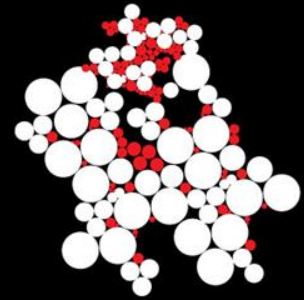


UNIVERSITY OF TWENTE.



# COMPARING PATIENT PREFERENCES FOR MEDICAL TREATMENTS WITH PROMETHEE II: A PILOT STUDY

HENK BROEKHUIZEN, MARJAN HUMMEL, KARIN GROOTHUIS, MAARTEN IJZERMAN



# OVERVIEW

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- Our decision context and requirements
- Choice of MCDA method
- Pilot study with PROMETHEE II
  - Methods
  - Main results
  - Sensitivity analysis (esp. relevant!)
- Discussion
- Future work

# OUR DECISION CONTEXT AND REQUIREMENTS

## PROBLEM DEFINITION

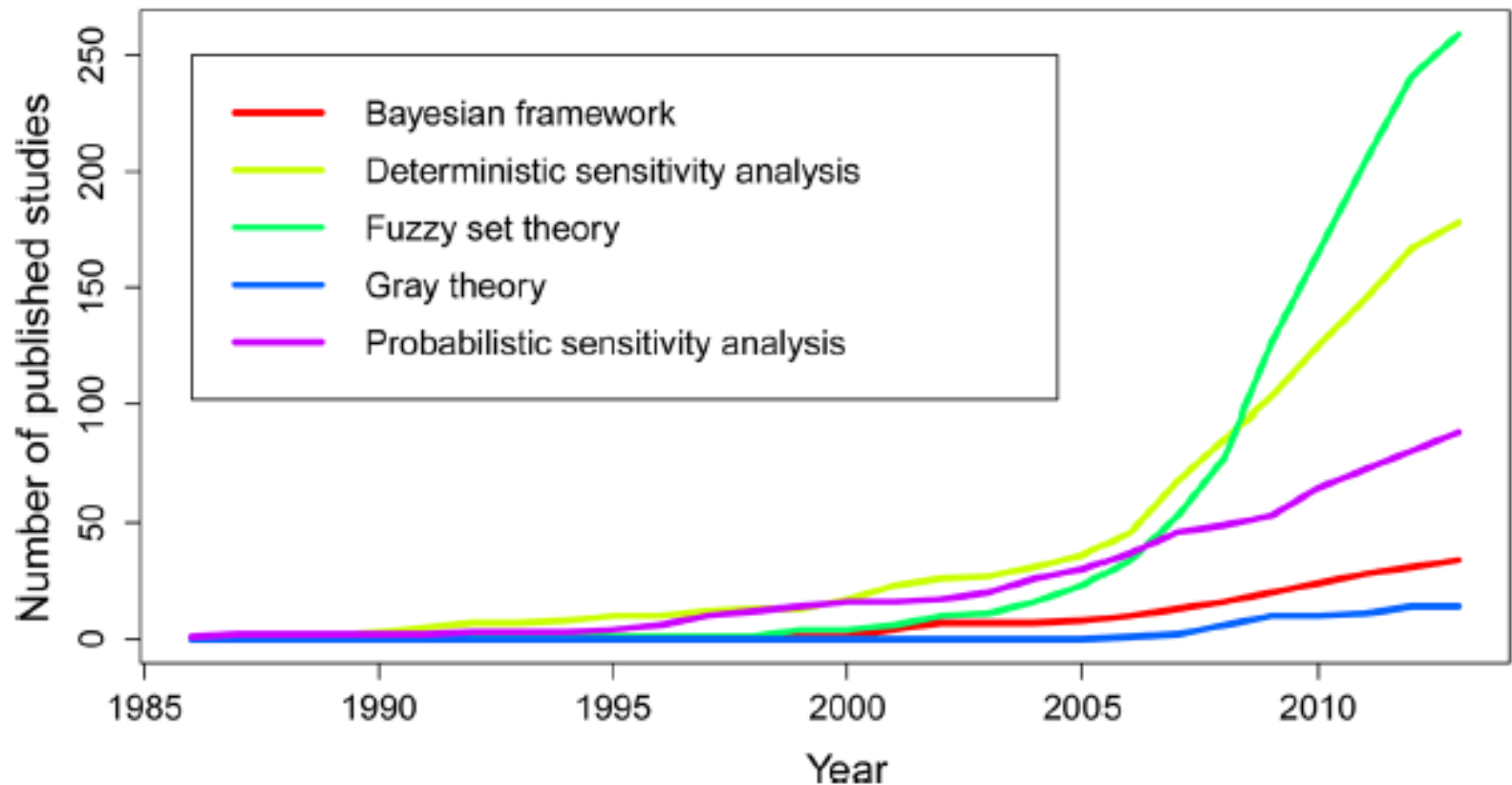
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- Decisions before drugs can be used:  
Market Access → Reimbursement → Prescribe
- MCDA a structured and transparent method to guide process
  - Growing interest in health field (Diaby 2013, Marsh 2014, ISPOR taskforce)
- Patient perspective important, can be measured with stated preference methods → This yields probabilistic preference data
- **How can we transparently integrate these (probabilistic) preferences in a structured MCDA process?**

# OUR DECISION CONTEXT AND REQUIREMENTS

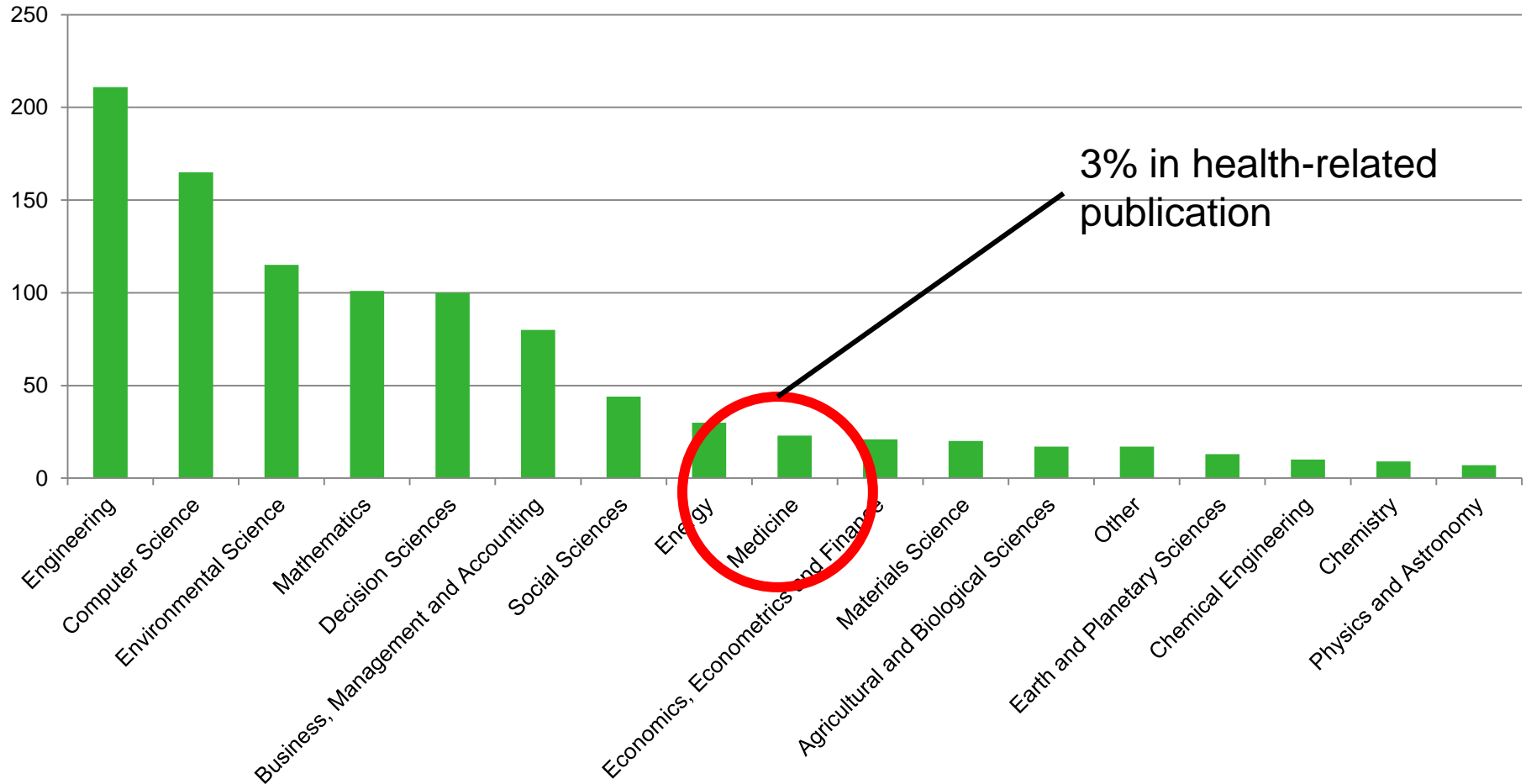
WHAT MCDA METHOD TO USE IN CONJUNCTION WITH PROBABILISTIC DATA?

- Broekhuizen 2015 review approaches to deal with uncertainty in MCDA (569 studies identified)



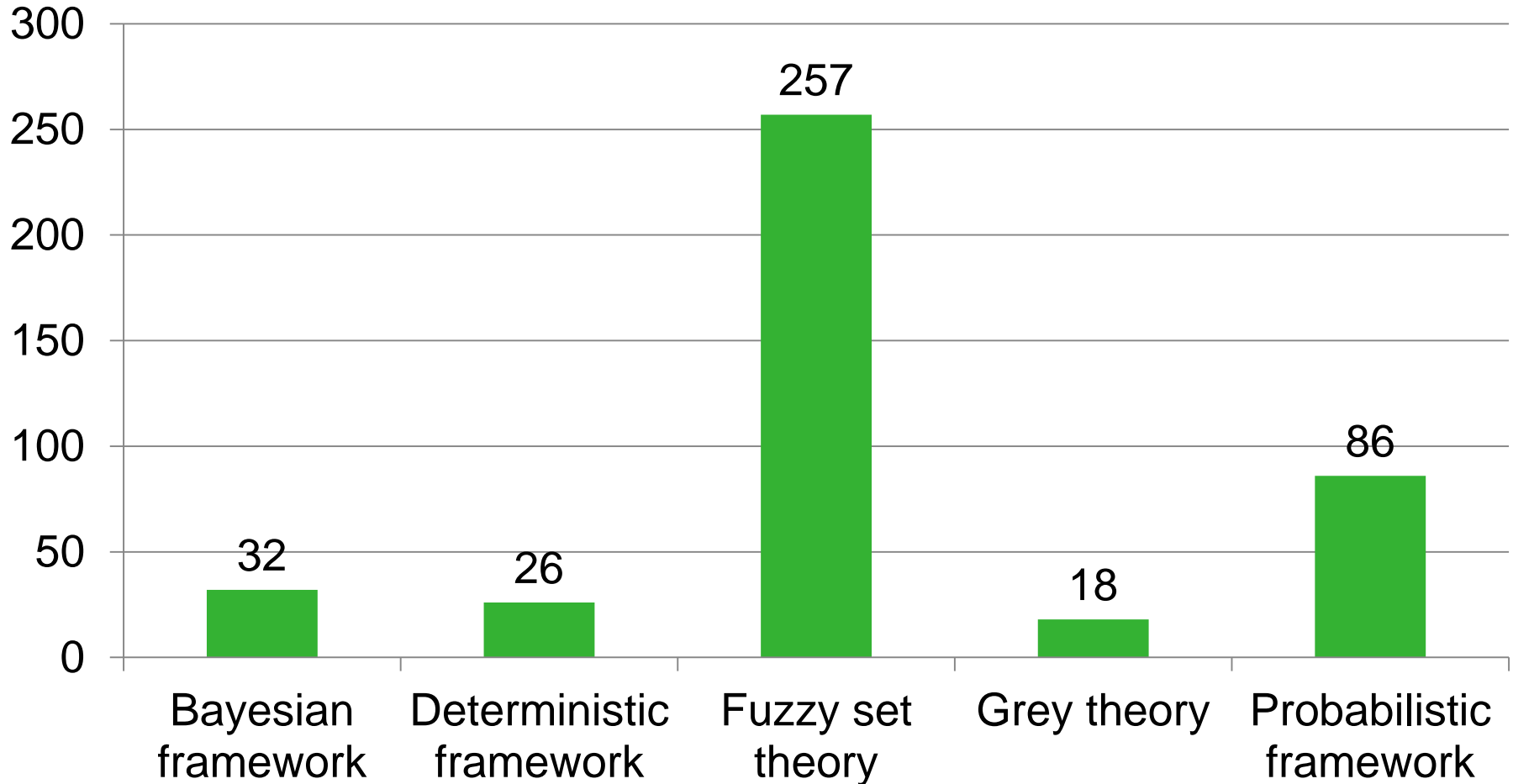
# REVIEW OF APPROACHES TO DEAL WITH UNCERTAINTY

## RESULTS: RESEARCH AREAS



# REVIEW OF APPROACHES TO DEAL WITH UNCERTAINTY

## RESULTS: UNCERTAINTY APPROACHES

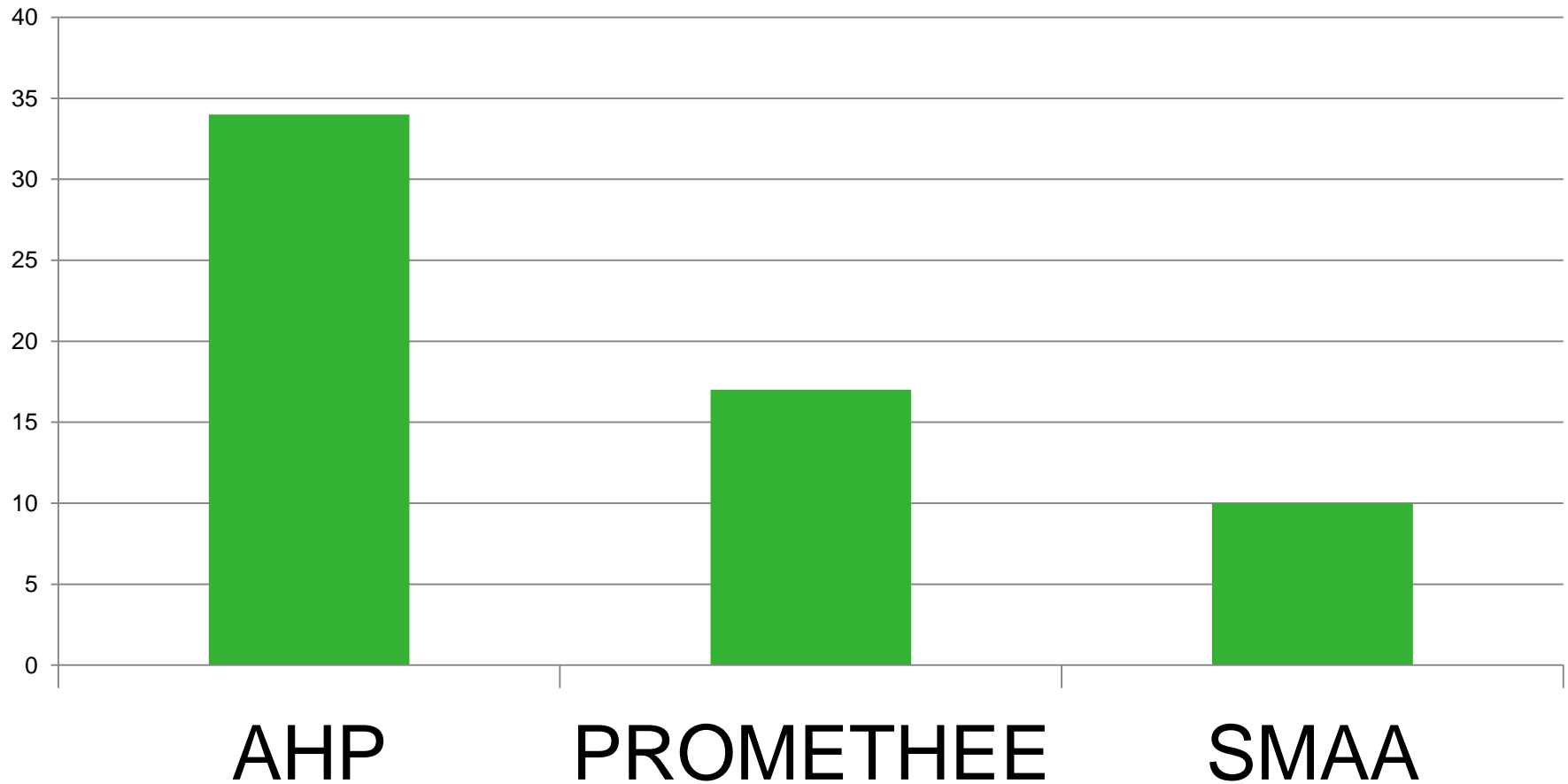


# OUR DECISION CONTEXT AND REQUIREMENTS

WHAT MCDA METHOD TO USE IN CONJUNCTION WITH PROBABILISTIC DATA?

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Top 3 MCDA methods used with probabilistic approach



# THE PILOT STUDY

## DESCRIPTION

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- *Goal:* choose an antidepressant
- *Alternatives:* Venlafaxine, Bupropion, Duloxetine
- *Criteria:*
  - 1) Response to treatment
  - 2) Achieve remission
  - 3) Minor side effects
  - 4) Major side effects
- *Weights* AHP panel session with 12 patients  
But method would readily extend to larger sample sizes
- *Performance scores* derived from clinical trials that compared the drugs with placebo.
- Modeled in *Visual PROMETHEE (academic edition)* and *R*

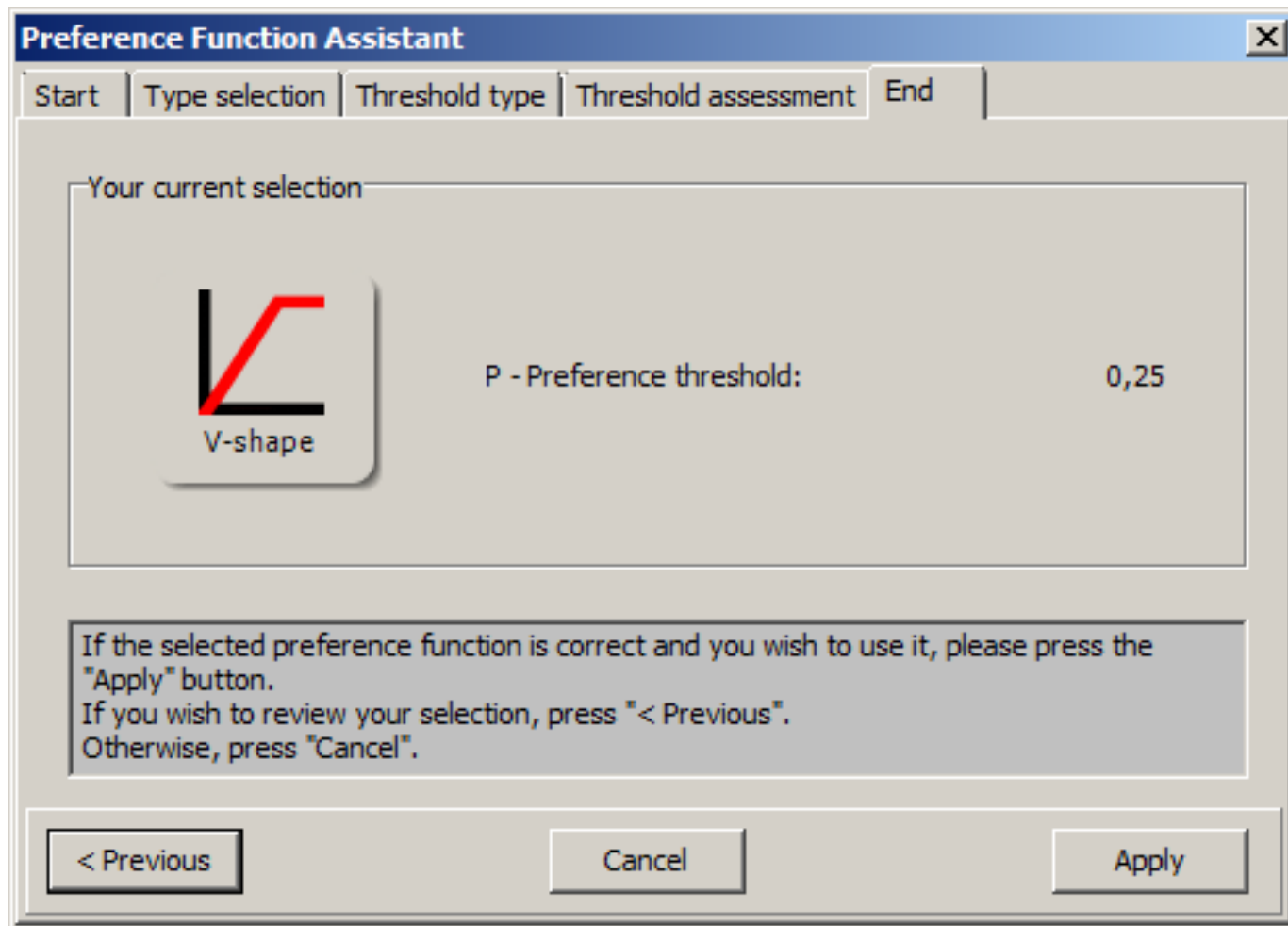


# THE PILOT STUDY

## SOURCE DATA

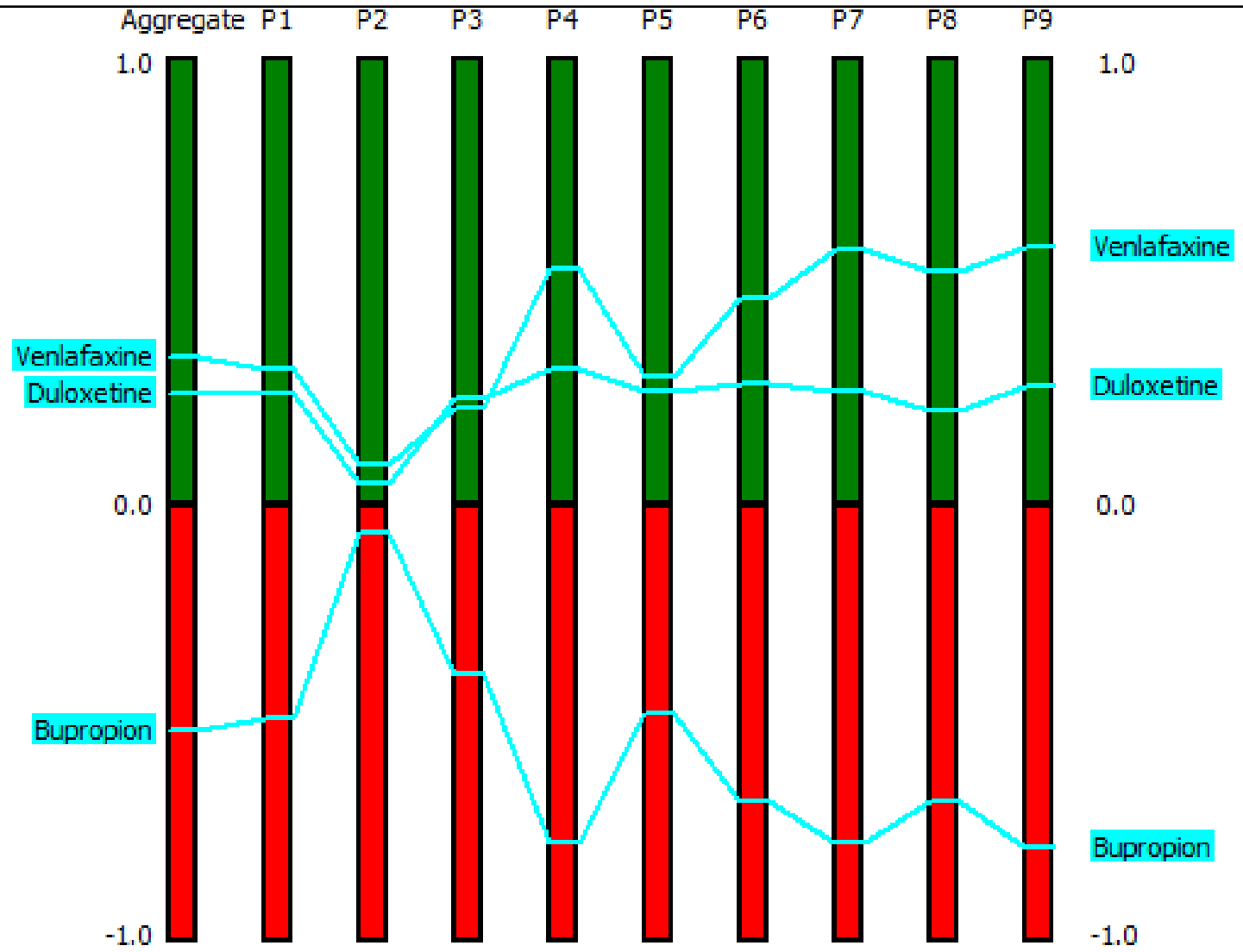
	Benefits		Risks	
	Response	Remission	Adverse events	Severe adverse events
Median weight (range)	0.62 (0.36 to 0.78)	0.16 (0.07 to 0.34)	0.04 (0.01 to 0.23)	0.19 (0.02 to 0.25)
Odds ratio (95% CI)				
Dul vs Plc	1.95 (1.61 to 2.36)	1.91 (1.56 to 2.34)	1.91 (1.50 to 2.43)	0.96 (0.39 to 2.35)
Ven vs Plc	2.04 (1.74 to 2.39)	1.97 (1.64 to 2.36)	1.80 (1.28 to 2.53) <sup>##</sup>	1.27 (0.81 to 2.00)
Bup vs Plc	1.48 (1.20 to 1.82)	1.46 (1.17 to 1.81)	1.55 (1.10 to 2.18) <sup>##</sup>	0.39 (0.16 to 0.95)

# PREFERENCE FUNCTION USED



# MAIN RESULTS

GLOBAL FLOWS AT AGGREGATE (GROUP) LEVEL AND FOR 9 PATIENTS



# SENSITIVITY TO VARIATION IN WEIGHTS

## RANK STABILITY INTERVALS

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- Response: [22%;100%],  
median = 62%, range 36% to 78%
- Remission: [0%;100%],  
median = 16%, range 7% to 34%
- Side effects: [0%;23%],  
median = 4%, range 1% to 23%
- Severe side effects: [0%;46%],  
median = 19%, range 2% to 25%

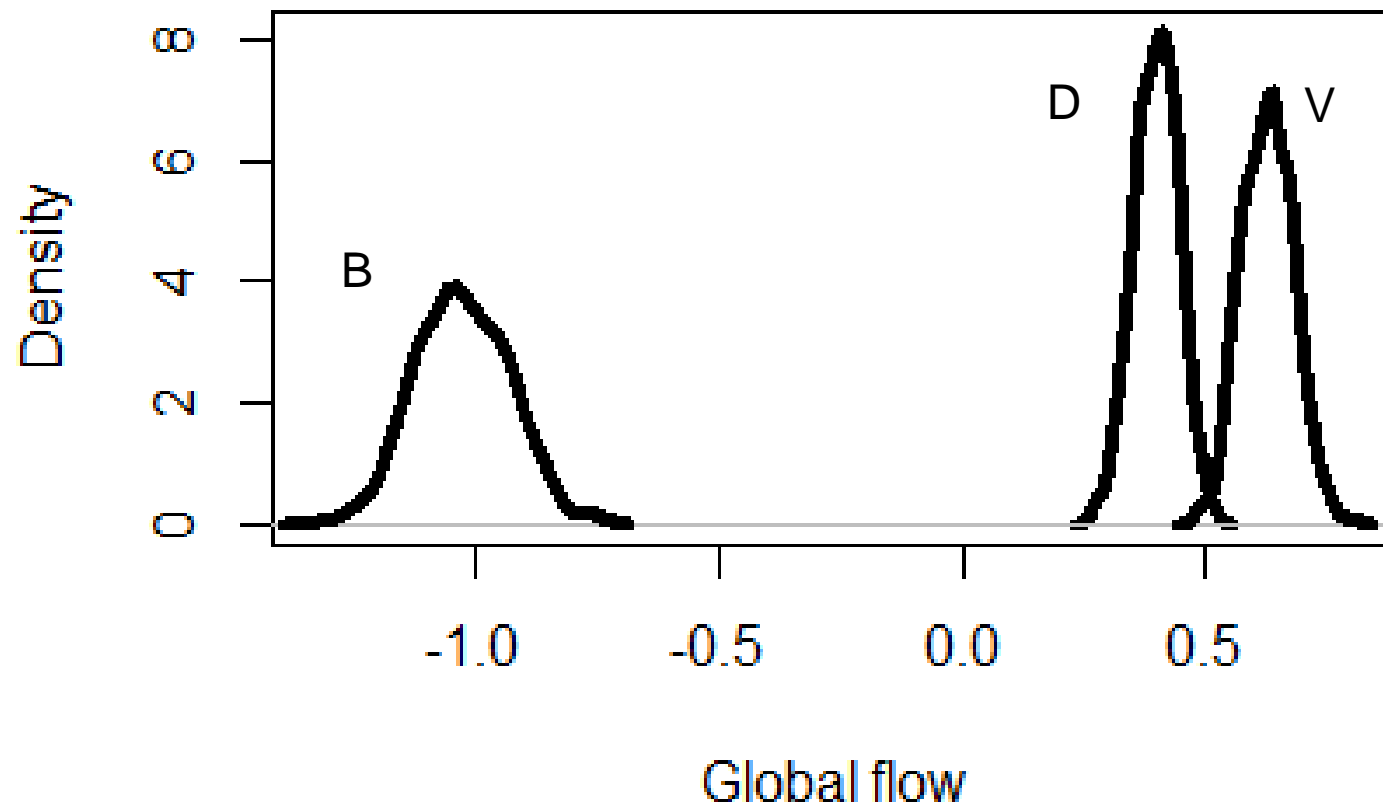


# SENSITIVITY TO VARIATION WEIGHTS

## PROBABILISTIC ANALYSIS

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- Bootstrapping weights, repeat 1000 times

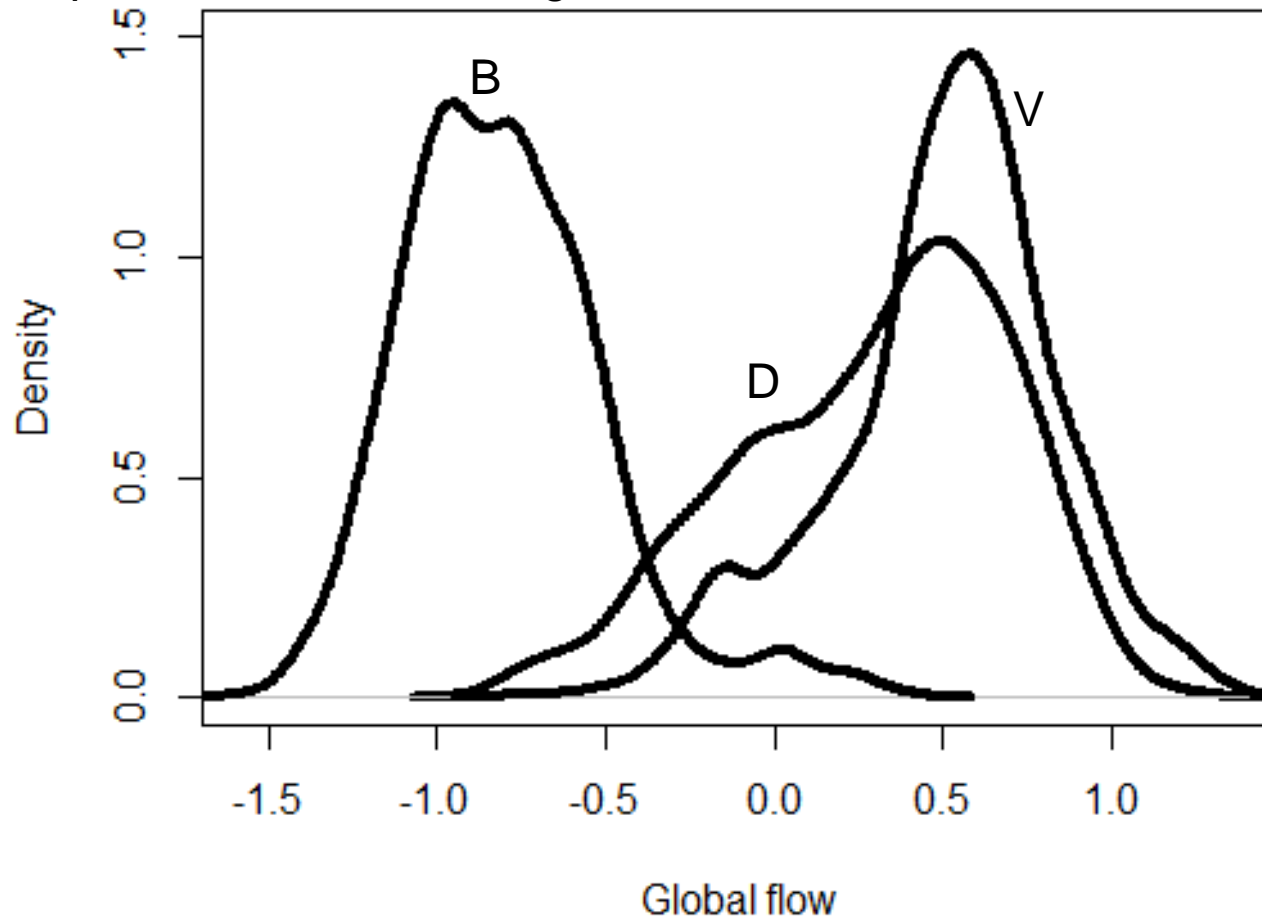


# SENSITIVITY TO VARIATION WEIGHTS AND SCORES

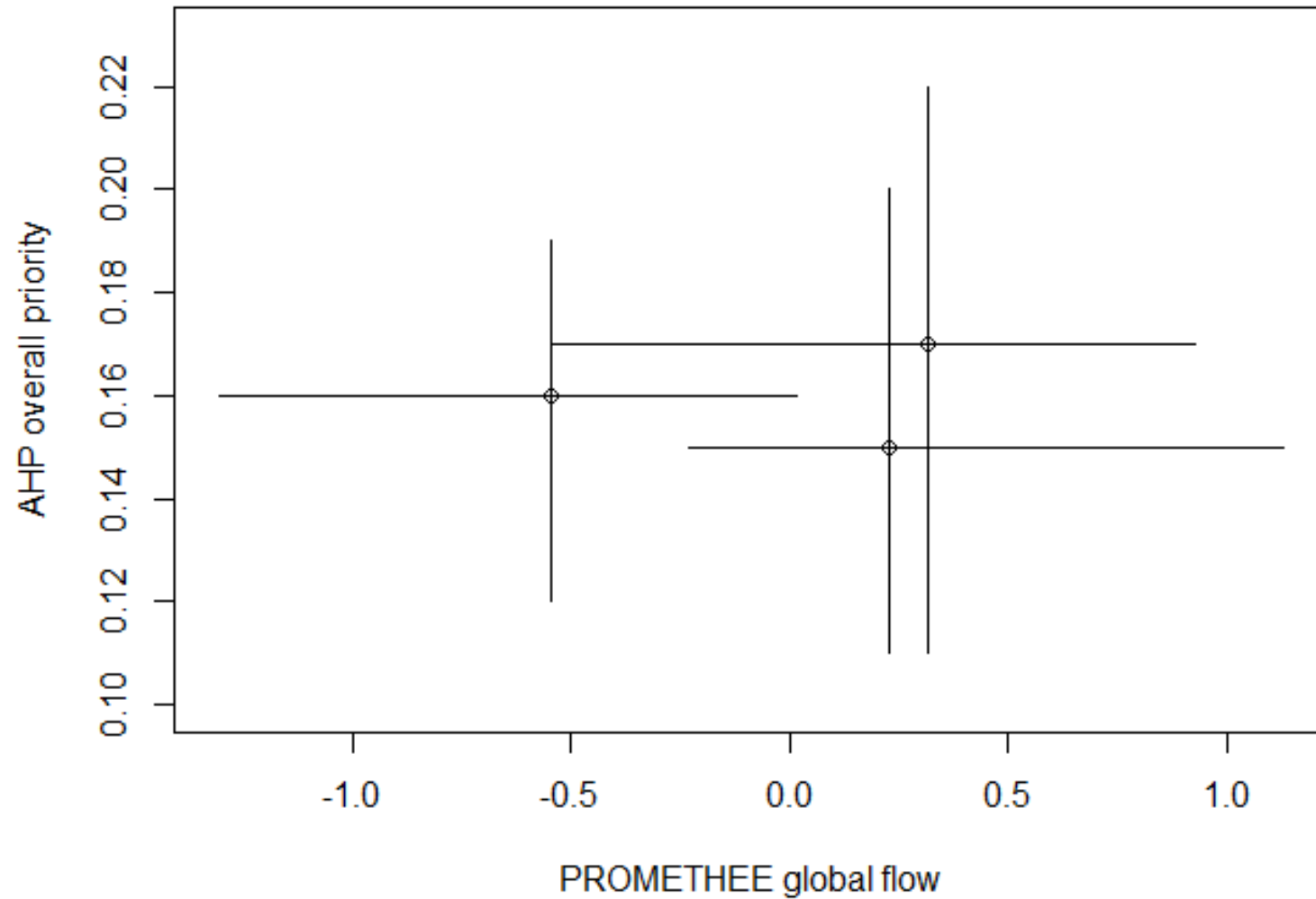
## PROBABILISTIC ANALYSIS

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- Sample odds ratios from lognormal distribution 1000 times



# COMPARISON WITH AHP RESULTS



# DISCUSSION

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- It is possible to compare the preferences of a large group of patients with PROMETHEE
  - Group preferences and individual preferences can be contrasted
  - Results similar to AHP results
  - Problem: Visual PROMETHEE limited to 9 scenarios
- The meaning of weights?
  - Can AHP weights really be used for PROMETHEE?



# FUTURE WORK

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- Supporting decision in early stages of health technology
  - Case: novel imaging modalities for non-small cell lung cancer
  - Klaske Siegersma (MSc student) will elicit from group of clinical experts:
    - Relevant criteria
    - Criteria weights
    - Performance scores / preference functions
- Piloting weights elicitation for PROMETHEE among patients
  - Problem: low numerical & health literacy
  - Incomparability? Veto?

# THANK YOU!

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- More information:

- [H.broekhuizen@utwente.nl](mailto:H.broekhuizen@utwente.nl)

- <http://www.utwente.nl/bms/htsr/Staff/broekhuizen/>

- Some references:

- V. Diaby, K. Campbell, and R. Goeree, “Multi-criteria decision analysis (MCDA) in health care: A bibliometric analysis,” *Oper. Res. Heal. Care*, vol. 2, no. 1–2, pp. 20–24, 2013.
- K. Marsh, T. Lanitis, D. Neasham, P. Orfanos, and J. Caro, “Assessing the Value of Healthcare Interventions Using Multi-Criteria Decision Analysis: A Review of the Literature,” *Pharmacoeconomics*, vol. 32, no. 4, pp. 1–21, 2014.
- H. Broekhuizen, C. Groothuis-Oudshoorn, J. van Til, M. Hummel, and M. IJzerman, “A review and classification of approaches for dealing with uncertainty in multi-criteria decision analysis for healthcare decisions,” *Pharmacoeconomics*, p. forthcoming, 2015.
- H. Broekhuizen, C. Groothuis-Oudshoorn, A. Hauber, and M. IJzerman, “Integrating patient preferences and clinical trial data in a quantitative model for benefit-risk assessment.,” in *25th Annual EuroMeeting of the Drug Information Association*, 2012.