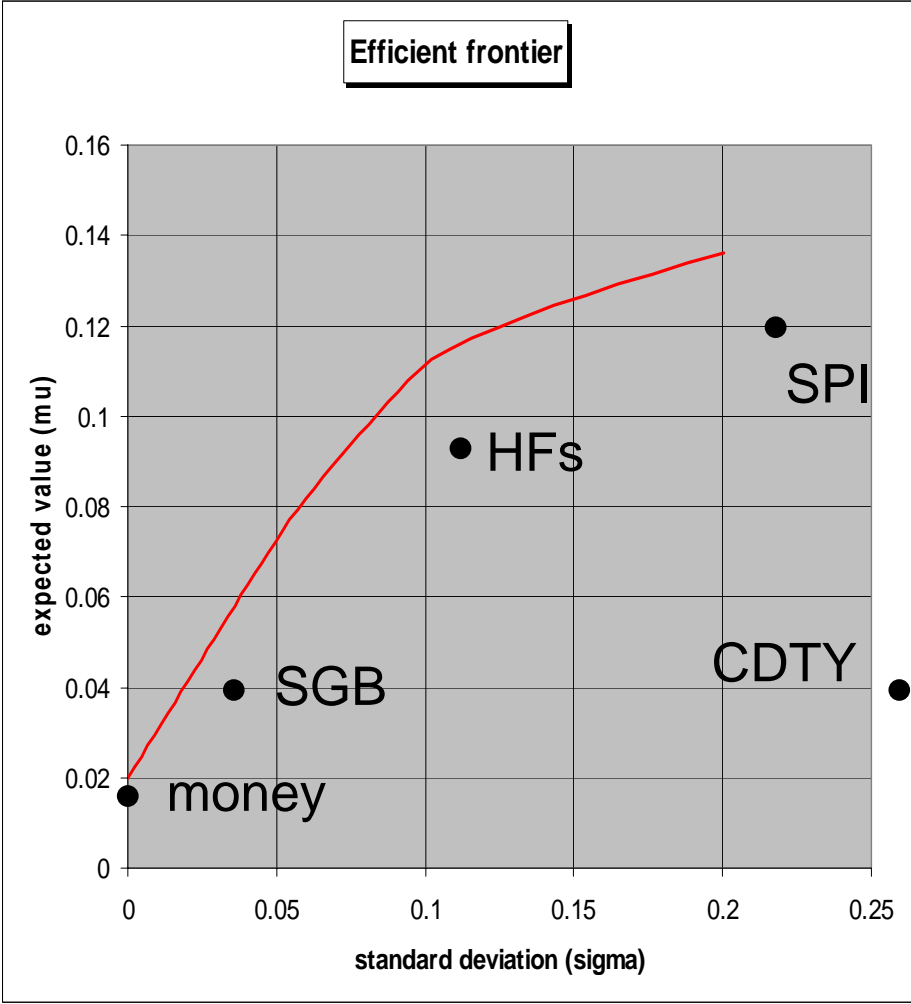
- Description of the Data
- Mean-Variance Diagram
- Mean-Variance Optimal Portfolio
- Prospect Theory Optimal Portfolio
- Prospect Theory in Mean-Variance Diagram

Description of Data (1)

Cumulative Gross Returns

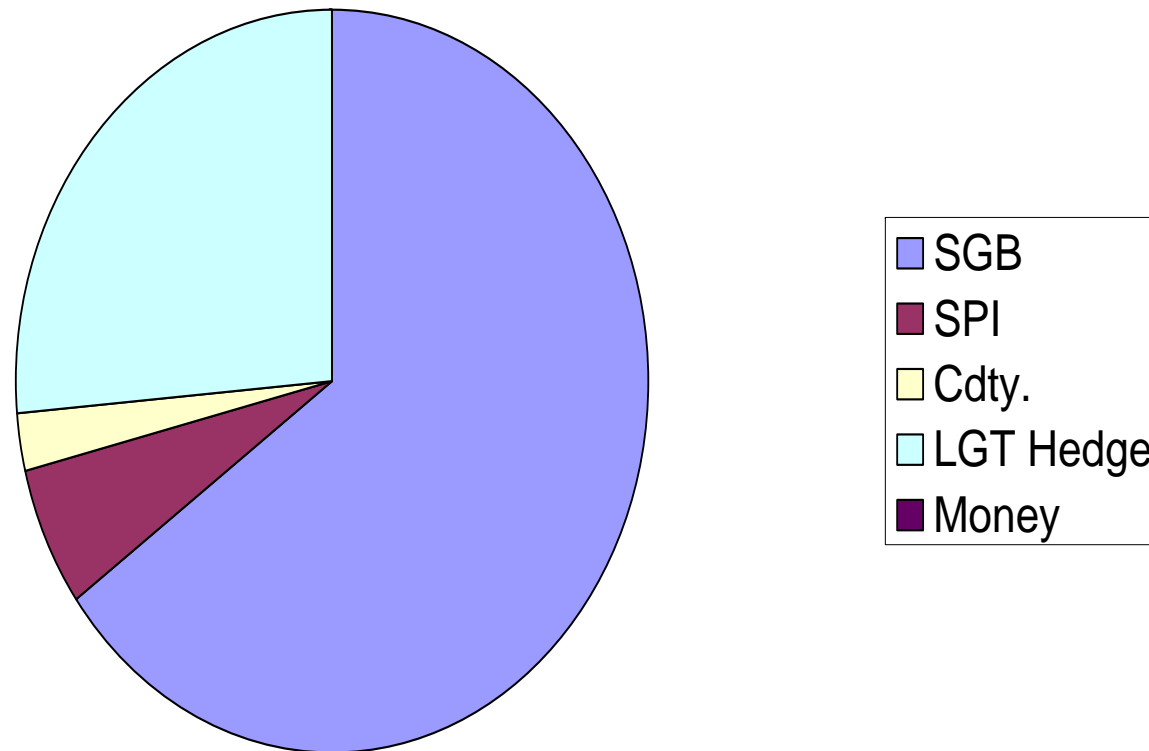


Description of Data (2)



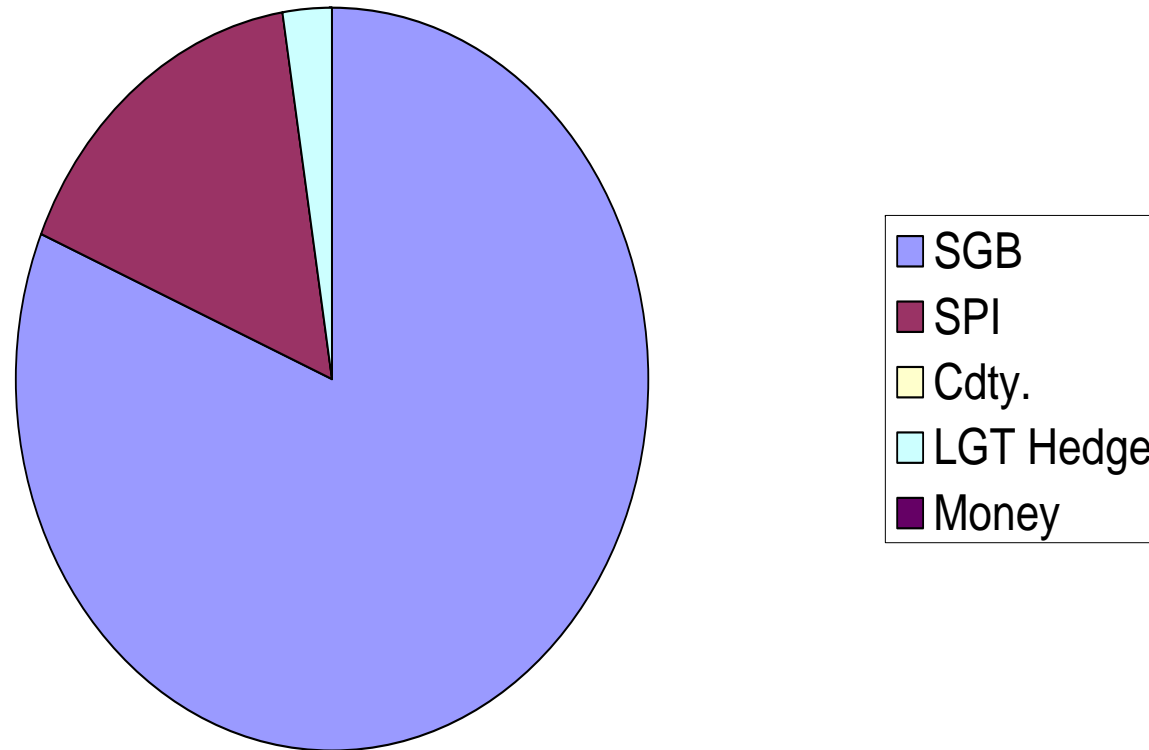
Mean-Variance Tangential Portfolio

Mean-Variance Tangential Portfolio

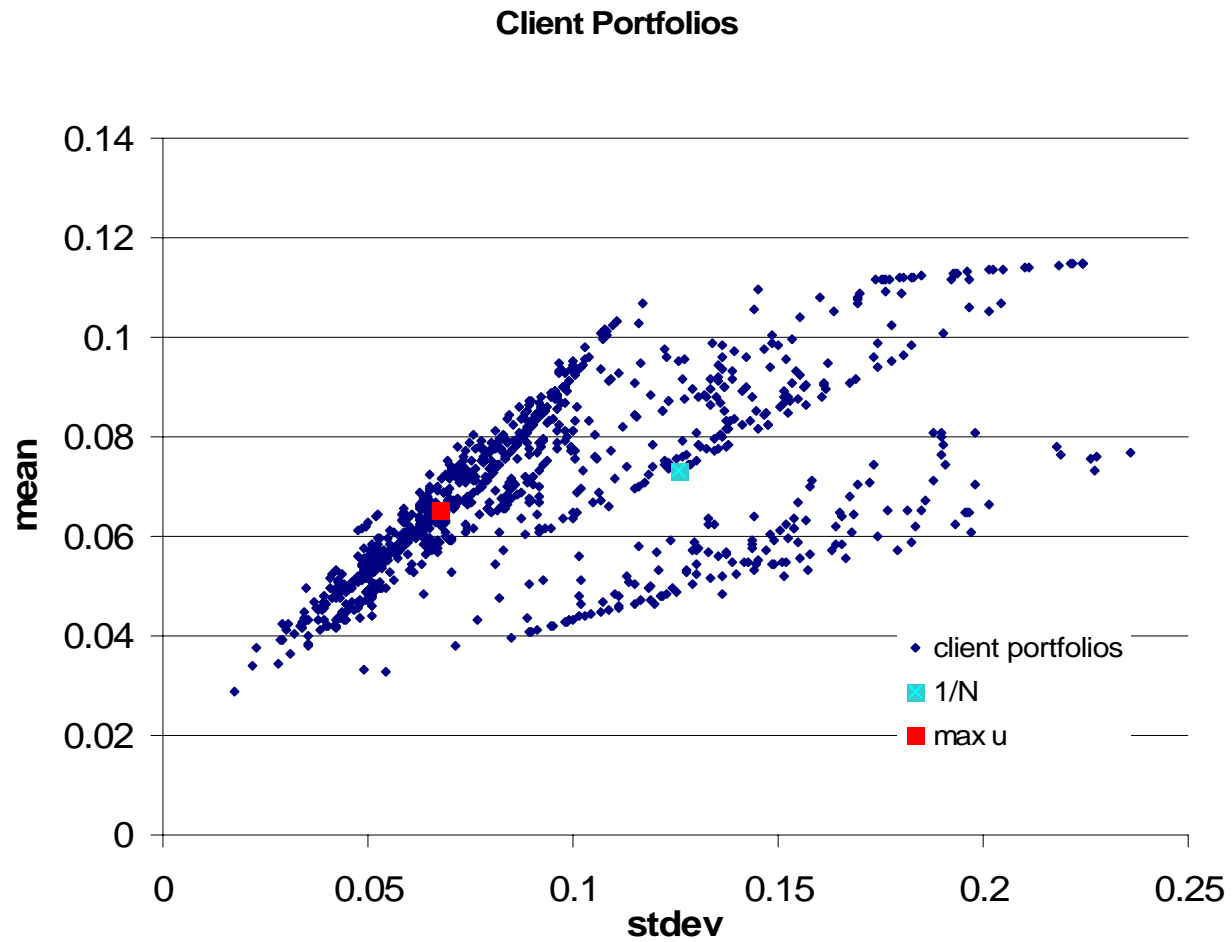


Prospect Theory Portfolio

PT-Optimal Portfolio



PT in MVA



6. What Next?

Old Finance



1930 1940 1950 1960 1970 1980 1990 2000

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"New Finance"

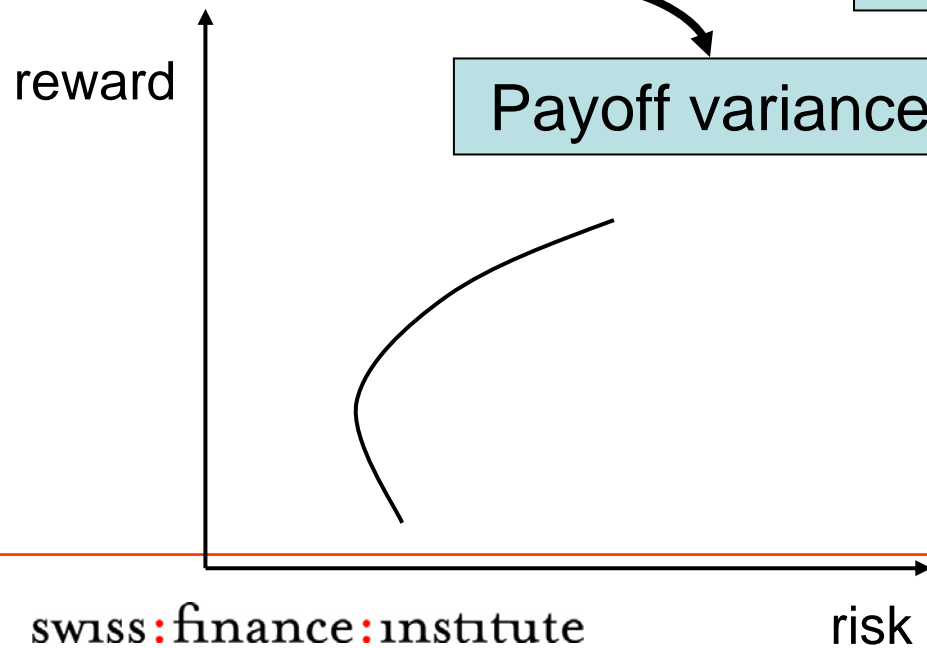


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Behavioral finance, inefficient markets; active and non-benchmark investing

Neuro-Finance



Bossaerts (2006): Markowitz in the Brain



Payoff variance

Payoff expectation



Asset Allocation based on Behavioral Finance



«Wir können sie jetzt nicht stören. – Sie sind mitten in der neuen Anlagestrategie!»

7. References (1)

- Barberis, Huang and Santos (2001), Prospect Theory and Asset Prices, Quarterly Journal of Economics, 116 (1),1-53.
- Bossaerts (2006): Markowitz in the Brain, paper presented at ZWF.
- Canner Mankiw and Weil (1997) : An asset allocation puzzle, American Economic Review, 87, pp.181-191.
- Campbell and Viceira (2002) Strategic Asset Allocation, CUP.
- De Giorgi and Hens (2006): Making Prospect Theory Fit for Finance, Journal of Financial Markets and Portfolio Management.
- De Giorgi, Hens and Mayer (2006): A Behavioral Foundation of Reward-Risk Portfolio Selection.
- De Giorgi, Hens and Levy (2005): Prospect Theory and the CAPM.

7. References (2)

- Hens (2006): Foxes, Rabbits and Scorpions, Interview in CFA-Magazine March-April 2006.
- Hens (2006): Keeping Risk in Mind, Lead Article of UBS-Wealth Management Magazine, 4-2006.
- Markowitz (1952): Portfolio Selection, Journal of Finance, 7, no.1, 77-91.

See also: <http://www.behavioralfinance.ch>