



Optimal asset allocation in 5,4,3,... Creating personalized risk profiles

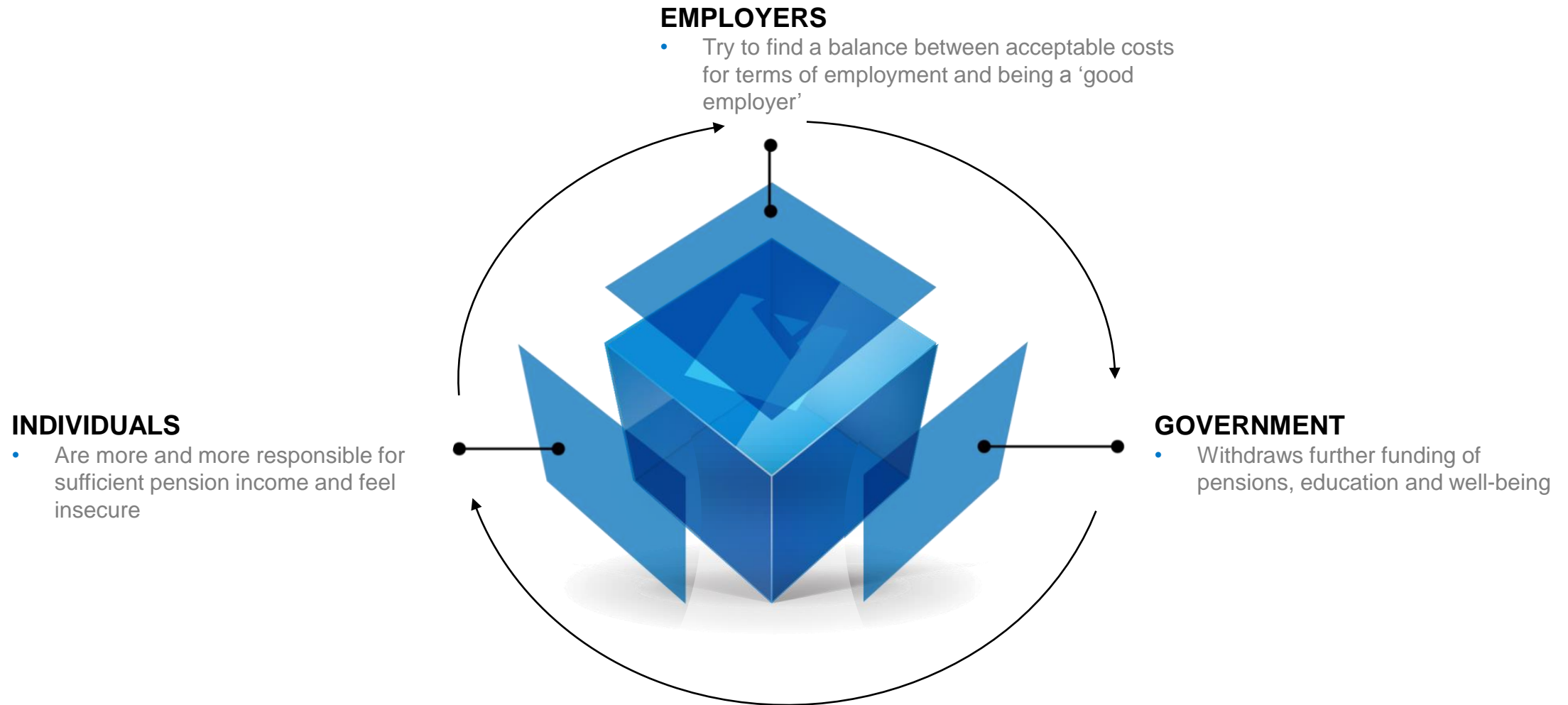
Chantal Hoet & Rogier Potter van Loon

Aegon Marketing & Analytics

Maastricht
December 13, 2016



Our society is changing...



More choices have to be made

How can we help individuals in making the right choice?

Key elements:

- Focus more on **emotions / feelings** in pension communication (we are no 'homo economicus')
- Make questions and required actions **plain and simple**

An example:

A new element in defined contribution schemes is introduced on September 1st, 2016

-> **'Investing in your pension capital after retirement'**

Individuals with a defined contribution scheme will have to make a choice between buying a fixed or variable annuity. But that's not an easy choice to make!

We help them determine their optimal portfolio!



Proud to serve Rotterdam dockworkers
We would like to introduce Ed....



Determine Ed's optimal portfolio

Required input:

- Equity volatility
- Equity risk premium
- Ed's age
- Ed's financial position
- Ed's risk aversion

How is RA currently determined?

In welke beleggingscategorieën belegt u/heeft u belegd?

- | | |
|------------------------------------------------------------------------------------------------------------------|---|
| <input type="checkbox"/> Geen, ik heb nog nooit belegd. | 6 |
| <input type="checkbox"/> Obligaties/Obligatiefondsen en/of mix(fondsen) met overwegend obligaties (50% of meer). | 7 |
| <input type="checkbox"/> Aandelen/Aandelenfondsen en/of mix(fondsen) met overwegend aandelen (meer dan 50%). | 8 |

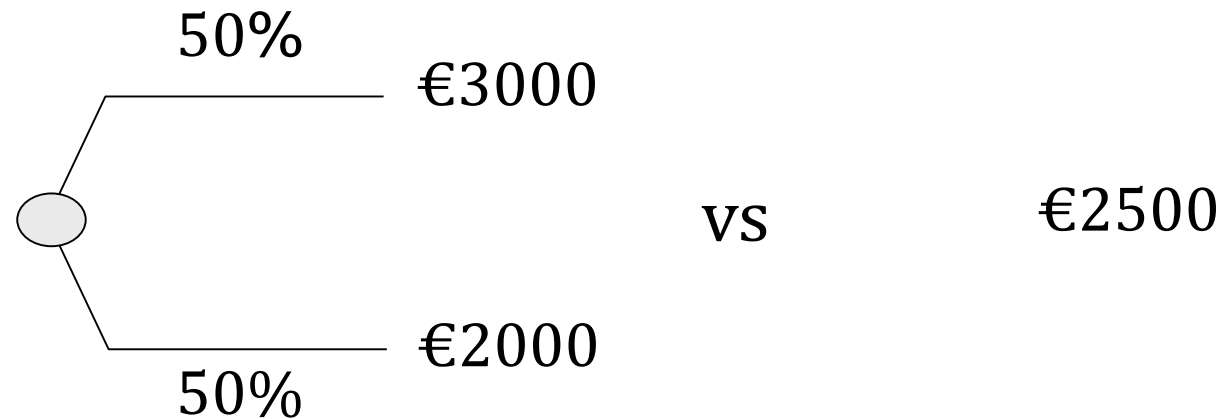
Hoe reageert u als uw beleggingen tussentijds dalen van 50.000 euro naar 45.000 euro?

- | | |
|---------------------------------------------------------|----|
| <input type="checkbox"/> Ik vind het zeer vervelend. | 6 |
| <input type="checkbox"/> Ik vind het vervelend. | 7 |
| <input type="checkbox"/> Ik vind het niet zo vervelend. | 9 |
| <input type="checkbox"/> Ik vind het niet vervelend. | 10 |

Welk deel van uw totale vermogen (exclusief uw eigen woning) staat op uw spaar- en/of betaalrekeningen met het oog op (onvoorziene) uitgaven?

- | | |
|-----------------------------------------|---|
| <input type="checkbox"/> Vrijwel niets. | 6 |
| <input type="checkbox"/> 5-25%. | 7 |
| <input type="checkbox"/> 25-50%. | 8 |
| <input type="checkbox"/> Meer dan 50%. | 9 |

Expected utility



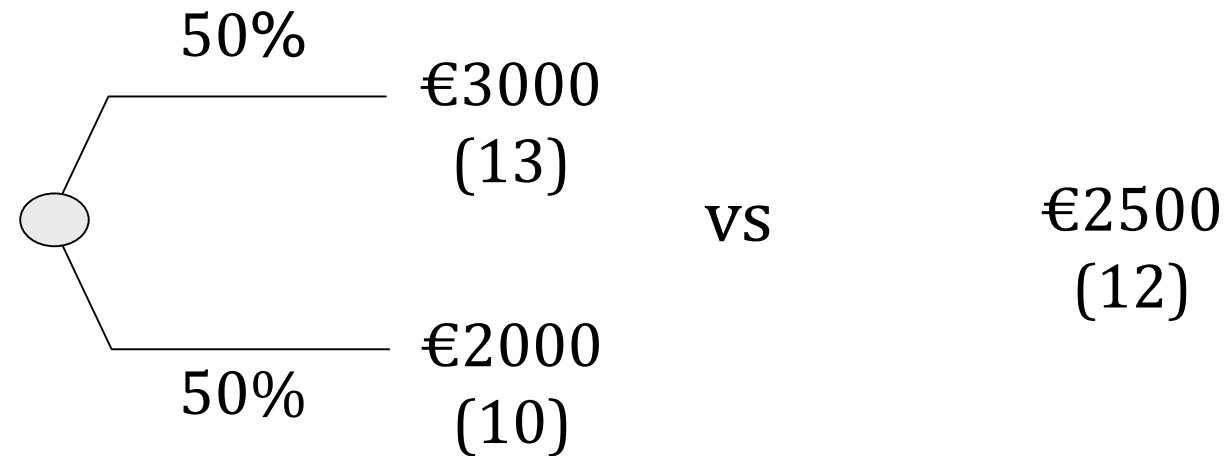
Expected Value:

$$0.5 \cdot 3000 + 0.5 \cdot 2000 = 2500$$

Expected Utility:

$$0.5 \cdot U(3000) + 0.5 \cdot U(2000) \text{ } >?< \text{ } U(2500)$$

Expected utility

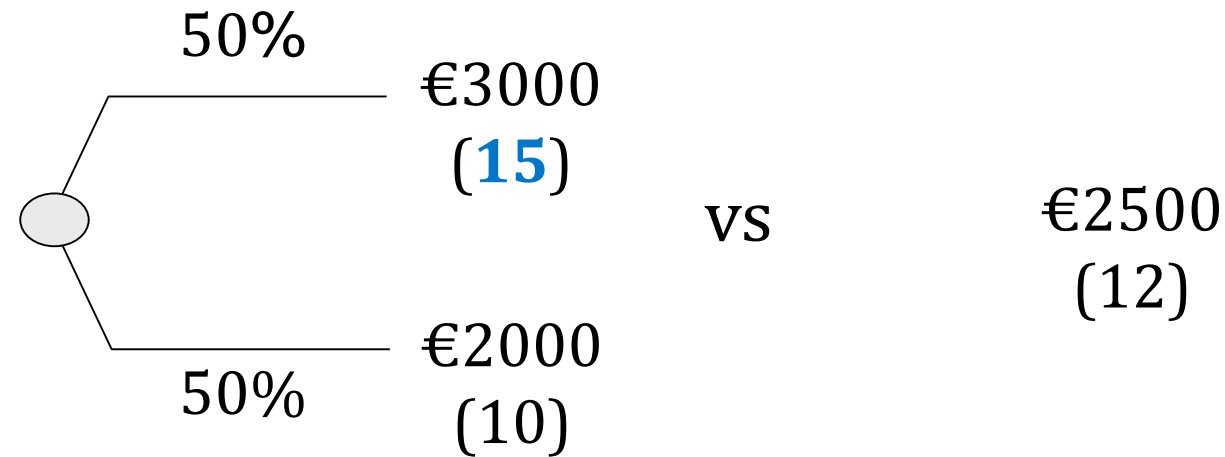


Assume: $U(2000) = 10$, $U(2500) = 12$, $U(3000) = 13$. Then:

$$EU[L] = 50\% \cdot U(2000) + 50\% \cdot U(3000) = 50\% \cdot 10 + 50\% \cdot 13 = 11,5$$

$$EU[R] = U(2500) = 12$$

Expected utility

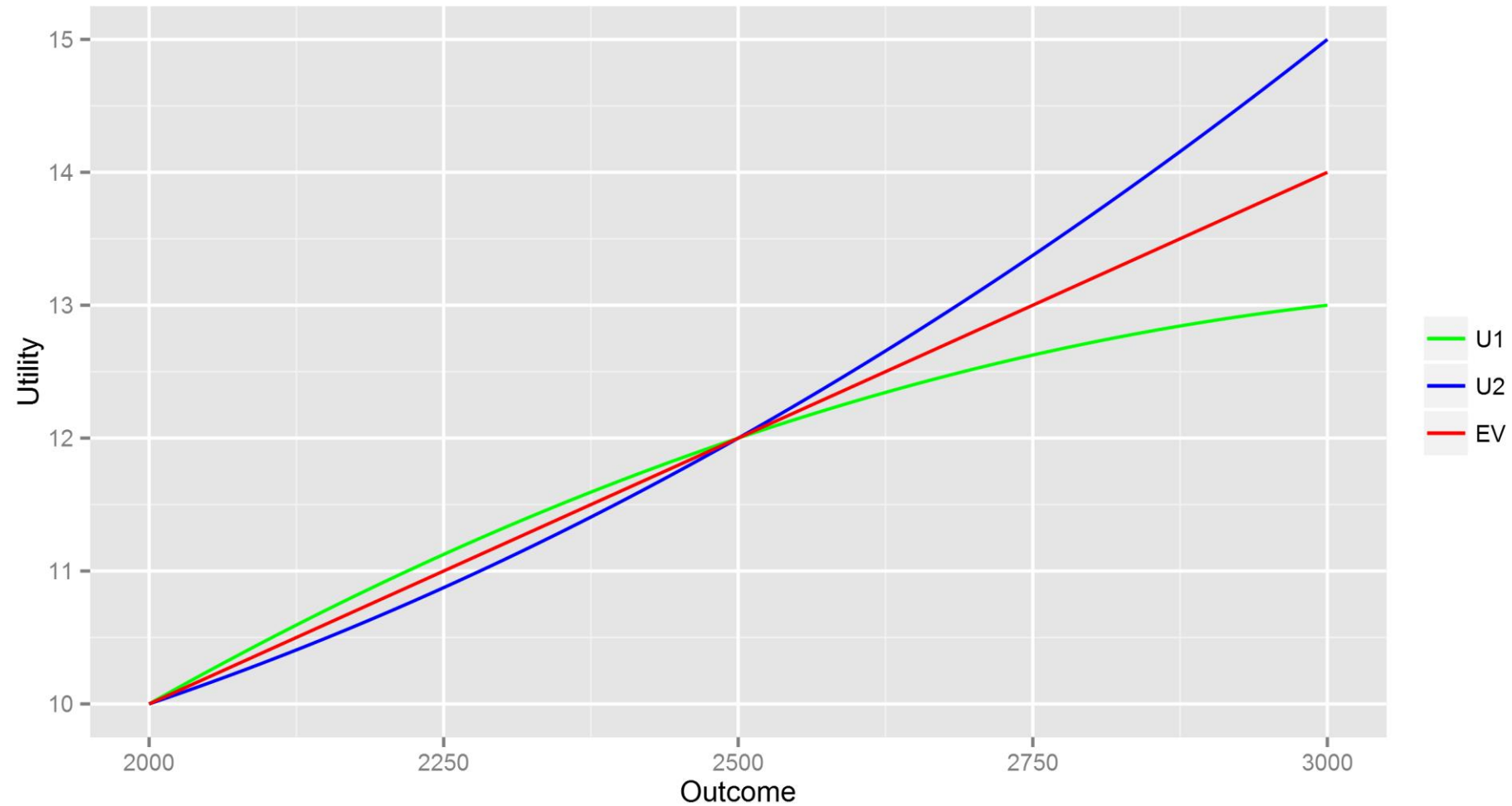


Assume: $U(2000) = 10$, $U(2500) = 12$, $U(3000) = 15$. Then:

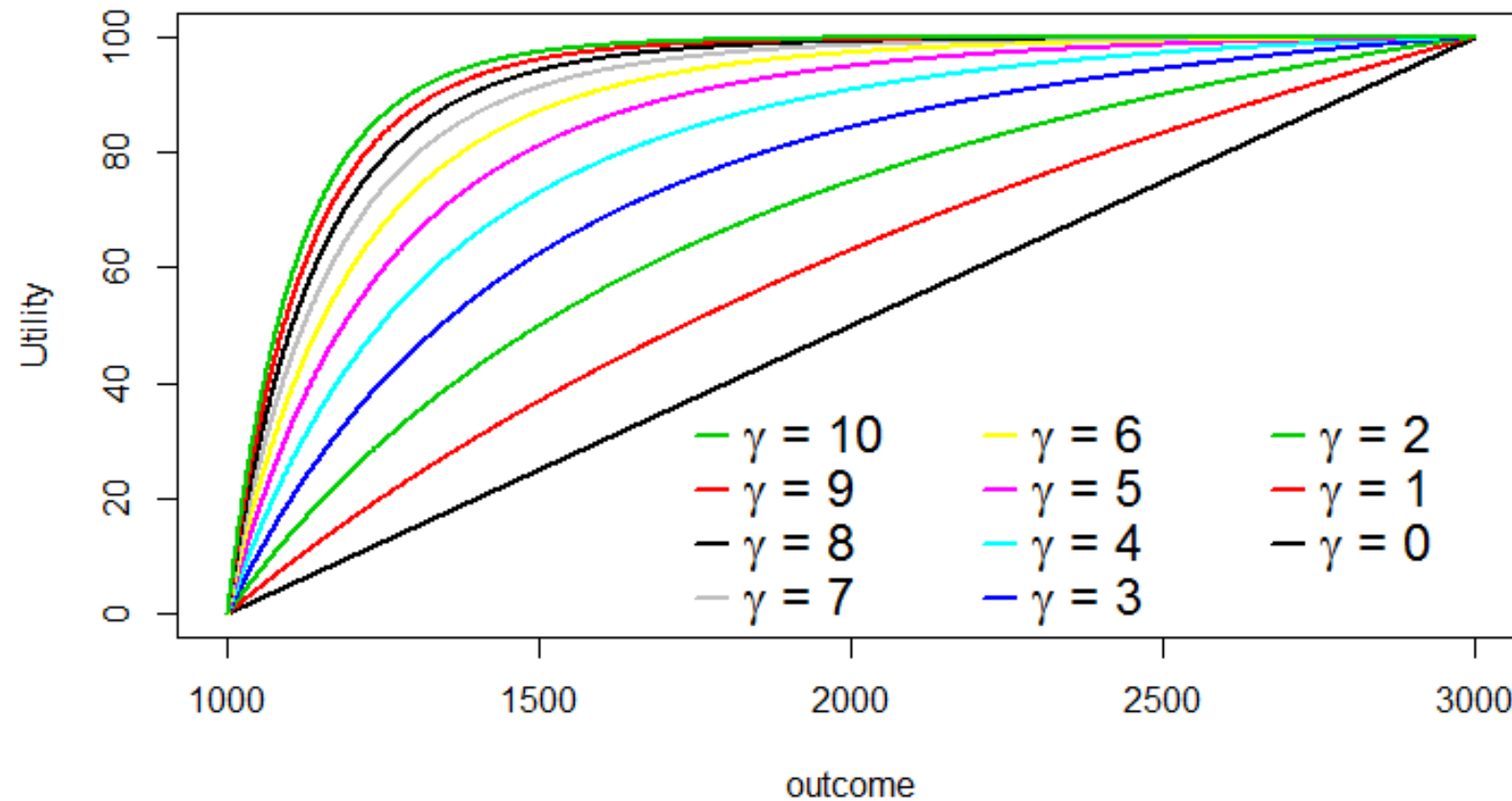
$$EU[L] = 50\% \cdot U(2000) + 50\% \cdot U(3000) = 50\% \cdot 10 + 50\% \cdot 15 = 12,5$$

$$EU[R] = U(2500) = 12$$

Utility functions



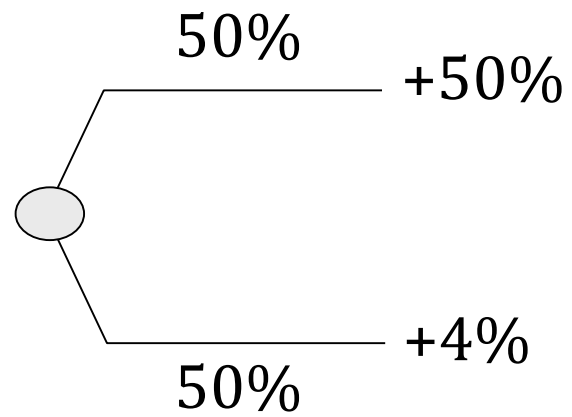
Power Utility



$$U(x) = \frac{x^{1-\gamma}}{1-\gamma}$$

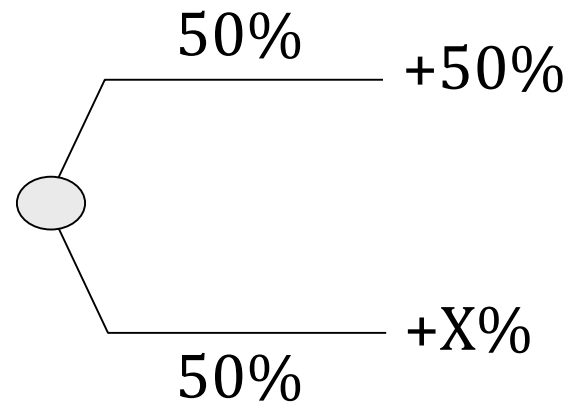
Constant Relative Risk Aversion (CRRA)

What is your γ ?



VS

+25%



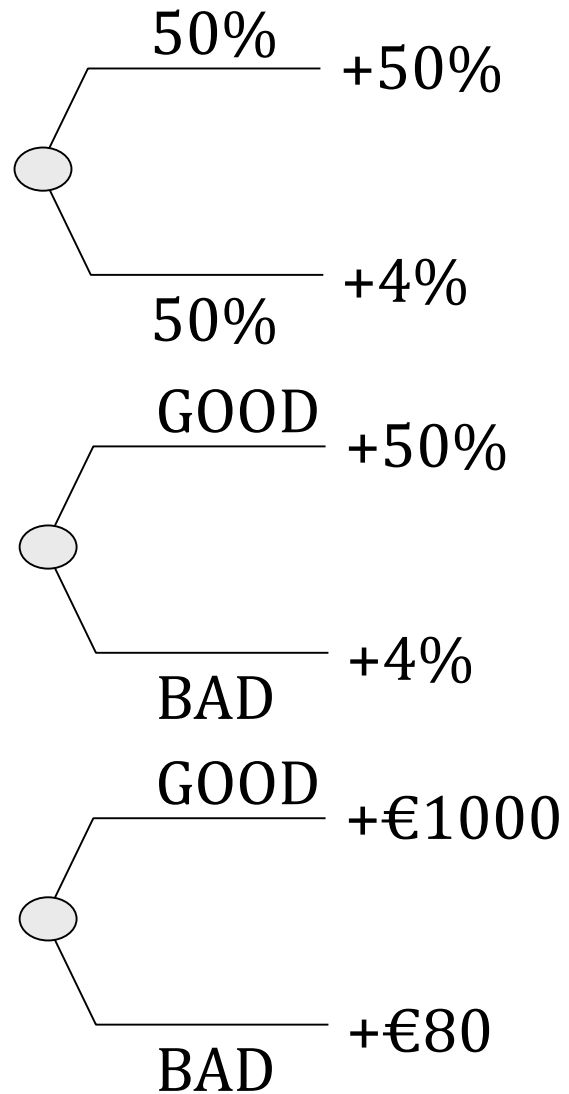
VS

+25%

What is your γ ?

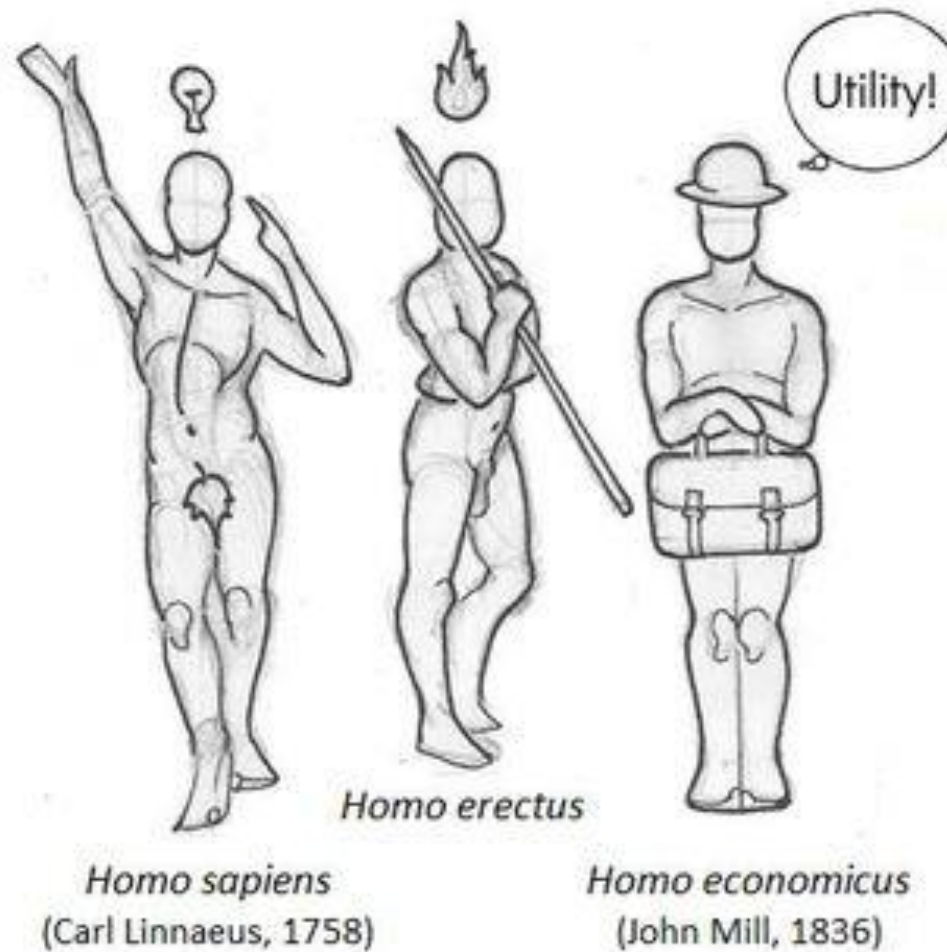
γ	Certain	Heads	Tails (X)
-0.5	+25%	+50%	-3%
0	+25%	+50%	+0%
1	+25%	+50%	+4%
2	+25%	+50%	+7%
3	+25%	+50%	+9%
4	+25%	+50%	+11%
5	+25%	+50%	+13%
6	+25%	+50%	+14%
7	+25%	+50%	+15%
8	+25%	+50%	+15.7%
9	+25%	+50%	+16.4%
10	+25%	+50%	+17.1%

Straightforward questions

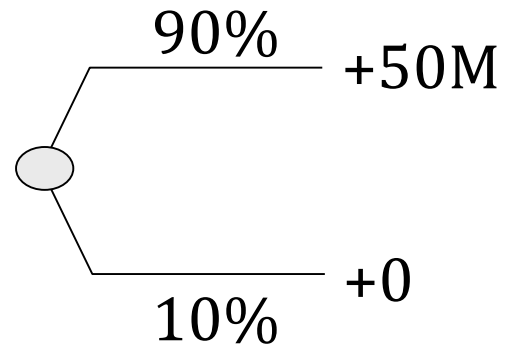


Homo Economicus?

Are you there?

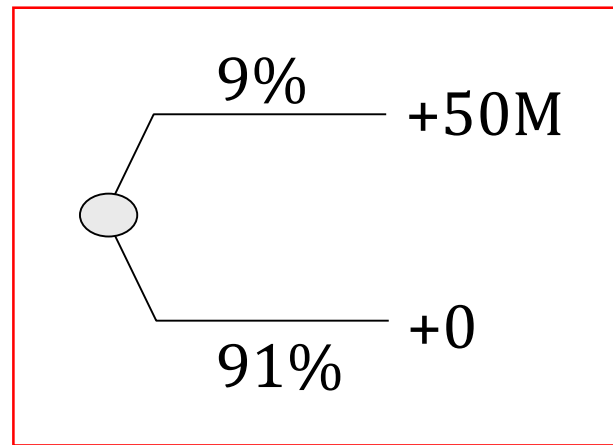


Independence?

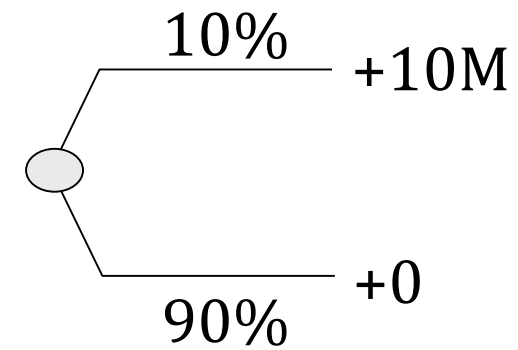


VS

+10M

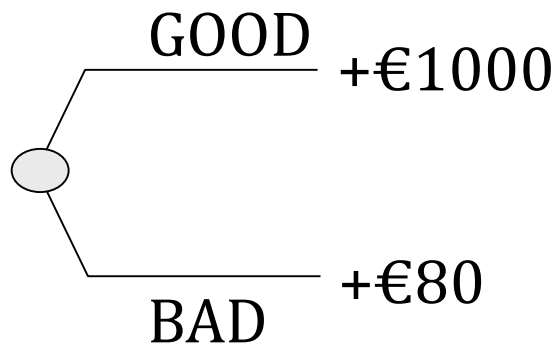


VS



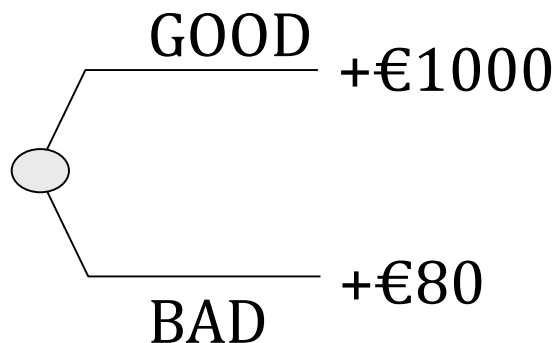
Certainty Effect

$$\begin{array}{ll}
 10\text{M} > (90\%: 50\text{M}) & \& (9\%: 50\text{M}) > (10\%: 10\text{M}) \\
 U(10\text{M}) > 0.9U(50\text{M}) & \& 0.09U(50\text{M}) > 0.1U(10\text{M}) \\
 U(10\text{M}) > 0.9U(50\text{M}) & \& 0.9U(50\text{M}) > U(10\text{M})
 \end{array}$$

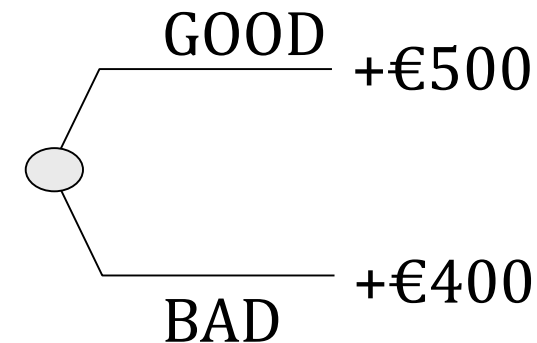


VS

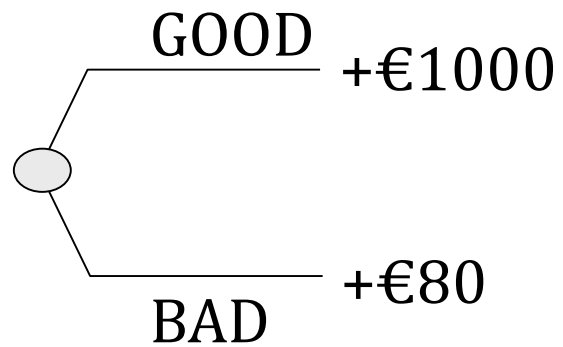
+€500



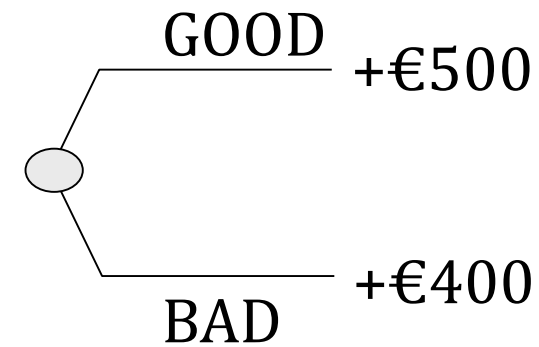
VS



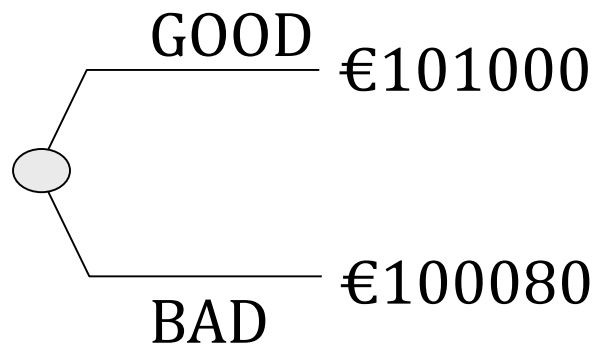
Reference point



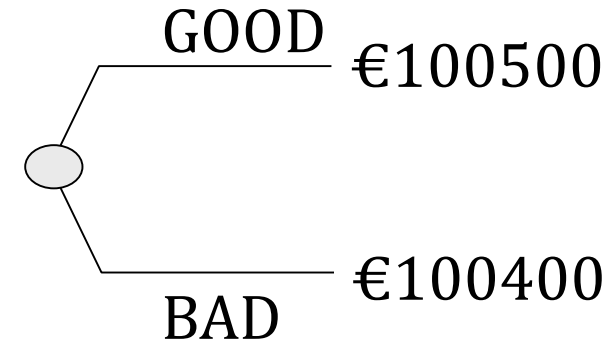
~



→ $\gamma = .5$



~



→ $\gamma > 50$

Determine reference point





 **Vragenlijst**

Wat is de hoogte van uw pensioenkapitaal?

Heeft u een partner (bent u getrouwd, geregistreerd of samenwonend)?

Hoeveel pensioen ontvangt u elders (naast uw pensioen bij Aegon en uw AOW)?

Determining γ

	Pensioen A	Pensioen B
 Zonnig Scenario	€3.160	€2.560
 Regenachtig Scenario	€2.140	€2.320
	<div>Pensioen A ></div>	<div>Pensioen B ></div>

Adapt to answers

	Pensioen A	Pensioen B
 Zonnig Scenario	€2.940	€2.680
 Regenachtig Scenario	€2.260	€2.440
	Pensioen A >	Pensioen B >

Risk profile

Uw risicoprofiel

Op basis van uw antwoorden past een defensief beleggingsprofiel het best bij u. Hier hoort verdeling van 20% aandelen en 80% vastrentende waarden bij. Als volgens deze verdeling voor u belegd wordt leidt dit tot de volgende mogelijke uitkomsten.

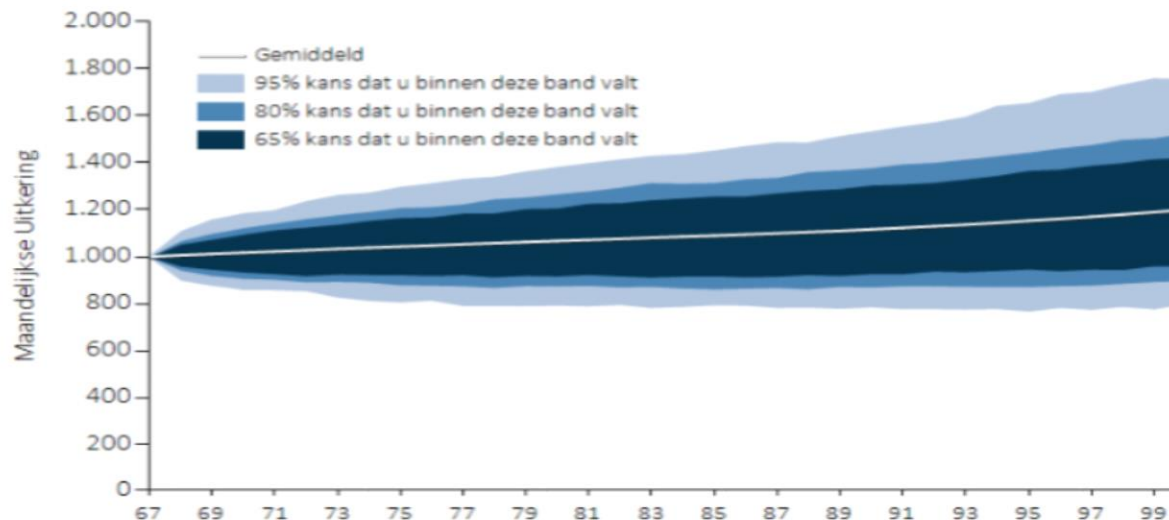
Daarbij horen op 75-jarige leeftijd de volgende uitkeringen van uw pensioen bij AEGON:

Met 95% kans ontvangt u meer dan: € 848 per maand

Met 5% kans ontvangt u meer dan: € 1.251 per maand

Dit betekent dat u gemiddeld € 1.043 per maand zult ontvangen.

Hieronder ziet u de kansverdeling van de mogelijke uitkeringen van uw pensioen bij AEGON.



Conclusion

- Knowing the degree of risk aversion is crucial for determining optimal portfolio allocation, and it varies widely among people.
- It is difficult to determine for a specific client, and 'semantic questions' don't capture risk-aversion
- Five personalized straightforward 50-50 questions allow us to create a custom risk profile for every participant



Thank you!

Rogier Potter van Loon
Rogier.pottervanloon@aegon.nl

Chantal Hoet
Choet@aegon.nl

