

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

Disclaimer

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

- The author of this text is Philippe J.S. De Brouwer and all rights are reserved by the author.
- The opinions expressed in this text are the views of the author and do not necessarily reflect those of his employers or affiliations.
- This text is not intended as investment advice, no transactions should be based on this text.
- The right to keep, copy and use this document for educational purposes is granted to Akademia Górniczo-Hutnicza and HSBC Holdings Plc and all their affiliates.

HSBC Disclaimer

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

This presentation has been prepared by Philippe De Brouwer to talk on a time slot for HSBC Service Delivery Sp z o.o. (HSBC). HSBC accepts no liability whatsoever for any direct, indirect or consequential loss arising from the use of this document. HSBC is under no obligation to keep current the information in this document. You are solely responsible for making your own independent appraisal of and investigations into the data, products, financial instruments and transactions referred to in this document and you should not rely on any information in this document as constituting investment advice. Neither HSBC nor any of its affiliates are responsible for providing you with legal, tax or other specialist advice and you should make your own arrangements in respect of this accordingly. The issuance of and details contained in this document, which is not for public circulation, does not constitute an offer or solicitation for, or advice that you should enter into, the purchase or sale of any security, commodity or other financial instrument or master agreement, or any other contract, agreement or structure whatsoever. This document is intended to be distributed in its entirety. Reproduction of this document, in whole or in part, or disclosure of any of its contents, without prior consent of author, is prohibited.

3/33

Outline

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

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

4/33

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

Introduction

The Traditional 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

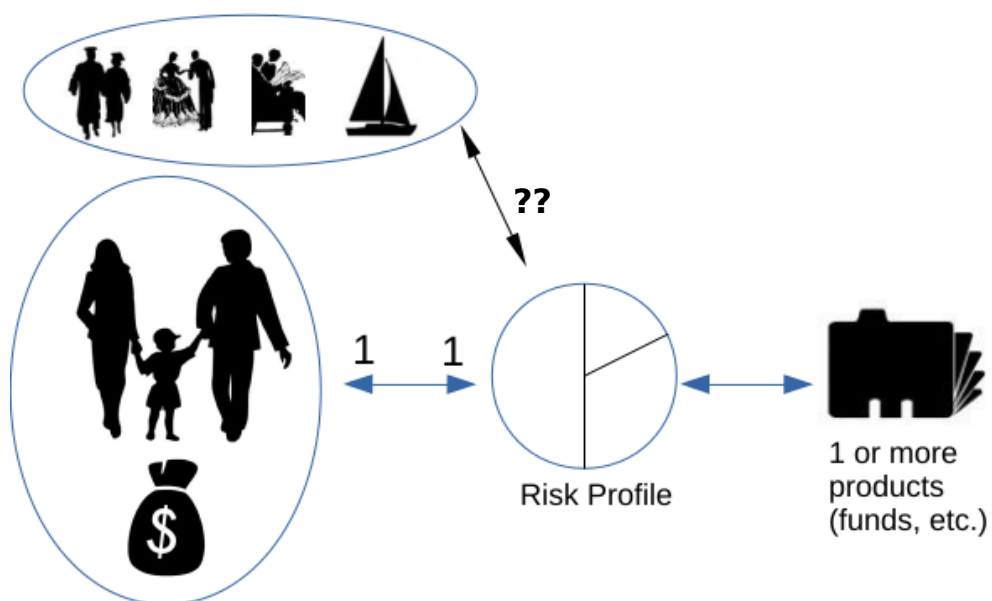


Figure 1: In the traditional approach to investment advice each investor has **one** “risk profile”.

Cognitive Dissonance Arose

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

Normative Theories \Rightarrow *All Investments in One Portfolio*

e.g. Mean-Variance (?)

Descriptive Theories \Rightarrow *Many Sub – Portfolios*

e.g. Behavioural Portfolio Theory (?)

7/33

Maslowian Portfolio Theory – MaPT

The Idea

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

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.

8/33

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.

9/33

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

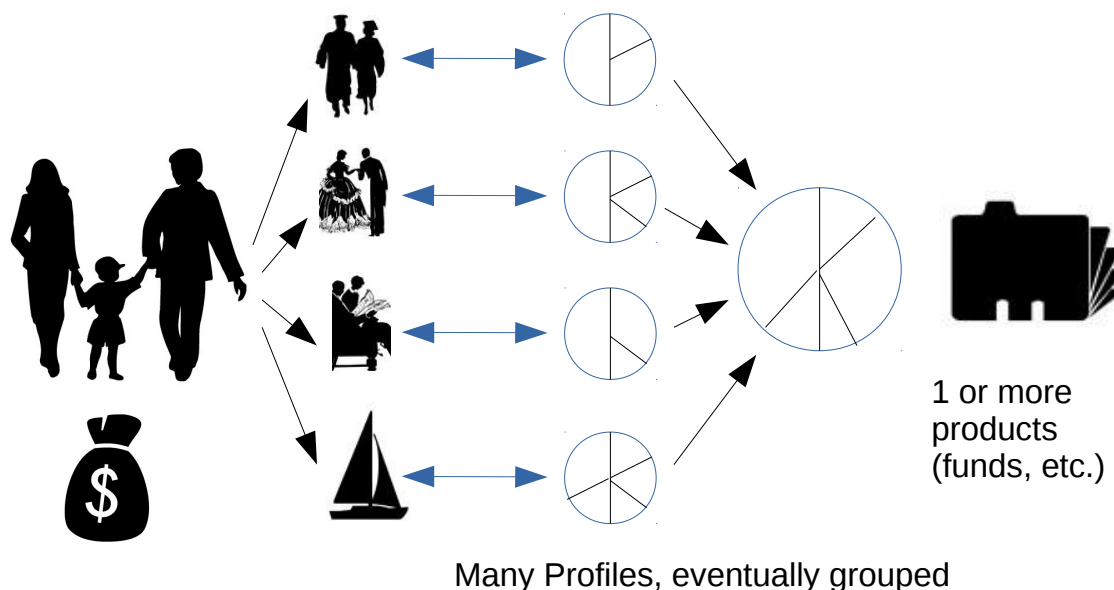


Figure 2: In the “Maslowian Approach” to investment advice each investor has one risk profile per life-goal.

10/33

What else is necessarily involved?

Opening the Box of Pandora ...

Maslowian
Portfolio
Theory

Dr. Philippe
J.S. De
Brouwer

Introduction

The Traditional
Approach

The Core Idea

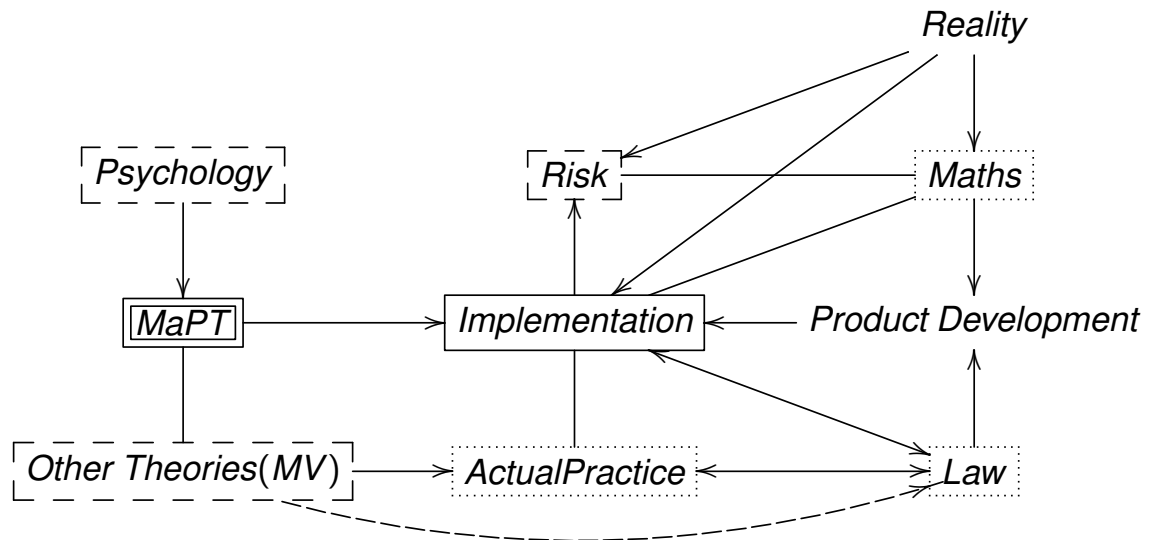
Risk-Reward
Methods

Coherent Risk
Measures

MiFID

Examples

Conclusions



11/33

What has been done already?

A Few Steps are Taken

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

- 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 is growing.

12/33

Target Oriented Investment Advice (TOIA)

The Logic

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

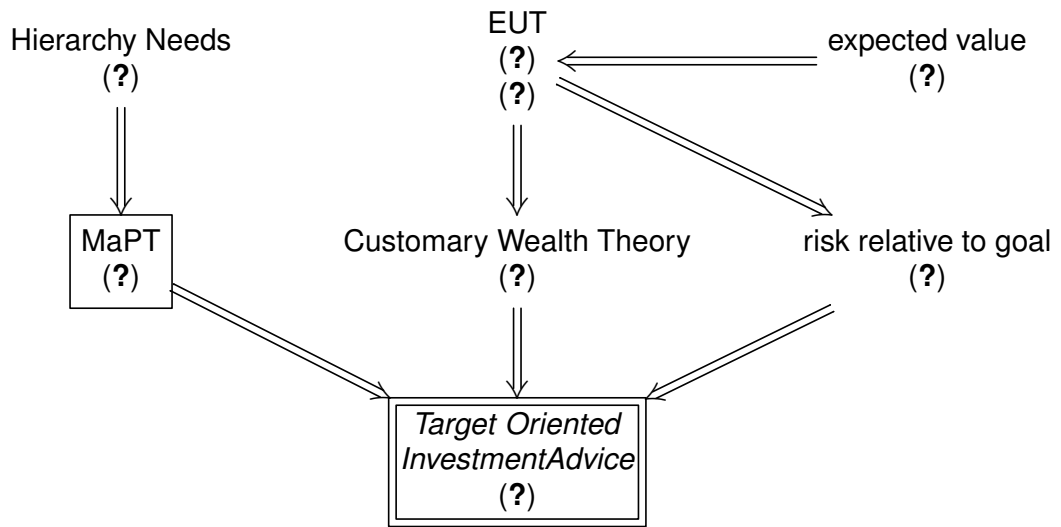


Figure 3: Milestones for the formulation of TOIA.

13/33

The Maths of TOIA

The Logic

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

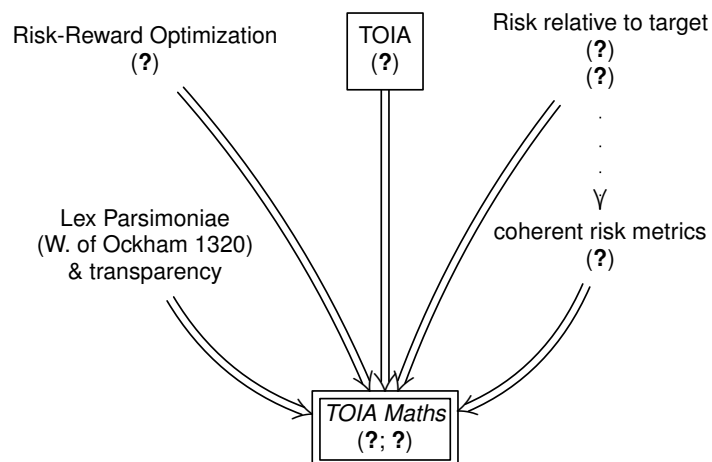


Figure 4: An Implementation of TOIA – as described in (?; ?)

14/33

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

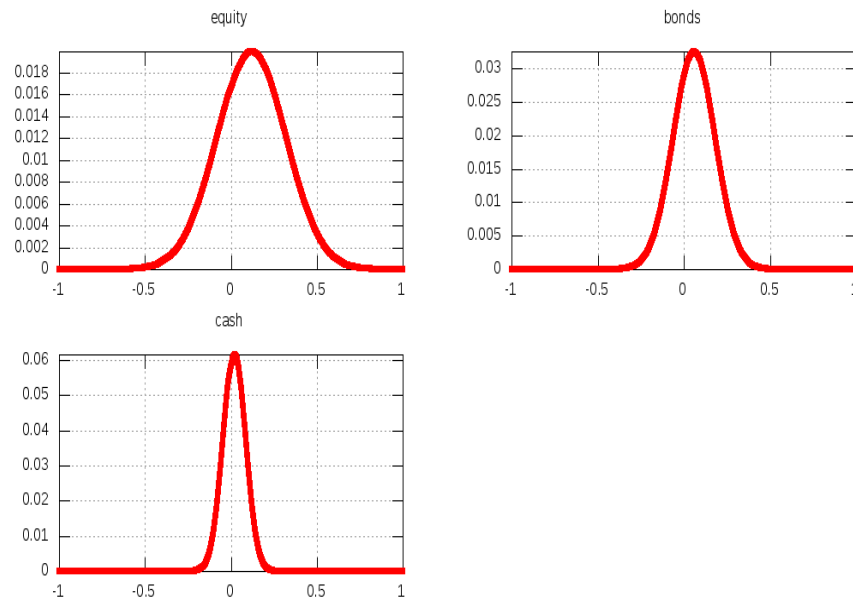


Figure 5: Equities, bonds and cash (Gaussian distributed).

15/33

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

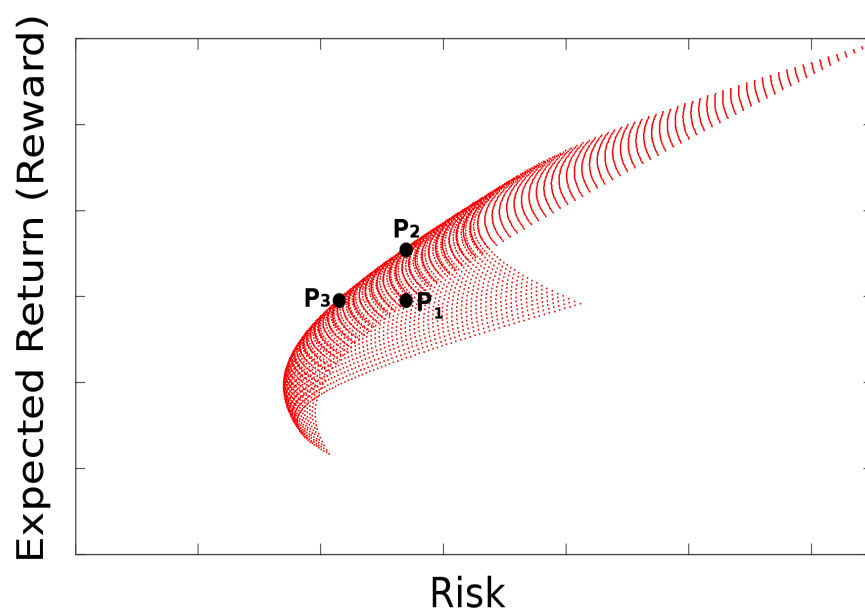


Figure 6: Portfolios in the risk/reward plane. The risk/reward method is simply “dominance” method in the Multi Criteria Decision Analysis.

16/33

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

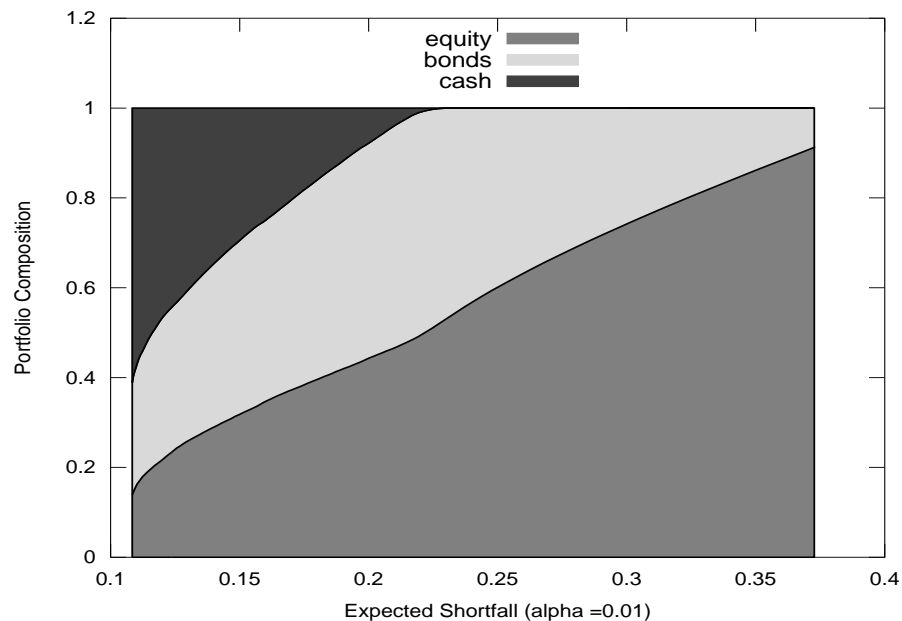


Figure 7: Recommended portfolios in function of ES.

17/33

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 α 100% worst outcomes of \mathcal{P}

18/33

Some Definitions (2)

Visualisation of ES, V@R and σ

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

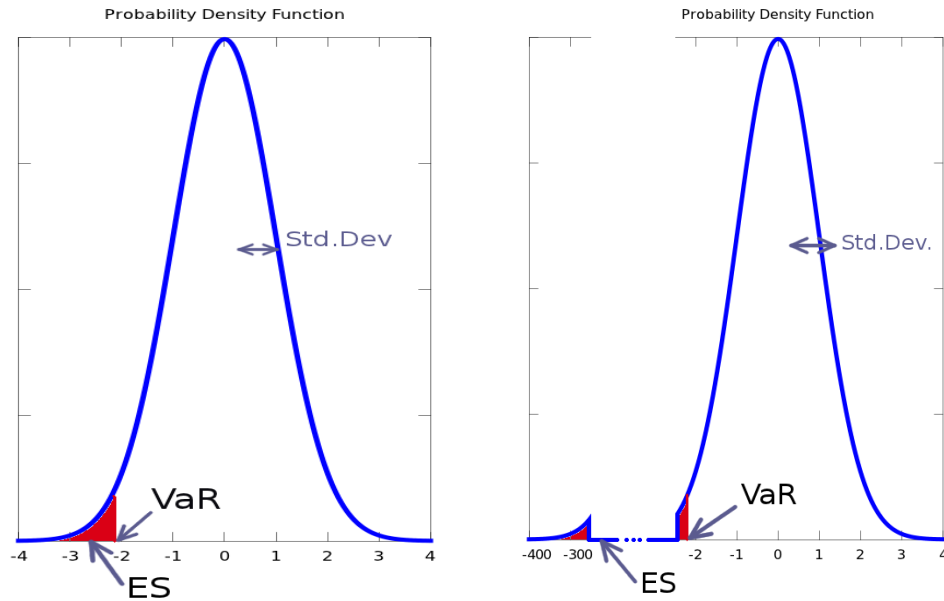


Figure 8: Interpretation of ES, V@R and σ .

Thinking Coherently—(I)

The Definition

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 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:

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

Thinking Coherently—(II)

Example for (In)Coherence of Risk Measures

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%!

21/33

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

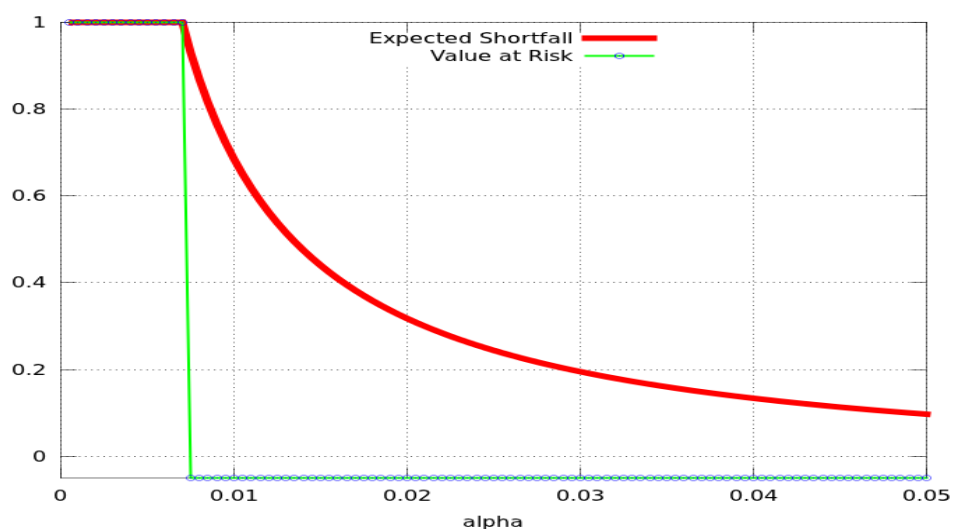


Figure 9: ES and V@R in function of α for one bond.

22/33

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

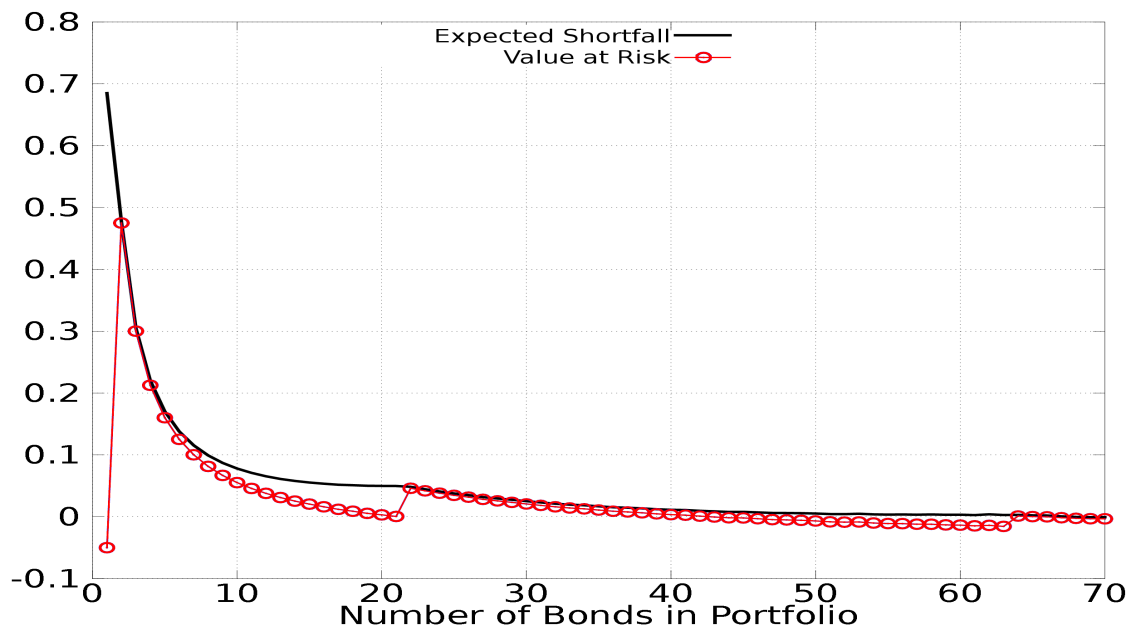


Figure 10: ES and V@R in function of number of bonds.

23/33

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.

24/33

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

Examples

25/33

Example 3: A Complex Example

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

Goal	τ	T	CF	V_0	α	ES_{max}
school	€ 100,000	1	€ 0	€ 100,000	0.01	10% of V_0
yacht	€ 120,000	5	€ 0	€ 100,000	0.1	20% of V_0
retirement	€ 200,000	10	€ 10,000	€ 100,000	0.01	minimum
extra	€ 50,000	10	€ 0	€ 50,000	0.05	€ 5,000

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 $\alpha 100\%$ worst outcomes is to be limited to ES_{max} .

26/33

Example 3: Feedback to Investor

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

Goal	Equities	Bonds	Cash	ES	Feedback
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.

27/33

Example 3: A Complex Example

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

The portfolios in the mean-variance space.

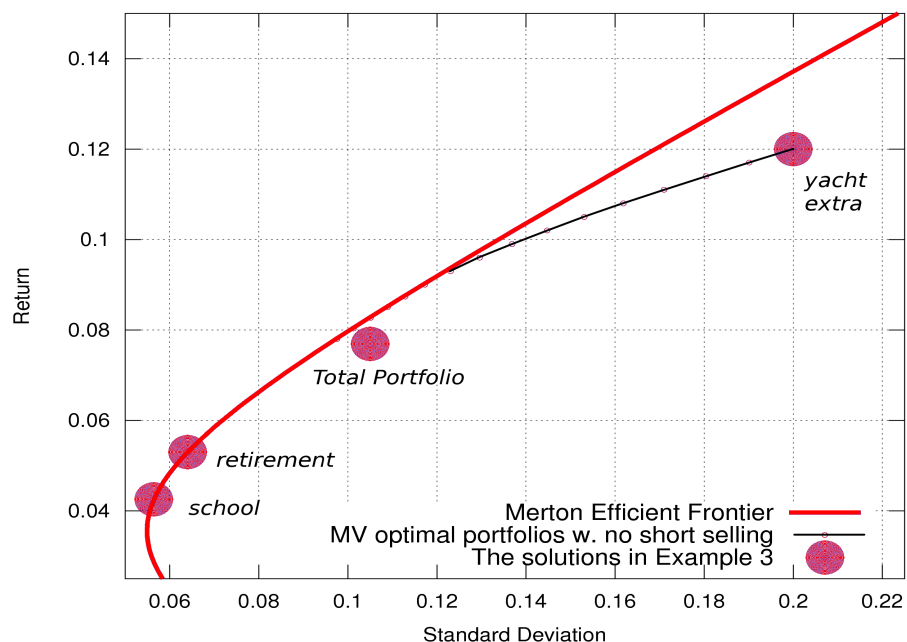


Figure 11: An example with four target portfolios.

28/33

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

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

- 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)

31/33

Conclusions

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

- 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

32/33

Bibliography