Erasmus School of
Health Policy
& Management

Empirical evidence
and future directions for equity weighting

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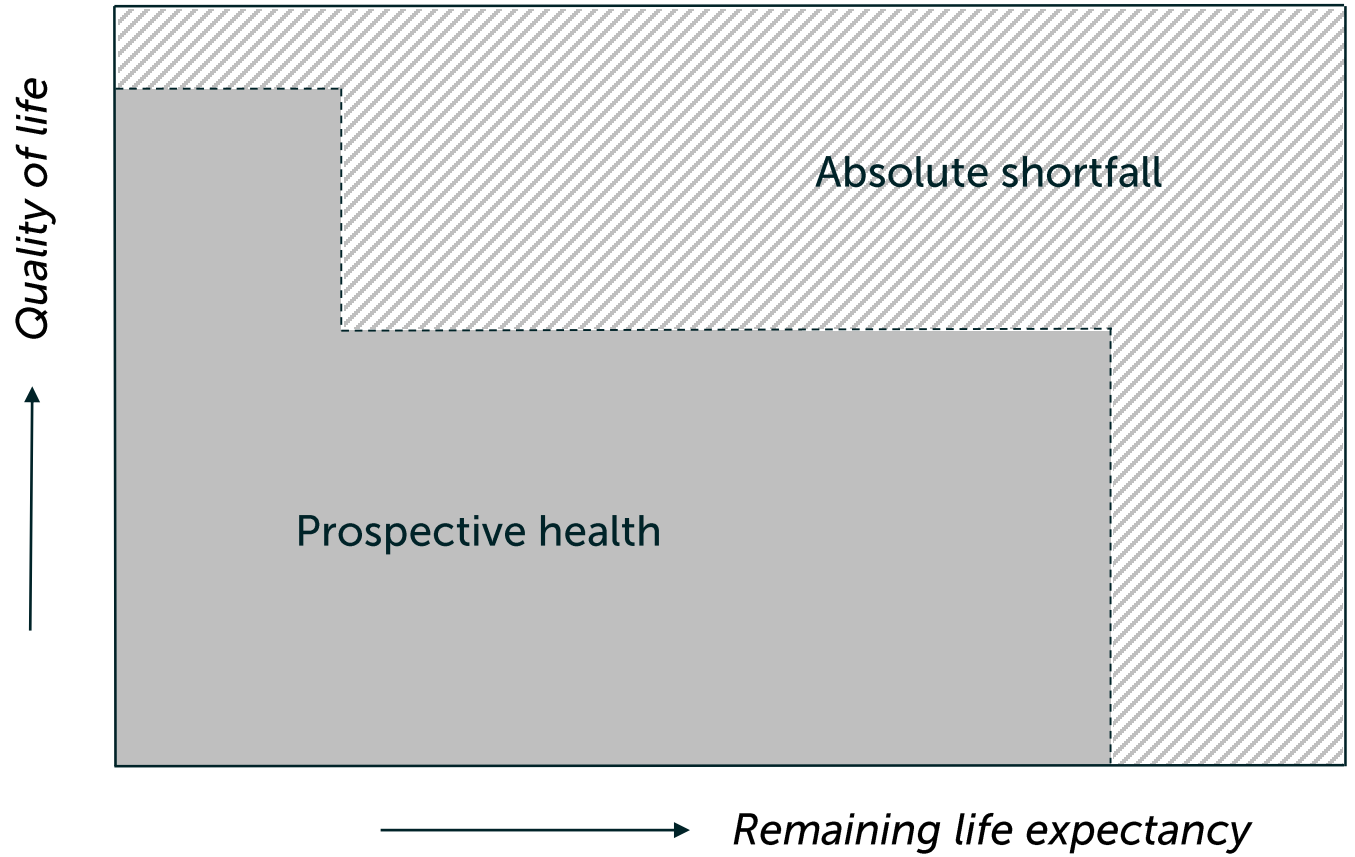
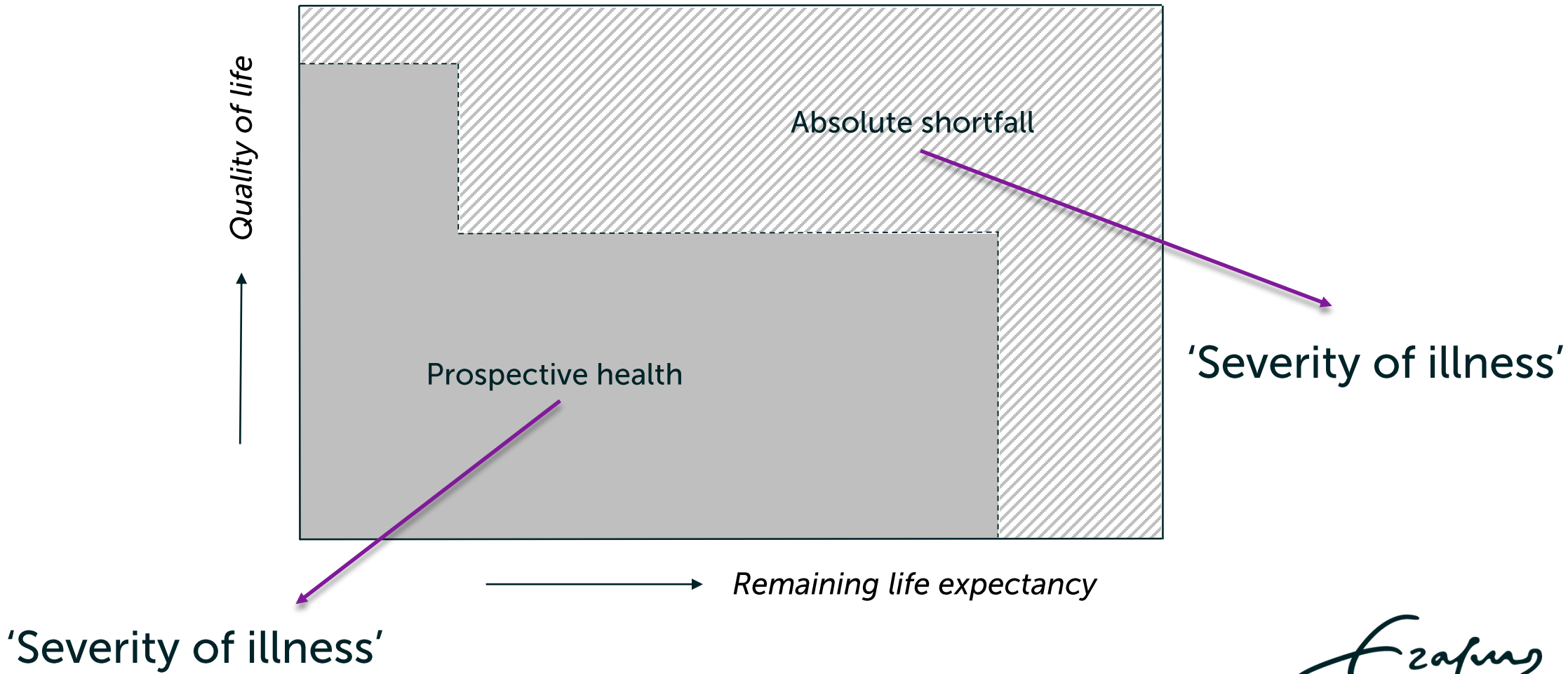
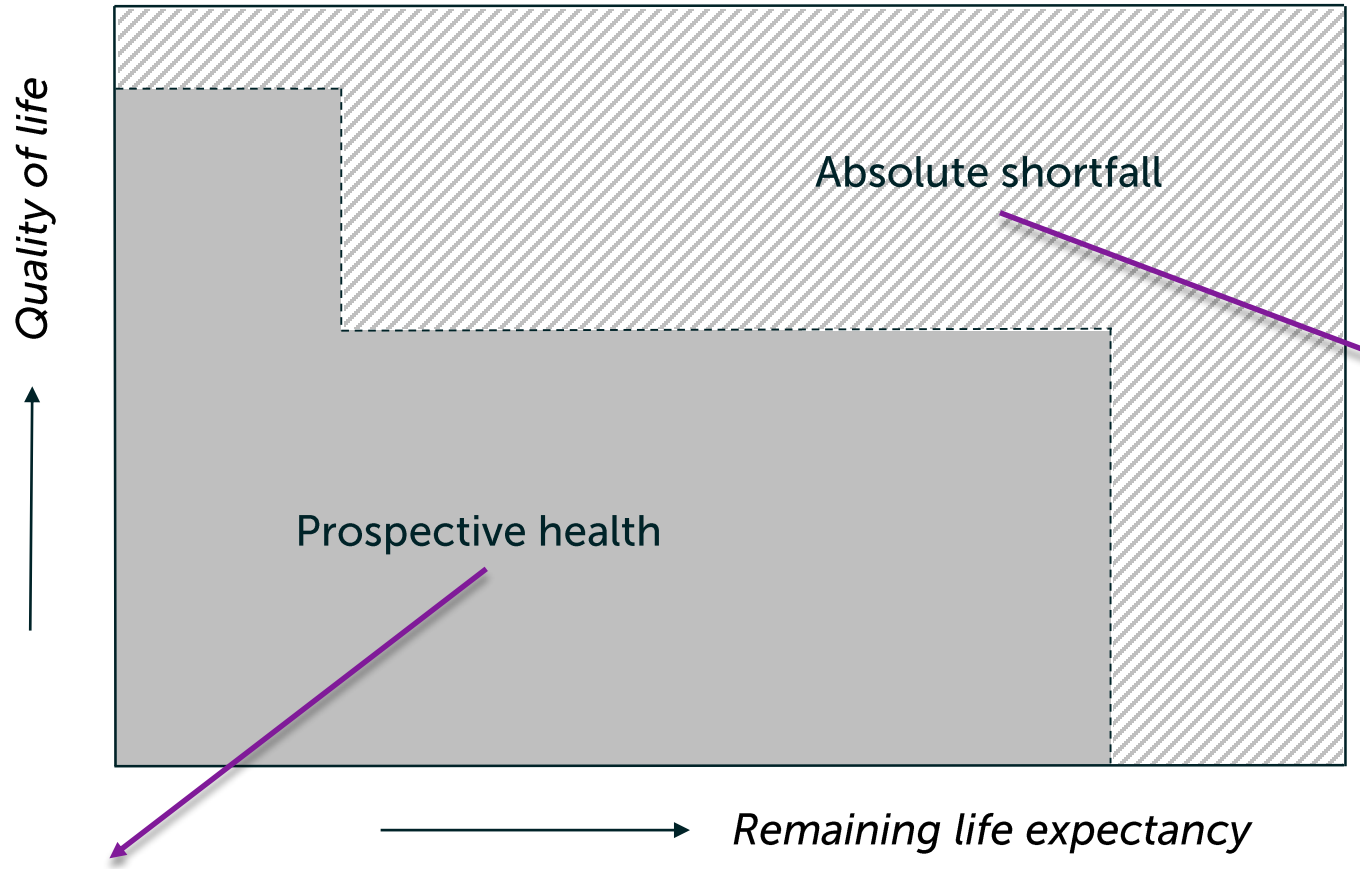
Proportional shortfall



Proportional shortfall



Proportional shortfall



‘Severity of illness’
or
‘Fair innings’

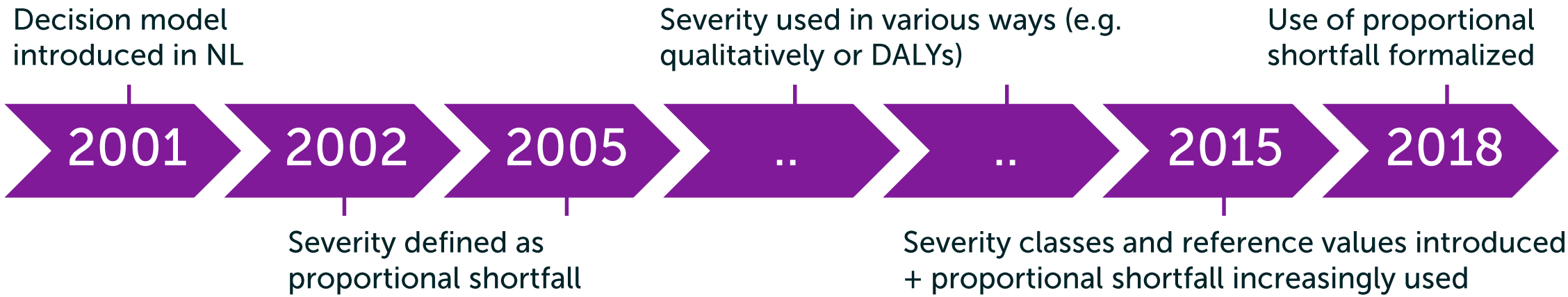
‘Severity of illness’

Why proportional shortfall?

Main reasons:

1. Balances concerns for ‘severity of illness’ and ‘fair innings’
2. Avoids ageism in reimbursement decisions (i.e. equal weight for younger and older patients)

A brief history of..



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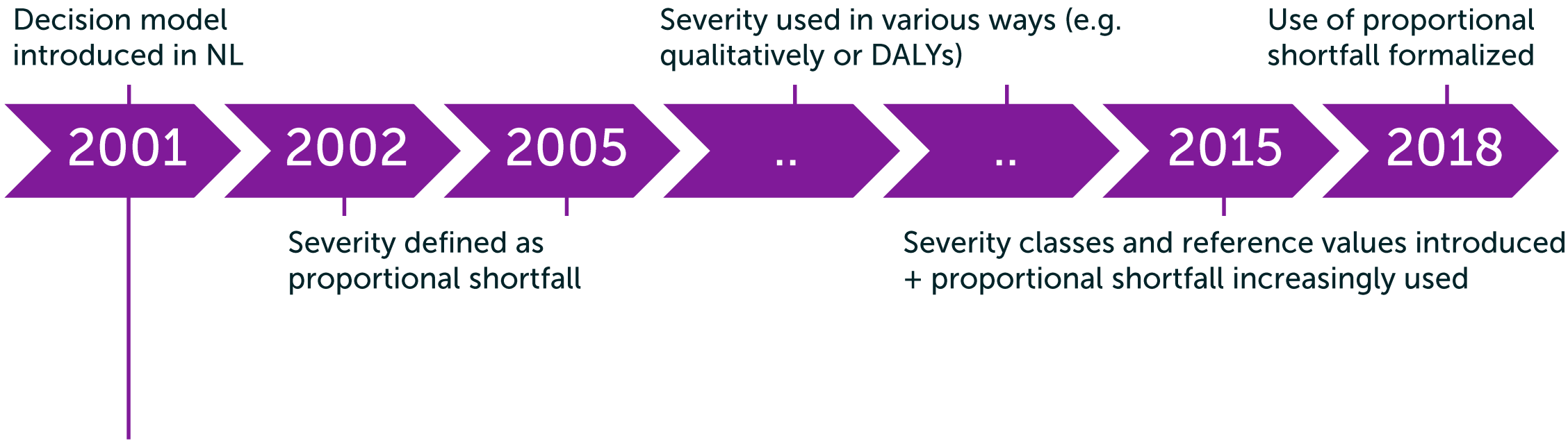

Since 2001, seven empirical studies examined whether proportional shortfall is aligned with societal preferences.

Support for proportional shortfall

Study	Year	Country	Design	*N*	Sample	Support for PS
Stolk et al.	2005	NL	Ranking exercise	65	Convenience	++
Olsen	2013	Norway	Pairwise-choice task	503	General public	--
Brazier et al.	2013	UK	DCE	3,669	General public	--/-
Van de Wetering et al.	2015	NL	DCE	1,205	General public	--
Bobinac et al.	2015	NL	WTP	1,320	General public	-
Rowen et al.	2016	UK	DCE	3,669	General public	+
Richardson et al.	2017	Australia	Paired comparison	606	General public	+

Level of support: -- = no, - = limited, + = modest, ++ = strong.

Support for proportional shortfall

Study	Year	Country	Design	*N*	Sample	Support for PS	Support for Age
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Support for proportional shortfall (2)

- Public generally prefers prioritising younger over older patients

- Consequence of using proportional shortfall is that older patients may more frequently be prioritised

How to move forward?

Adjust proportional shortfall?

- To align proportional shortfall with preferences for prioritising younger patients
- To meet the objective of avoiding ageism (by giving older patients a lower weight)

Adjust monetary reference values?

- To reflect severity-related preferences within different age groups


Younger patients
Older patients

Societal preferences for severity and age

Two stated-preference studies conducted to examine (the strength of) societal preferences for severity and age.

Choice- and person-trade-off tasks:

- Elicit preferences for priority setting based on severity, age, and combination of both (status: in press)

Contingent-valuation tasks:

- Estimate the severity-dependent willingness to pay per QALY at different ages (status: data collection)

Societal preferences

Difference in severity, same age:

- Preference for reimbursing treatment for more severely ill patients

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Difference in age, same severity level:

- Preference for reimbursing treatment for younger patients

Societal preferences

Difference in severity, same age:

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Difference in age, same severity level:

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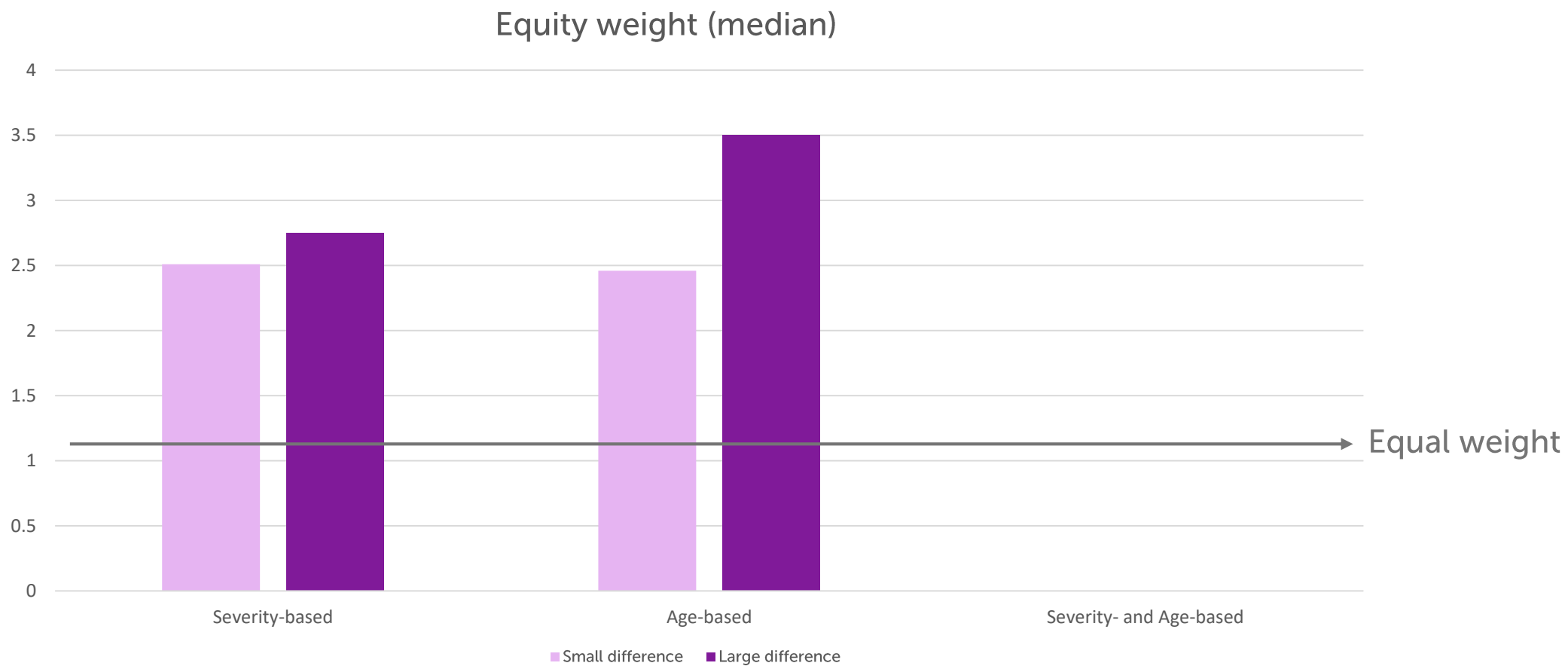
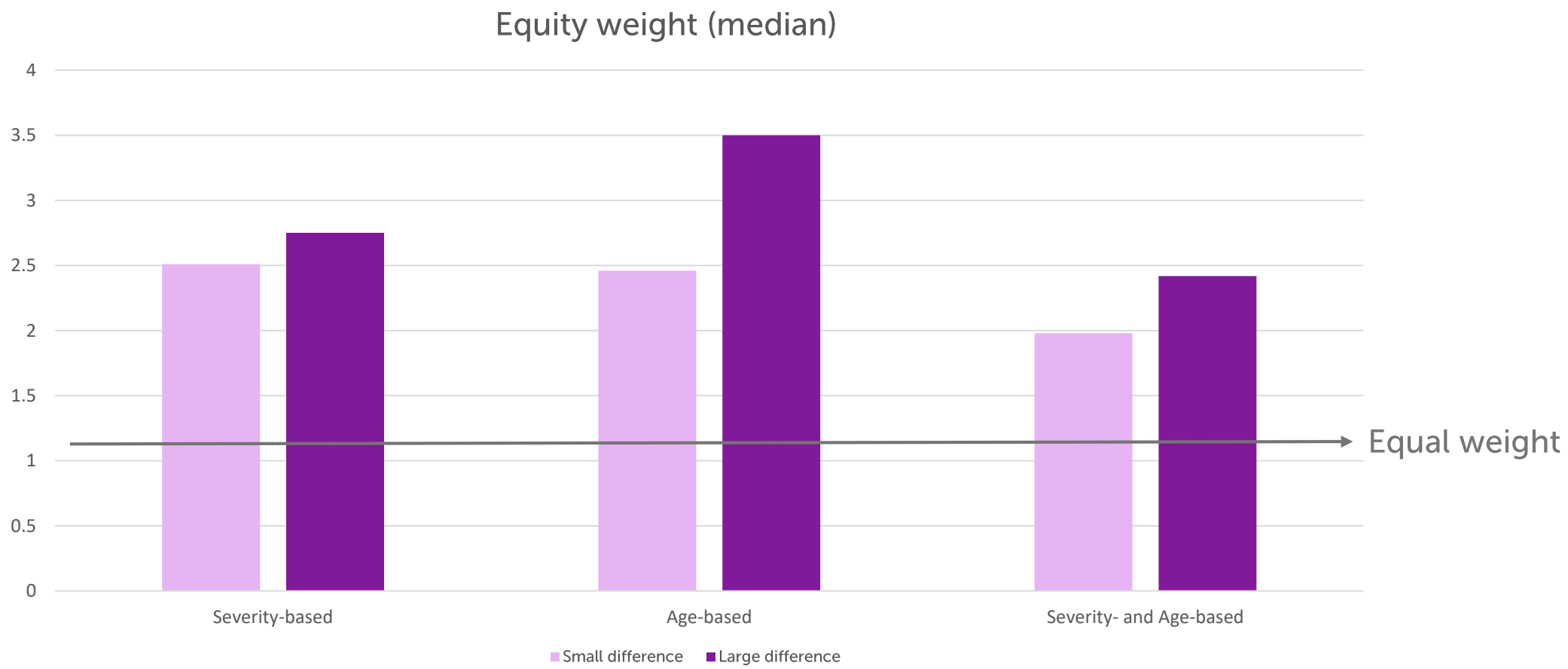
Difference in severity *and* age:

- Preference for reimbursing treatment for younger patients, regardless of patients' severity level

Strength of preferences



Strength of preferences




UAH

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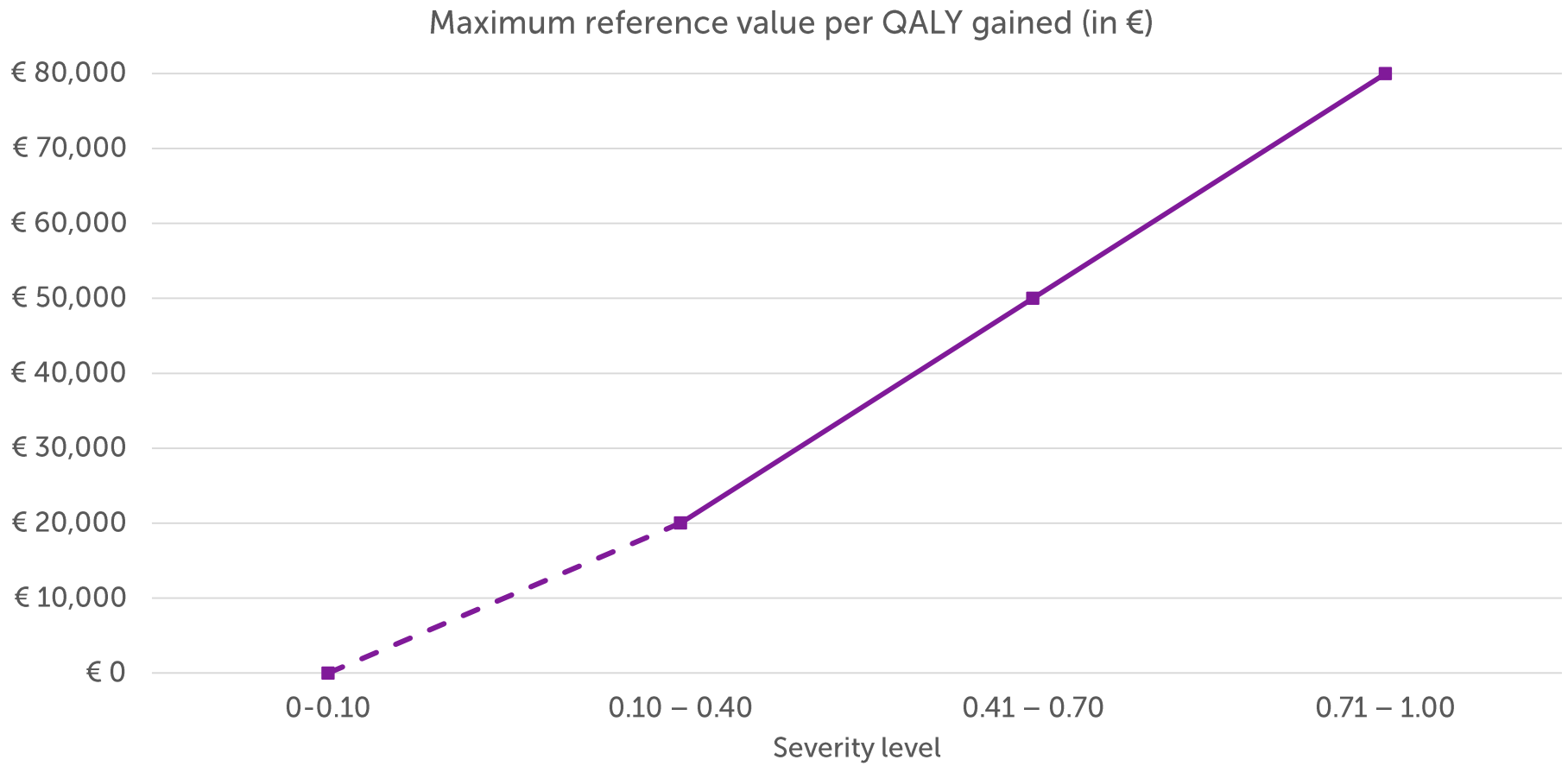
Current decision framework



Severity-dependent WTP at different ages

		Age			
		10 years	20 years	40 years	70 years
Severity	10	€	€	€	€
	30	€	€	€	€
	50	€	€	€	€
	70	€	€	€	€
	90	€	€	€	€

Severity-dependent WTP at different ages

		Age			
		10 years	20 years	40 years	70 years
Severity	10	€	€	€	€ LOWER
	30	€	€	€	€
	50	€	€	€	€
	70	€	€	€	€
	90	€ HIGHER	€	€	€

Hypothesis:

- Higher willingness to pay for relatively more severely ill and younger patients.

Future directions

- Severity and age may both be important, but age may be more important

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- If severity is not ‘it’, what else may be relevant? Rarity of diseases? Prioritising patients at the end of life?

Future directions

- Severity and age may both be important, but age may be more important
- Proportional shortfall or reference values may need to be adjusted to account for age-related societal preferences in society or to avoid ageism
- If severity is not ‘it’, what else may be relevant? Rarity of diseases? Prioritising patients at the end of life?
- How to account for uncertainty in severity estimates that may impact the outcomes of reimbursement decisions?

Calculating the SAPCE

Versteegh et al. (2019) published a method and developed a tool for calculating the severity-adjusted probability of being cost effective.

By integrating:

- Uncertainty associated with patients' QALE (obtained from PSA)
- Uncertainty associated with remaining QALE in absence of disease (based on age- and sex-adjusted population QALE)

And:

- Obtaining a distribution for (absolute and/or) proportional shortfall
- Calculating the probability a new technology is cost-effective given the different reference values that may apply

Table 1: Example calculation of the severity–adjusted probability of being cost-effectiveness

	Disease burden calculation					Model results			Combined results	
Model run	Patient QALE (Qd)	Population QALE[a] (Qn)	AS (Qn - Qd)	PS ((Qn - Qd) / Qn)	Applicable threshold in € (*Vs*)	Incremental costs in € (△C)	Incremental benefits (△Q)	ICER in € (△C/△Q)	INMB in € (△Q*Vs - △C)	Cost-effective[b]
1	15	25	10	0.40	20,000	20,000	0.60	33,333	-8,000.00	0
2	16	24	8	0.33	20,000	8,000	0.50	16,000	2,000.00	1
3	17	28	11	0.39	20,000	15,000	0.60	25,000	-3,000.00	0
4	15	28	13	0.46	50,000	10,000	0.50	20,000	15,000.00	1
5	14	27	13	0.48	50,000	10,000	0.40	25,000	10,000.00	1
6	13	26	13	0.50	50,000	25,000	0.30	83,333	-10,000.00	0
7	15	26	11	0.42	20,000	25,000	0.60	41,667	-13,000.00	0
8	15	32	17	0.53	50,000	15,000	0.50	30,000	10,000.00	1
9	16	25	9	0.36	20,000	25,000	0.60	41,667	-13,000.00	0
10	16	26	10	0.38	20,000	20,000	0.80	25,000	-4,000.00	0
Severity–adjusted probability of being cost–effective										40%

ICER, incremental cost-effectiveness ratio, INMB = incremental net monetary benefit; QALE, quality-adjusted life expectancy; [a] Population QALE is age and sex specific; [b] 1 = Yes.

From: Versteegh MM, Ramos IC, Buyukkaramikli NC, Ansaripour A, Reckers-Droog VT, Brouwer WBF. Severity-Adjusted Probability of Being Cost Effective. *PharmacoEconomics 2019;*1-9.

iMTA Disease Burden Calculator

iDBC tool (R based) available for:

- The Netherlands, Norway, USA, Spain, Germany, and the UK
- (Free) download from iMTAs website: https://imta.shinyapps.io/iDBC/

Want to discuss further?

Contact me

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Additional slides

Proportional shortfall – Calculations

Different calculations in context of (strong) heterogeneity, episodic disease course, and prevention.

Heterogeneity:

- Calculated as a weighted average

Episodic course:

- Calculated and presented per subgroup *during* episode
- Representative of shortfall during episode, but total shortfall is overestimated due to exclusion of disease-free period

Proportional shortfall – Calculations (2)

Prevention:

- Moment of treatment
- Subgroup of patients who actually fall ill

Rationale:

- Illustrates the sense of urgency/necessity of preventive treatment
- Avoids differences between patients who receive preventive or curative care for the same disease
- Avoids ‘double penalty’ as relatively higher costs and lower average proportional shortfall would lead to relatively less favourable ICERs for preventive treatments
- Better aligned with objective to prioritise the more severely ill