Maslowian Portfolio Theory

Why Goal Based Investing Makes Sense

Dr. Philippe J.S. De Brouwer

Stochastic analysis and its applications
28.05.2017 - 03.06.2017
Bedlewo

Maslowian Portfolio Theory
Dr. Philippe J.S. De Brouwer
Introduction
The Traditional Approach
The Core Idea
Risk-Reward Methods
Coherent Risk Measures
MiFID
Examples
Conclusions

Disclaimer

HSBC Disclaimer

Outline

1. Introduction
   - The Traditional Approach
   - The Core Idea
   - Risk-Reward Methods
   - Coherent Risk Measures
   - MiFID
2. Examples
3. Conclusions

Introduction

The Traditional Approach

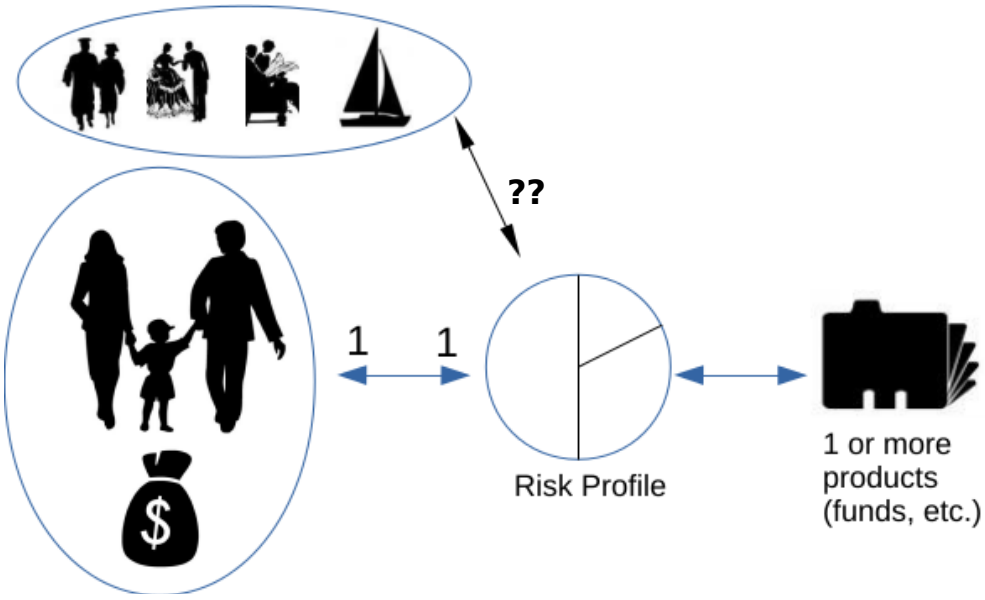


Figure 1: In the traditional approach to investment advice each investor has **one** “risk profile”.

Cognitive Dissonance Arose

Normative Theories ⟹ *All Investments in One Portfolio*

e.g. Mean-Variance (**?**)

Descriptive Theories ⟹ *Many Sub – Portfolios*

e.g. Behavioural Portfolio Theory (**?**)

Maslowian Portfolio Theory – MaPT
The Idea

Core Idea

Investments serve a purpose in life. The life-goals are the purpose of the investments, and money is only a means to attain a life-goal, it is not a goal in itself.

Maslowian Portfolio Theory (MaPT)

Investments should cater for needs

Maslowian Portfolio Theory
Dr. Philippe J.S. De Brouwer
Introduction
The Traditional Approach
The Core Idea
Risk-Reward Methods
Coherent Risk Measures
MiFID
Examples
Conclusions

Human Needs	Investments/MaPT
Physiological Needs	liquid/cash
Safety Needs	insurance, retirement savings
Love Needs	mixed portfolios for projects
Esteem Needs	mixed portfolios for projects
Self Actualization	broker account

Table 1: Maslowian Portfolio Theory.

The Maslowian Approach

Maslowian Portfolio Theory
Dr. Philippe J.S. De Brouwer
Introduction
The Traditional Approach
The Core Idea
Risk-Reward Methods
Coherent Risk Measures
MiFID
Examples
Conclusions

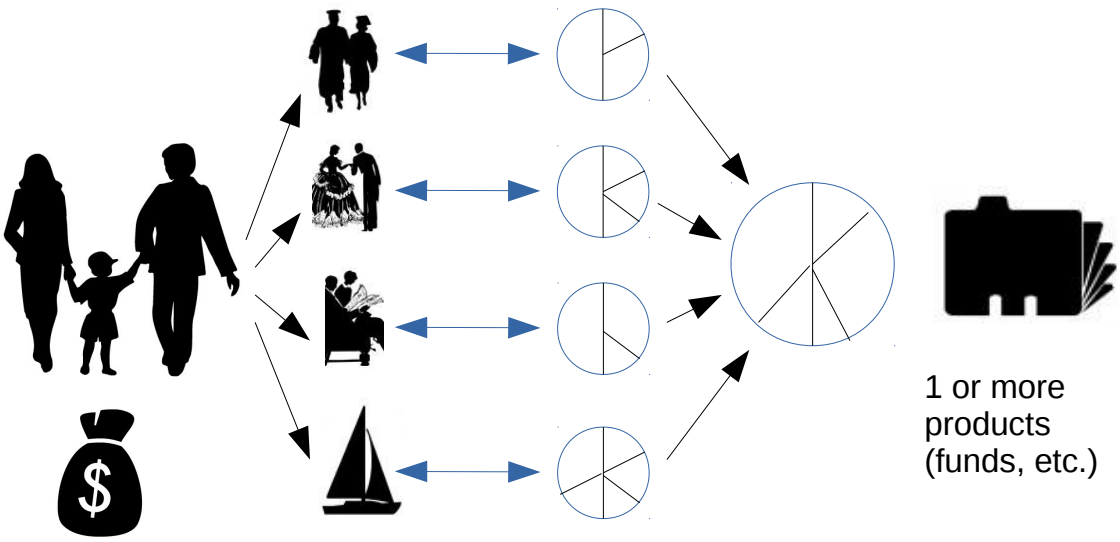
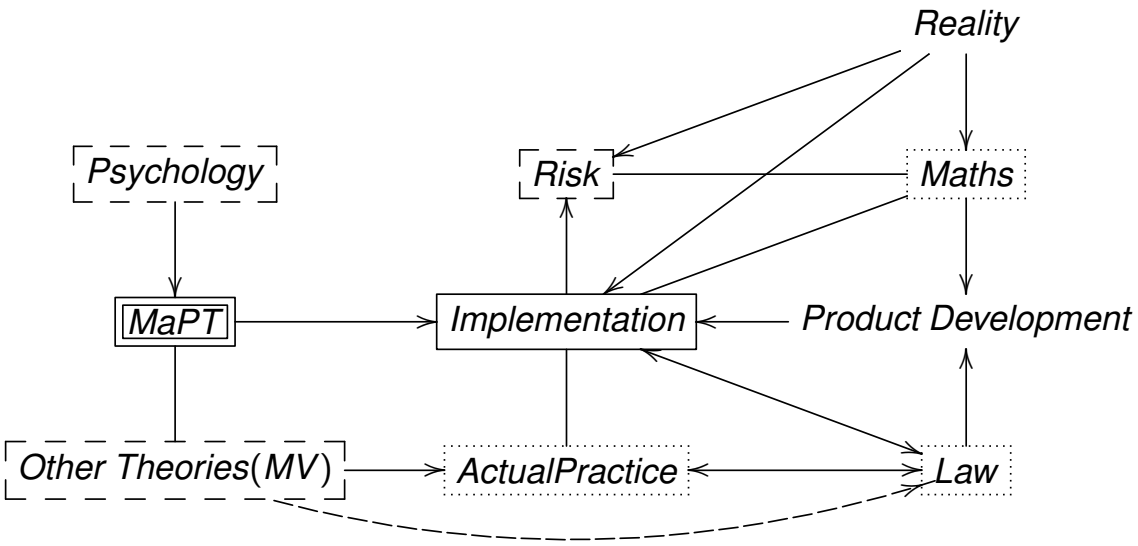


Figure 2: In the “Maslowian Approach” to investment advice each investor has one risk profile per life-goal.

What else is necessarily involved?
Opening the Box of Pandora . . .



What has been done already?
A Few Steps are Taken

- Problem formulation ca. 2000
- Refereed Publications:
  - investment horizon is relevant: (**?**)
  - analogy (first ideas): (**?**)
  - MaPT: (**?**)
  - TOIA: (**?**)
  - implementation of MaPT & TOIA: (**?**)
- in the advent of robo-advice and MiFID II the interest in goal-based investment advice if growing.

Target Oriented Investment Advice (TOIA)
The Logic

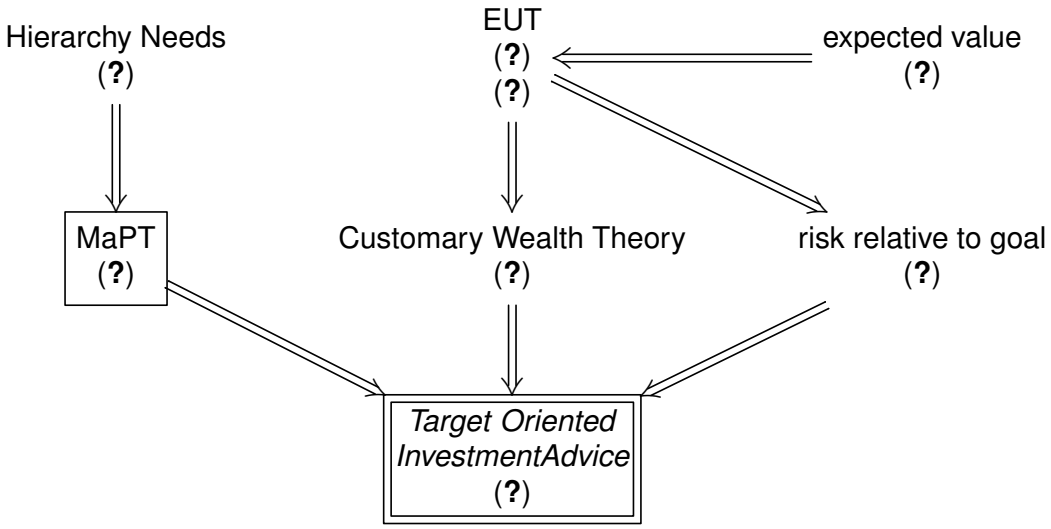


Figure 3: Milestones for the formulation of TOIA.

The Maths of TOIA
The Logic

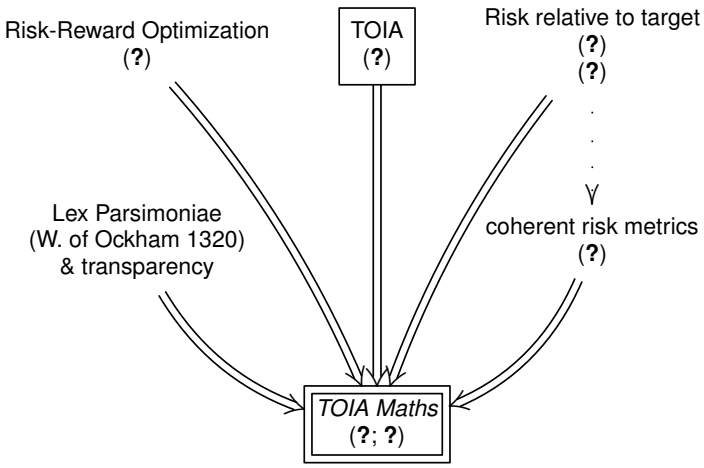


Figure 4: An Implementation of TOIA – as described in (?; ?)

3 Gaussian Assets
Equities, Bonds and Cash

Maslowian Portfolio Theory
Dr. Philippe J.S. De Brouwer
Introduction
The Traditional Approach
The Core Idea
Risk-Reward Methods
Coherent Risk Measures
MiFID
Examples
Conclusions

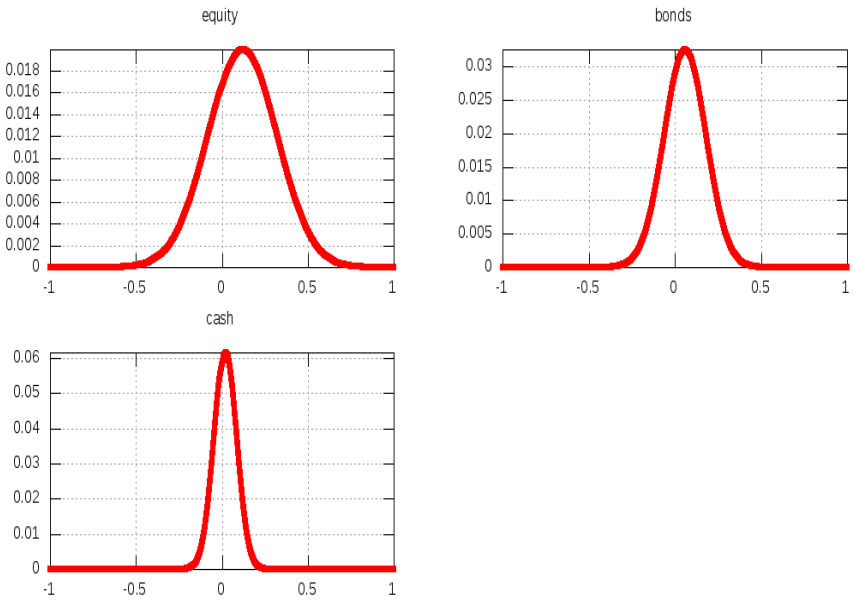


Figure 5: Equities, bonds and cash (Gaussian distributed).

The Mechanics of a Risk-Reward Method

Maslowian Portfolio Theory
Dr. Philippe J.S. De Brouwer
Introduction
The Traditional Approach
The Core Idea
Risk-Reward Methods
Coherent Risk Measures
MiFID
Examples
Conclusions

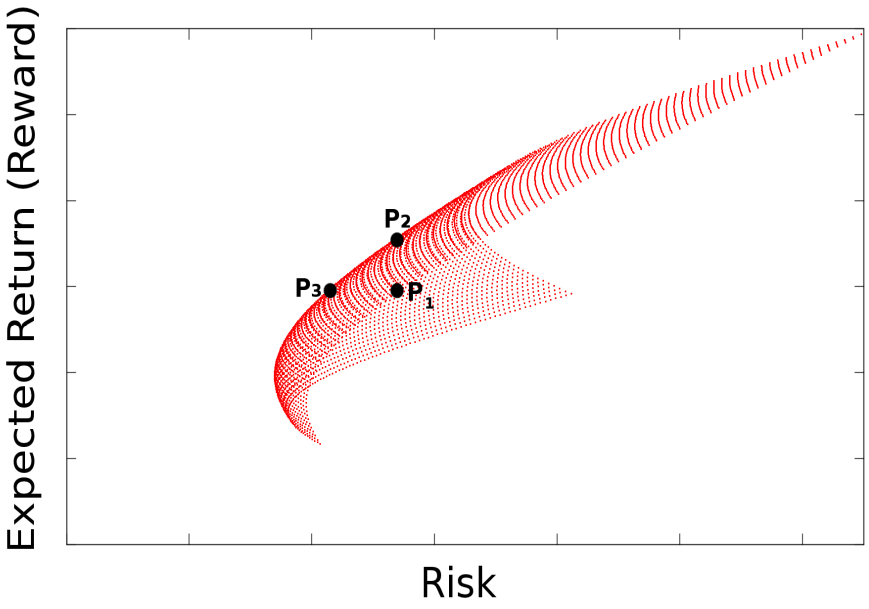


Figure 6: Portfolios in the risk/reward plane.The risk/reward method is simply “dominance” method in the Multi Criteria Decision Analysis.

Example 1
Gaussian Equities, Bonds and Cash—inflation adjusted

Maslowian Portfolio Theory
Dr. Philippe J.S. De Brouwer
Introduction
The Traditional Approach
The Core Idea
Risk-Reward Methods
Coherent Risk Measures
MiFID
Examples
Conclusions

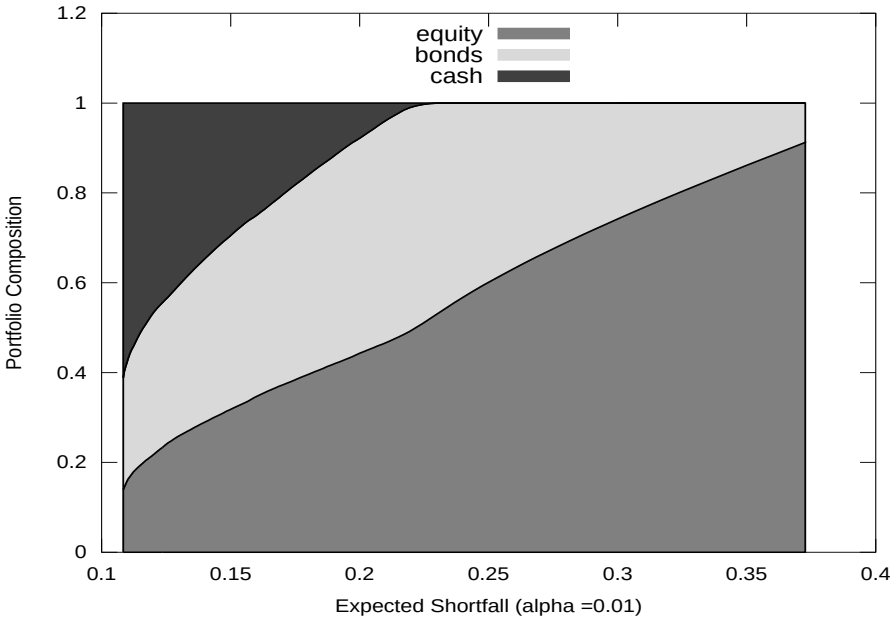


Figure 7: Recommended portfolios in function of ES.

Some Definitions (1)

Maslowian Portfolio Theory
Dr. Philippe J.S. De Brouwer
Introduction
The Traditional Approach
The Core Idea
Risk-Reward Methods
Coherent Risk Measures
MiFID
Examples
Conclusions

definition 1

$\mathcal{P}$ = the absolute return

definition 2

σ = standard deviation = $\sqrt{VAR}$

definition 3 (Value-at-Risk (V@R))

For the stochastic profit variable, absolute return $\mathcal{P}$, and a probability $\alpha \in [0, 1]$, we define the Value at Risk (V@R):

$$V@R_\alpha(\mathcal{P}) := -Q_{\mathcal{P}}(\alpha)$$

definition 4

$ES_\alpha(\mathcal{P})$ = the average of the $\alpha 100\%$ worst outcomes of $\mathcal{P}$

Some Definitions (2)
Visualisation of ES, V@R and σ

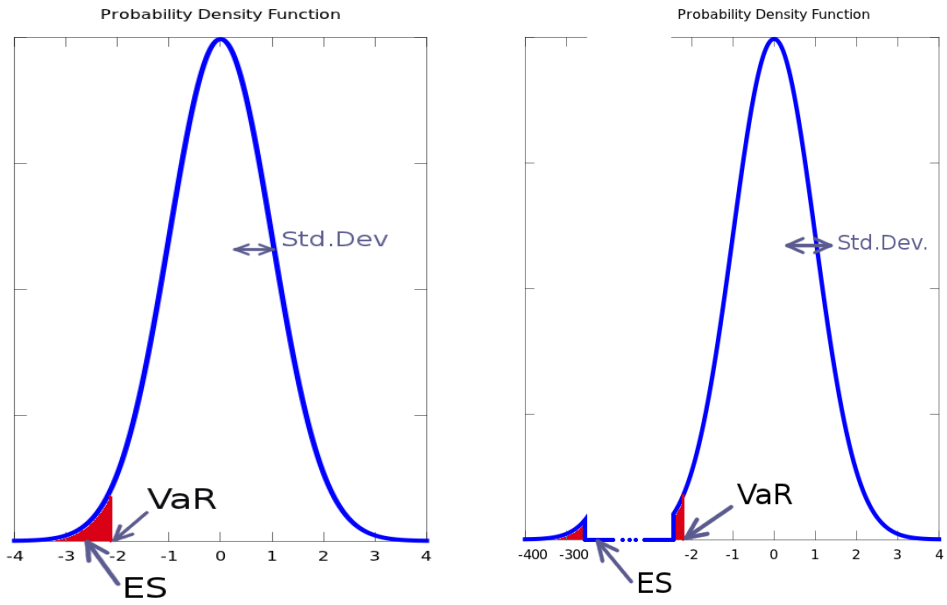


Figure 8: Interpretation of ES, V@R and σ.

Thinking Coherently—(I)
The Definition

definition 5 (Coherent Risk Measure)

A function $\rho : \mathbb{V} \mapsto \mathbb{R}$ (where $\mathbb{V}$ is the set of real-valued stochastic variables) is called a **coherent risk measure** if and only if it is

1. **monotonous**: $\forall X, Y \in \mathbb{V} : X \leq Y \Rightarrow \rho(X) \geq \rho(Y)$
2. **sub-additive**: $\forall X, Y, X + Y \in \mathbb{V} : \rho(X + Y) \leq \rho(X) + \rho(Y)$
3. **positively homogeneous**: $\forall a > 0 \text{ and } \forall X, aX \in \mathbb{V} : \rho(aX) = a\rho(X)$
4. **translation invariant**: $\forall a > 0 \text{ and } \forall X \in \mathbb{V} : \rho(X + a) = \rho(X) - a$

After the paper "Thinking Coherently"—(**?**)

Law-invariance under P:

$\forall X, Y \in \mathbb{V}$ *and* $\forall t \in \mathbb{R} : P[X \leq t] = P[Y \leq t] \Rightarrow \rho(X) = \rho(Y)$

Thinking Coherently—(II)
Example for (In)Coherence of Risk Meaures

Maslowian Portfolio Theory
Dr. Philippe J.S. De Brouwer
Introduction
The Traditional Approach
The Core Idea
Risk-Reward Methods
Coherent Risk Measures
MiFID
Examples
Conclusions

Example 1

Assume one bond with a 0.7% probability to default in one year in all other cases it pays 105% in one year.
The 1% V@R is $-5\% \Rightarrow$ *V@R spots* ***no*** *risk!*

Example 2

Consider two identical bonds with the same parameters, but independently distributed
The 1% V@R of the diversified portfolio is 47.5%!

Thinking Coherently—(III)
Continuity in α

Maslowian Portfolio Theory
Dr. Philippe J.S. De Brouwer
Introduction
The Traditional Approach
The Core Idea
Risk-Reward Methods
Coherent Risk Measures
MiFID
Examples
Conclusions

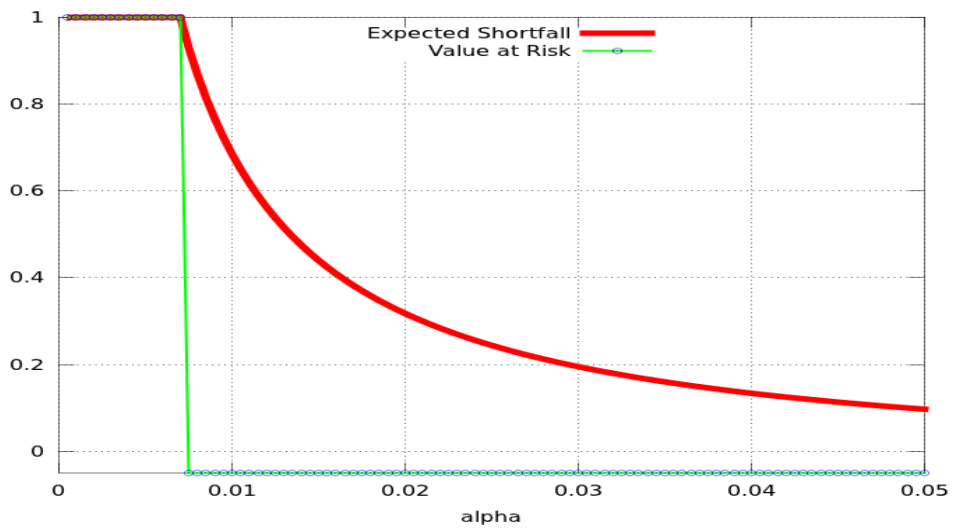


Figure 9: ES and V@R in function of α for one bond.

Thinking Coherently—(IV)
Convecity (I)

Maslowian Portfolio Theory
Dr. Philippe J.S. De Brouwer
Introduction
The Traditional Approach
The Core Idea
Risk-Reward Methods
Coherent Risk Measures
MiFID
Examples
Conclusions

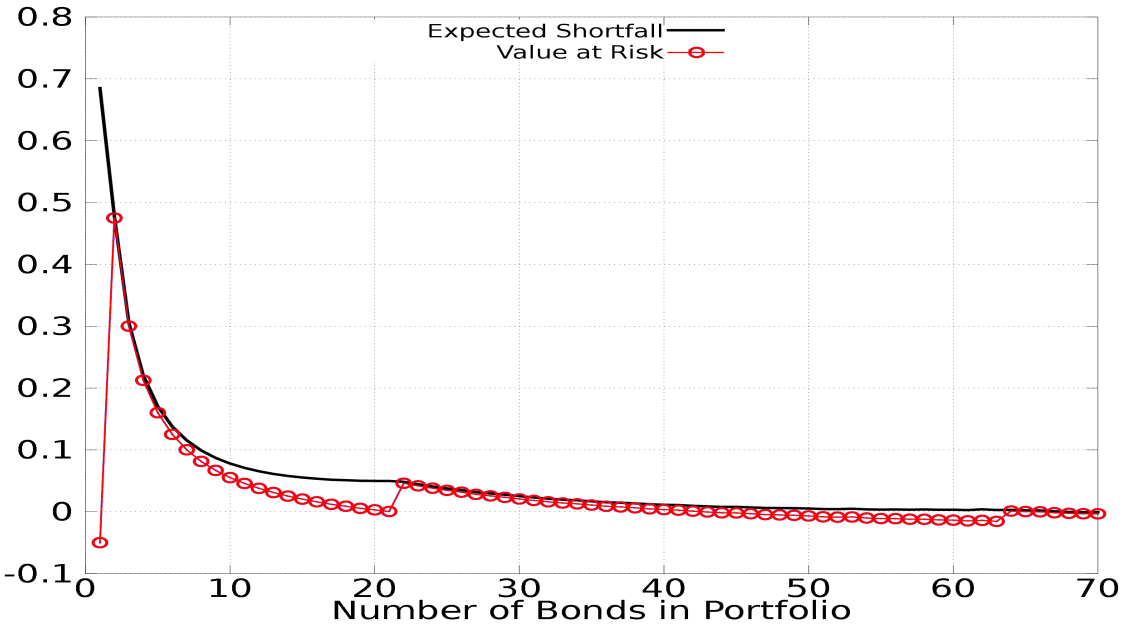


Figure 10: ES and V@R in function of number of bonds.

The Suitability Requirement
in the Markets in Financial Instruments Directive (MiFID)

Maslowian Portfolio Theory
Dr. Philippe J.S. De Brouwer
Introduction
The Traditional Approach
The Core Idea
Risk-Reward Methods
Coherent Risk Measures
MiFID
Examples
Conclusions

Rules for Know-Your-Customer: *suitability requirements* guide the industry to a one-risk-profile-per-investor approach based on a questionnaire

1. tries to find something that does not exist: a unique risk profile
2. increases model risk (all in one portfolio)
3. focus “risk-tolerance” (not defined, changeable and not the most important)
4. empowers emotions to become decisive $\Rightarrow$ stimulates bubbles and crashes
5. little understanding of the investor’s targets
6. questionnaire = the worst MCDM to find something that does little matter and use it as the only parameter for the only decision, and map this arbitrary parameter in arbitrarily to an arbitrary set of investments.

Examples

Example 3: A Complex Example

Goal	τ	T	**CF**	V_0	α	ES_m
school	€ 100,000	1	€ 0	€ 100,000	0.01	10%
yacht	€ 120,000	5	€ 0	€ 100,000	0.1	20%
retirement	€ 200,000	10	€ 10,000	€ 100,000	0.01	minin
extra	€ 50,000	10	€ 0	€ 50,000	0.05	€ 5,0

Table 2: The investment parameters for in Example 3. The investor wants to invest V_0 (plus annually CF) and wants it to grow to τ in T years, the expectation of the average of the α100% worst outcomes is to be limited to ES_{max}.

Example 3: Feedback to Investor

Goal	Equities	Bonds	Cash	ES	Feedba
school	12.8%	24.4%	62.8%	10.8%	add
yacht	100%	0%	0%	18%	reduc
retirement	21%	30%	49%	€ 3161.20	ES
extra	100%	0%	0%	€ 3836.07	is les
total portfolio	50.46%	16.12%	33.42%	—	

Table 3: An overview of the ES-optimal portfolio compositions, as well as their proportion of the total portfolio. In the last two columns one finds respectively the percentage of the sub-portfolio at $t = 0$ (i.e. at the moment of writing the financial plan), and the Expected Shortfall as obtained after optimization.

Example 3: A Complex Example

The portfolios in the mean-variance space.

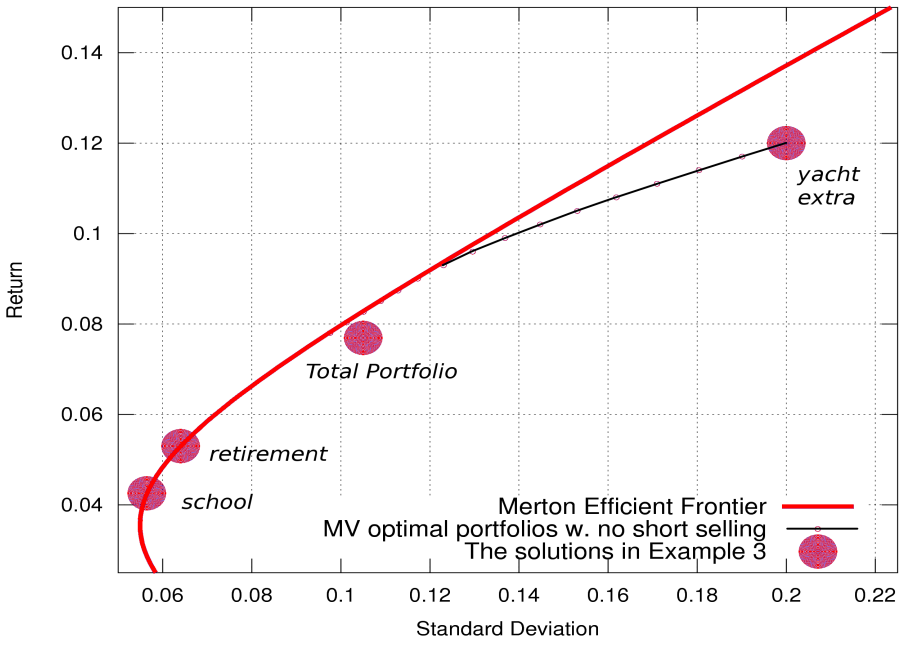


Figure 11: An example with four target portfolios.

Conclusions

Disadvantages of TOIA

1. portfolios are not necessarily MV-optimal
   1. because of **mental accounting** . . . however in a *very* abstract way (multiple horizons in MaPT/TOIA!)
   2. **ES used in stead of VAR** . . . however this is much more logical, coherent and intuitive
2. **time consuming** for advisers
3. **computing time intensive** to optimize portfolios
4. **if applied, should be complete** – *all* needs should be covered (facilitated by Maslow's framework)
5. More research is needed (e.g. efficient investment strategies)

Advantages of TOIA

1. creates a **natural language** to guide the investor;
2. investment advice that **serves a purpose**, that makes sense for the investor, helps people to realize goals;
3. **no use of ill-defined concepts** such as “risk tolerance”, no need for magical beliefs about the ability to define, determine and use this parameter;
4. provides a framework to hold onto, to temper emotions
   1. **portfolio returns are not/less deteriorated** by behavioural biases
   2. **bubbles and crashes are tempered**—if TOIA is widely used
5. ideal method to **build trust and a long term relationship** between advisor and investor
6. TOIA **reduces model risk** (diversification within diversification)

Conclusions

- MaPT **puts investing in a frame: the frame of life**! Investments not a goal in their own right
- MaPT is **valid**, **normative**, **coherent**, and **applicable in practice** (e.g. TOIA)
- MaPT and its implementation TOIA have distinctive advantages: they
  - **answer to real needs** with interpretable parameters
  - Maslow offers a **natural language** in communication with investors + helps not to forget goals
  - are a rational approach **to mitigate some behavioural biases**, while other biases are used to help the investor
  - offers diversification within diversification

Bibliography