Estimating input parameters for decision modeling

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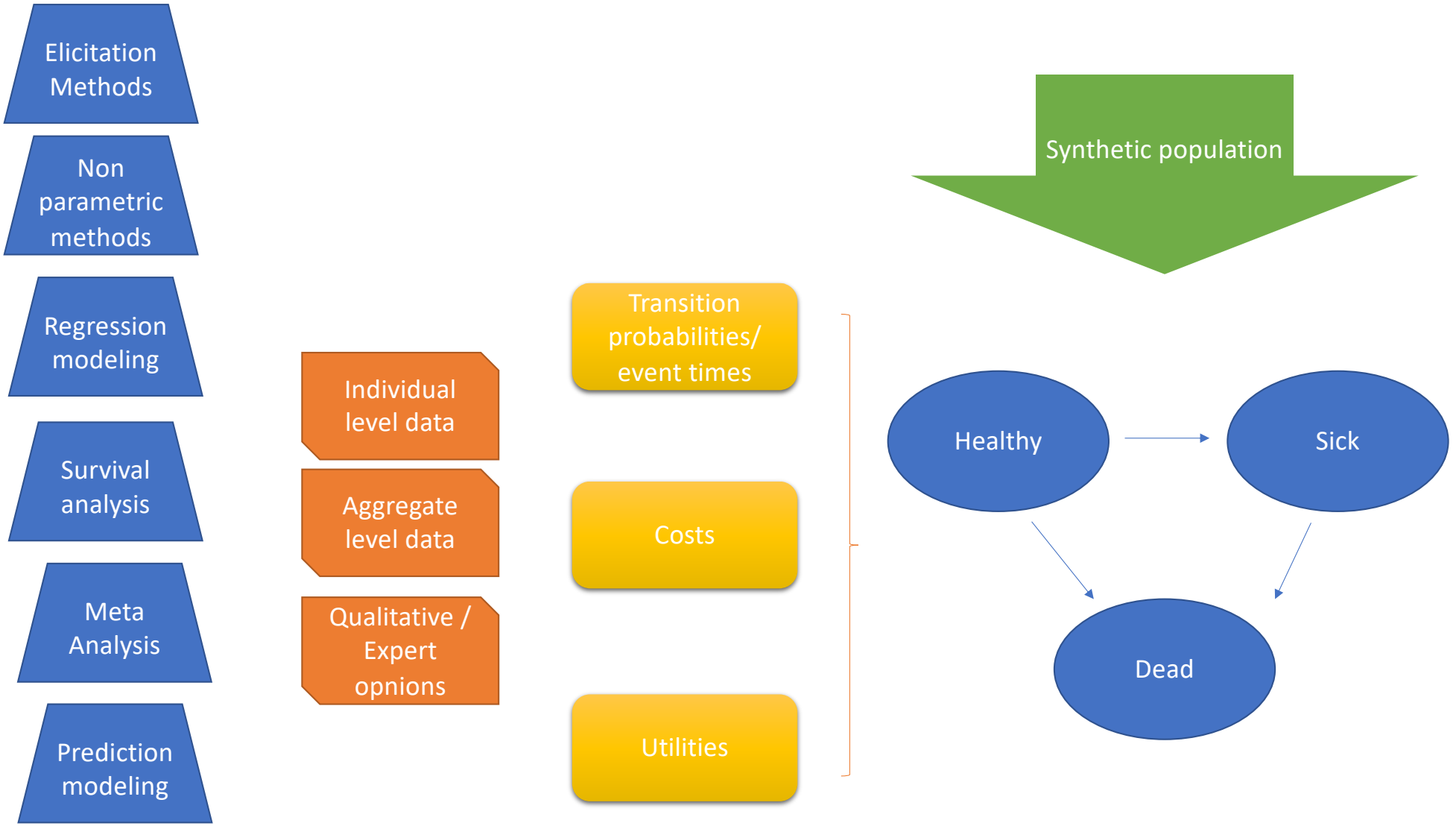
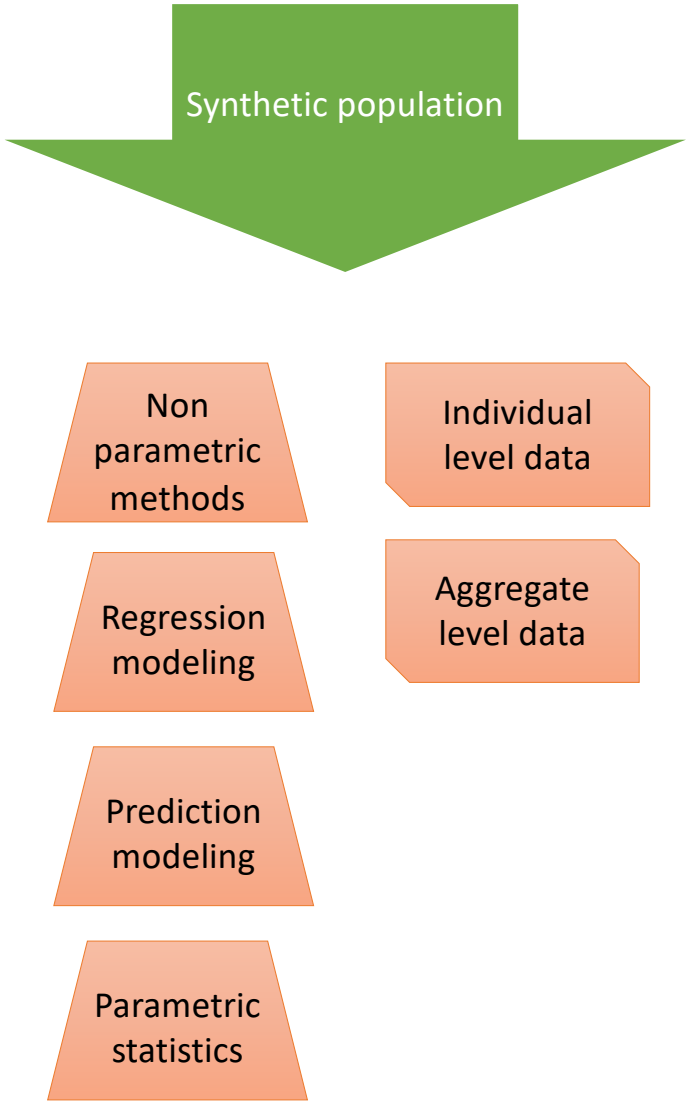

Elicitation Methods
Non parametric methods
Regression modeling
Survival analysis
Meta Analysis
Prediction modeling
Individual level data
Aggregate level data
Qualitative / Expert opnions
Transition probabilities/ event times
Costs
Utilities
Synthetic population
Healthy
Sick
Dead


Synthetic population
Non parametric methods
Individual level data
Regression modeling
Aggregate level data
Prediction modeling
Parametric statistics

Individual level data

	id	sex	age	obstruct	perfor	adhere	nodes
1	1	1	43	0	0	0	5
2	1	1	43	0	0	0	5
3	2	1	63	0	0	0	1
4	2	1	63	0	0	0	1
5	3	0	71	0	0	1	7
6	3	0	71	0	0	1	7
7	4	0	66	1	0	0	6
8	4	0	66	1	0	0	6
9	5	1	69	0	0	0	22
10	5	1	69	0	0	0	22

Synthetic population

Non parametric methods

Individual level data

	id	sex	age	obstruct	perfor	adhere	nodes
1	1	1	43	0	0	0	5
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5	3	0	71	0	0	1	7
6	3	0	71	0	0	1	7
7	4	0	66	1	0	0	6
8	4	0	66	1	0	0	6
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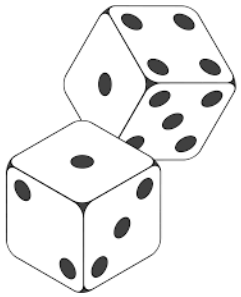
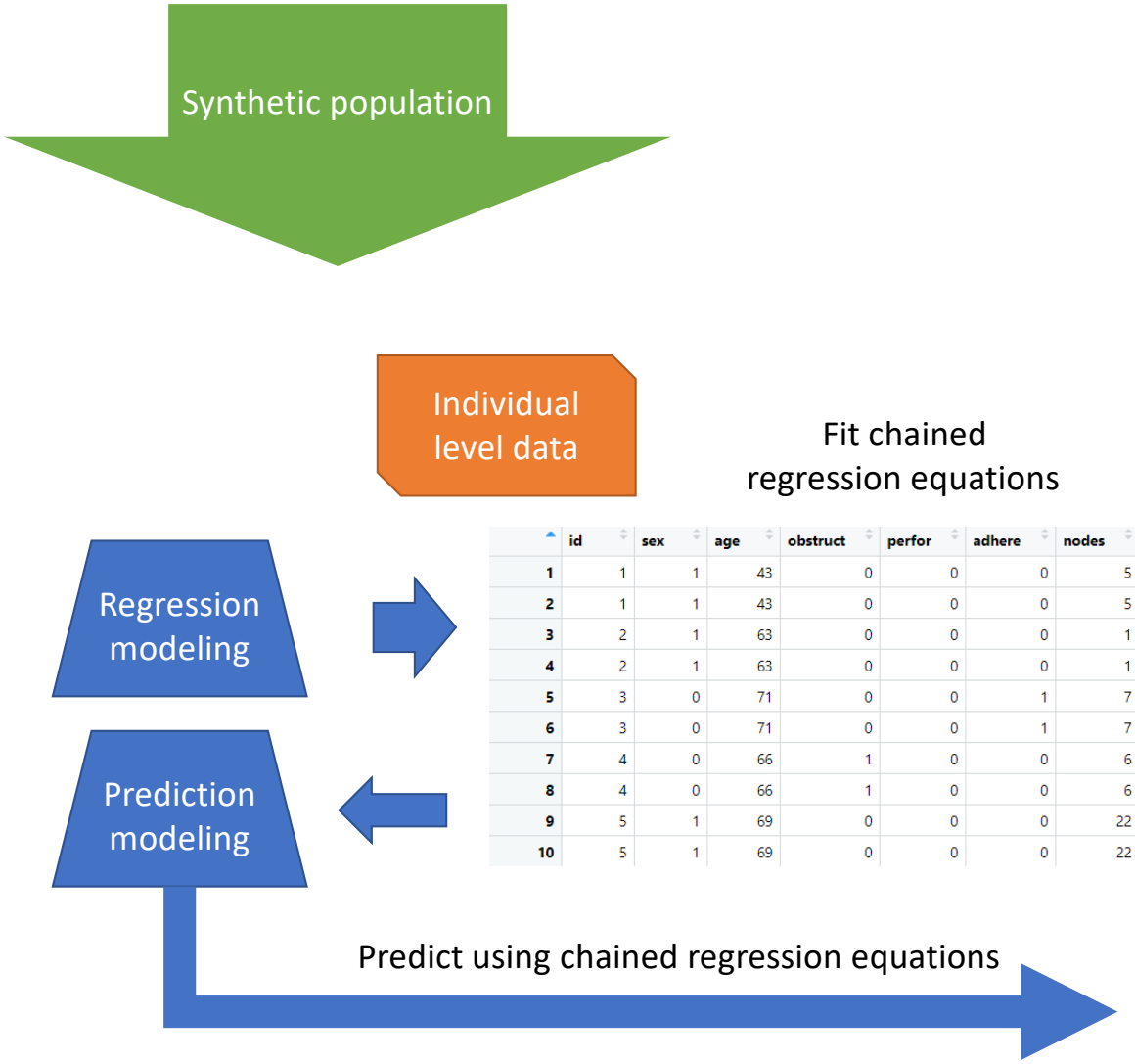


Bootstrap with replacement!

id	sex	age	obstruct	perfor	adhere	nodes
98	1	74	0	0	1	1
741	0	53	0	0	0	5
736	1	57	0	0	0	NA
368	0	42	0	0	0	10
835	0	54	0	0	0	3
692	0	66	0	0	0	1
60	0	57	1	0	0	4
539	1	59	0	0	0	4
597	1	61	1	0	0	5
413	0	22	0	0	0	3
411	1	79	0	0	0	1
321	0	61	0	0	0	2
192	1	57	1	0	1	1
920	0	70	0	0	1	5
23	0	61	0	0	0	4
503	1	48	0	0	0	1
740	1	70	0	0	0	3
560	1	55	0	0	0	7
281	1	56	0	0	0	2
358	0	64	1	0	0	NA
452	1	32	1	0	1	11
868	1	38	0	0	0	3
817	0	36	0	0	0	7
201	1	71	0	0	0	1
589	1	39	0	0	0	2



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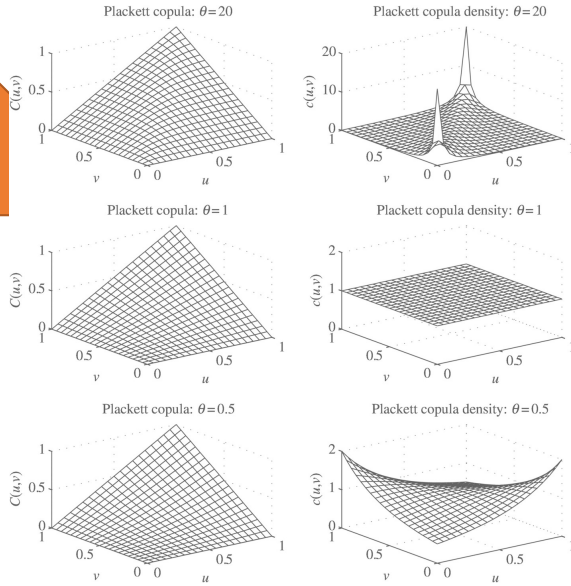
Synthetic population

Aggregate level data

Parametric statistics



https://www.cambridge.org/core/books/abs/copulas-and-their-applications-in-water-resources-engineering/plackett-copula/2D407DAB691623AB52CF74044B42C61F

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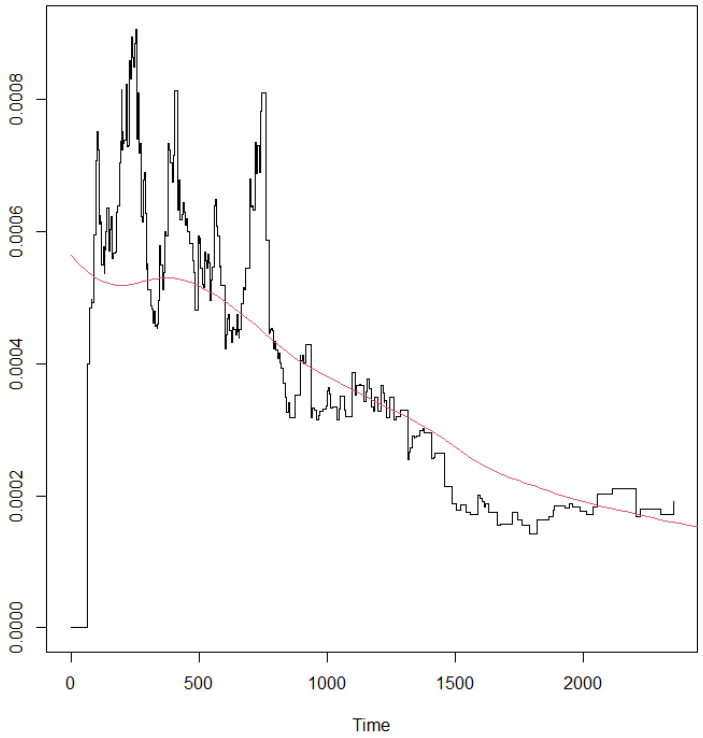
Transition probabilities/ event times

Non parametric methods

Individual level data

id	time	status
1	1521	1
1	968	1
2	3087	0
2	3087	0
3	963	1
3	542	1
4	293	1
4	245	1
5	659	1
5	523	1
6	1767	1
6	904	1
7	420	1

Kaplan Meier estimate of transition probabilities



Transition probabilities/ event times

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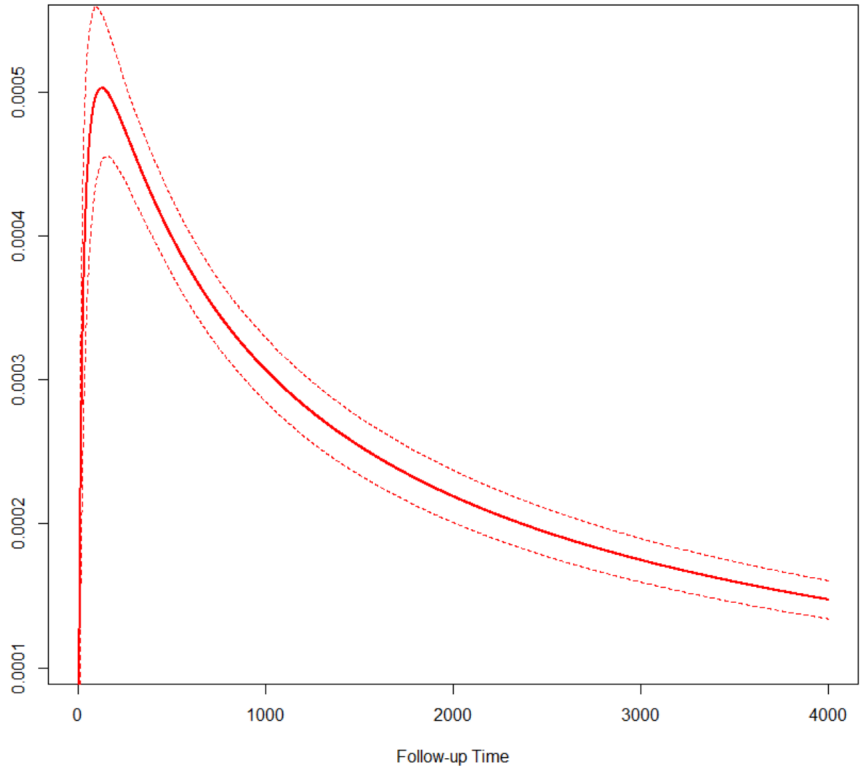
Lognormal distribution
Transition probabilities



other distributions:
gamma, Weibull ,exponential etc)

Transition probabilities/ event times

Parametric methods

Individual level data

id	time	status
1	1521	1
1	968	1
2	3087	0
2	3087	0
3	963	1
3	542	1
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5	659	1
5	523	1
6	1767	1
6	904	1
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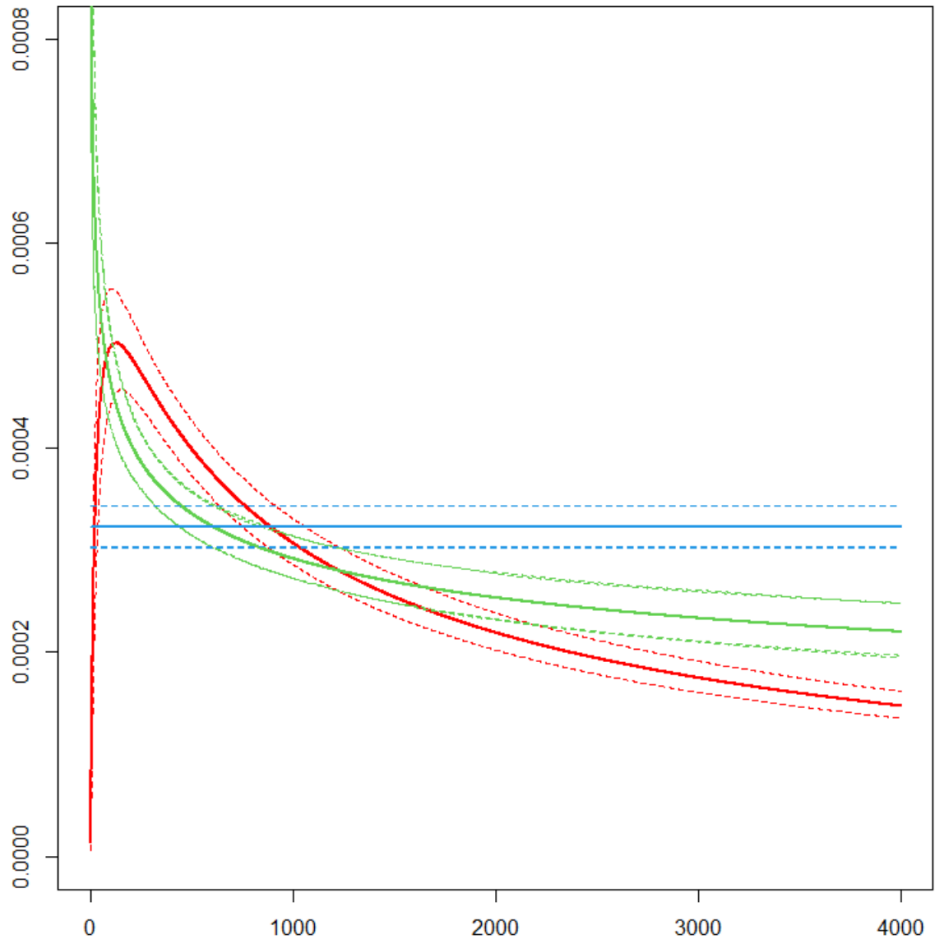
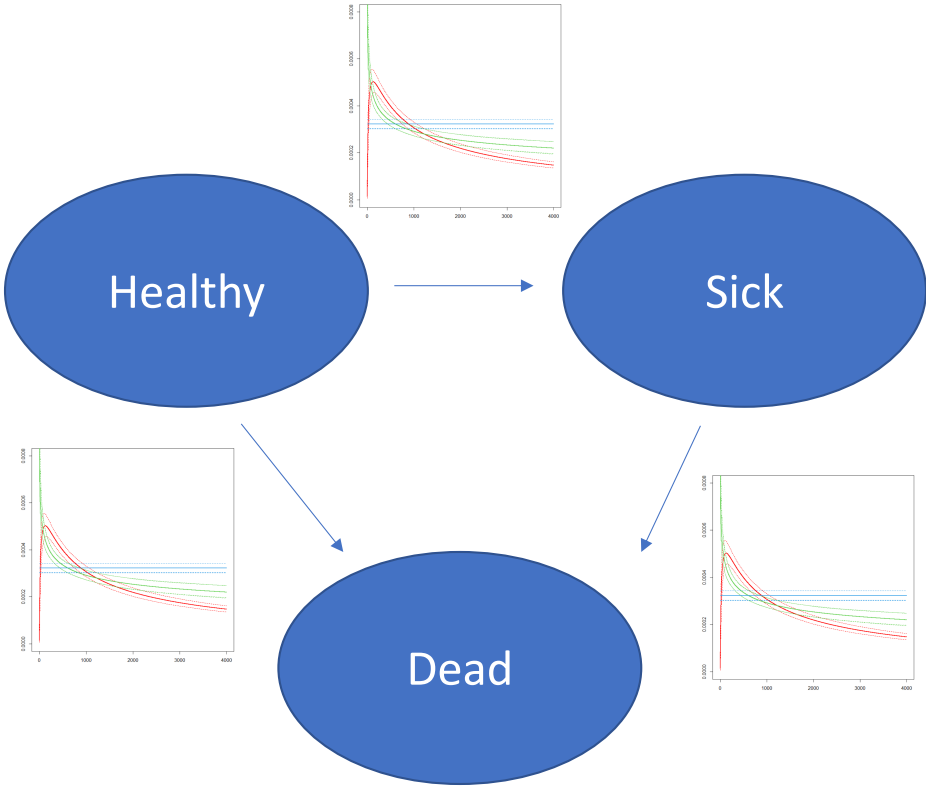
Exponential
Lognormal
Weibull



Transition probabilities/ event times

Parametric methods

Individual level data



Parametric Multistate modeling

Two ways:

- Fit a multivariate model
- Fit separate models per transition

Transition probabilities/ event times

Parametric methods

Individual level data

id	time	status
1	1521	1
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2	3087	0
3	963	1
3	542	1
4	293	1
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5	659	1
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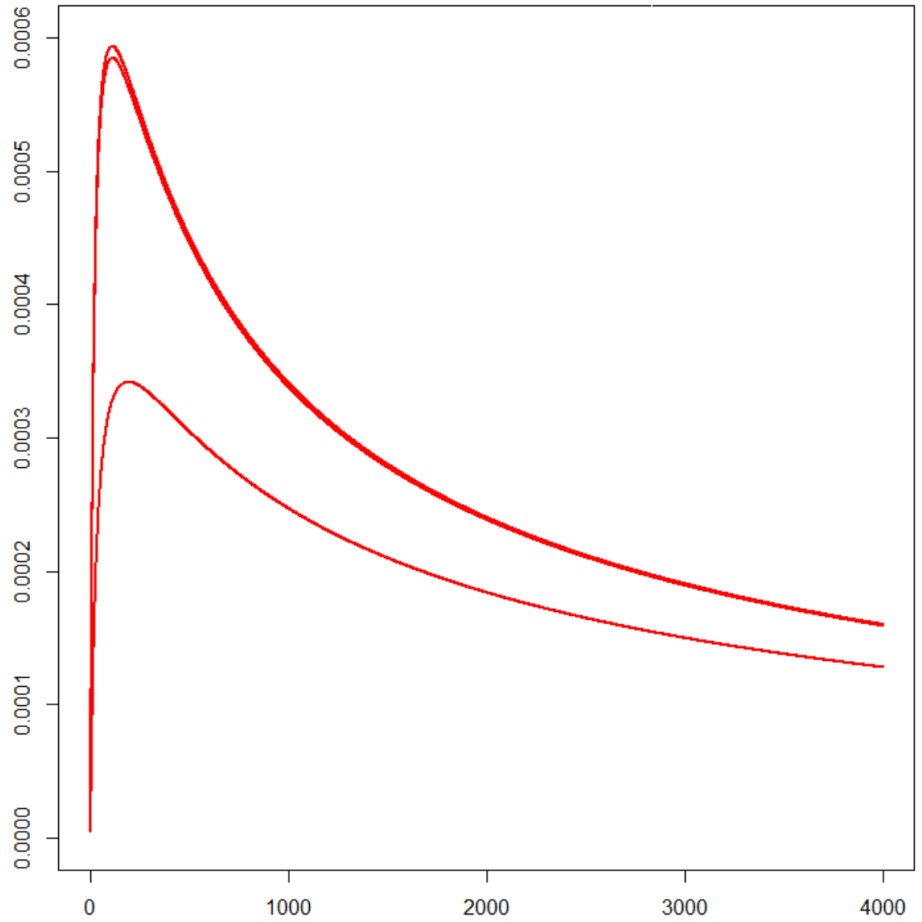
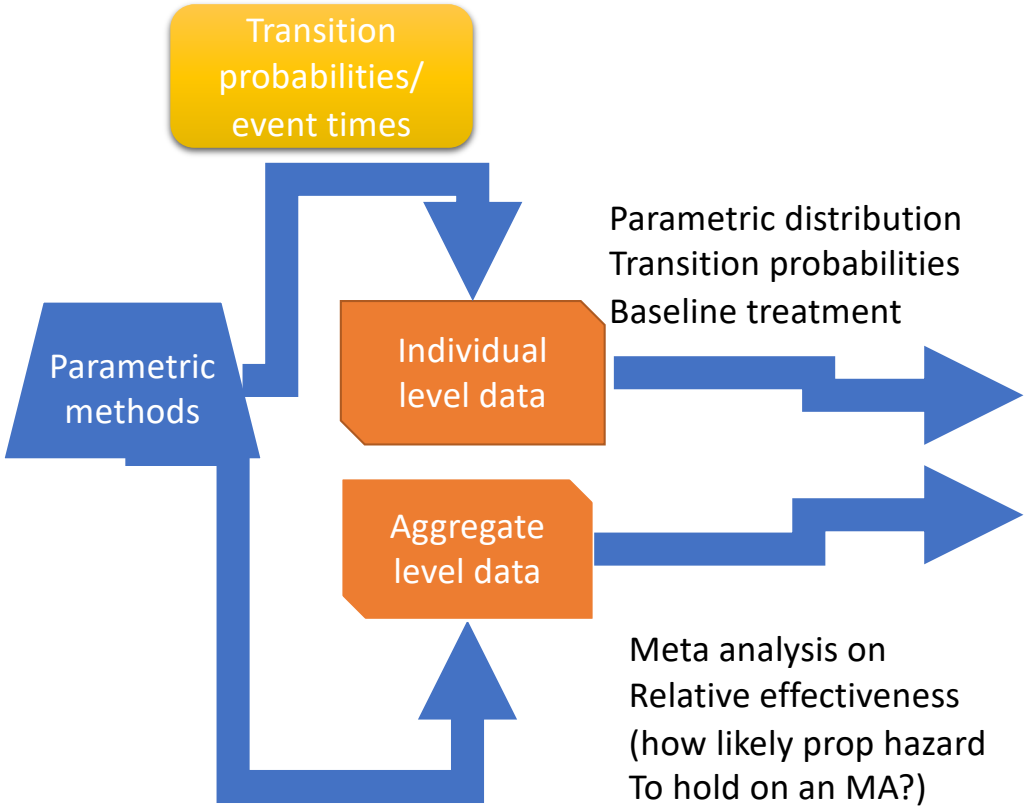
6	904	1
7	420	1

treatment–specific (or)
Covariate-specific
Transition probabilities

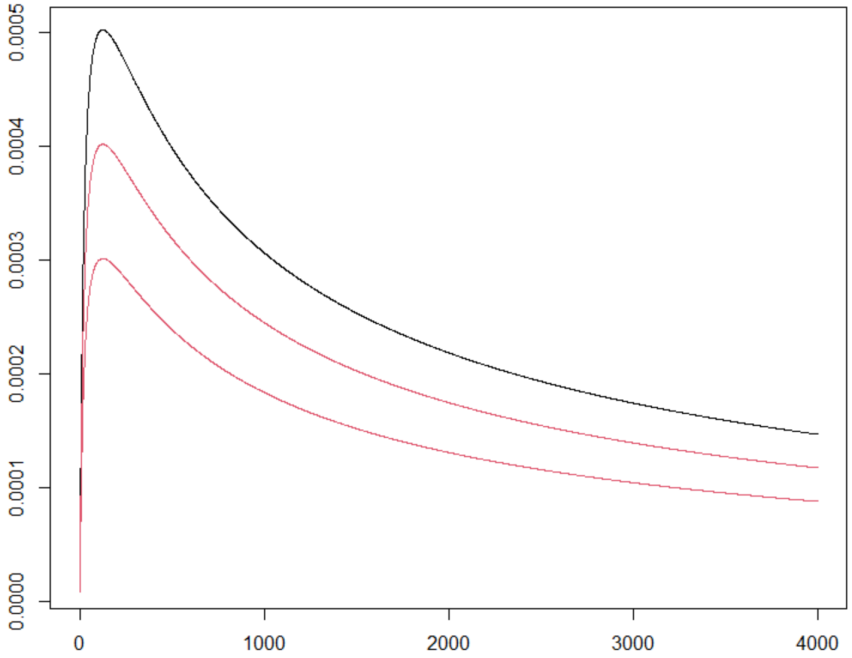


Proportional Hazard assumption
(how likely to hold after end of follow up?)



Parametric distribution
Transition probabilities
Baseline treatment

Meta analysis on
Relative effectiveness
(how likely prop hazard
To hold on an MA?)



Alternative NMA with fractional polynomials

Utilities

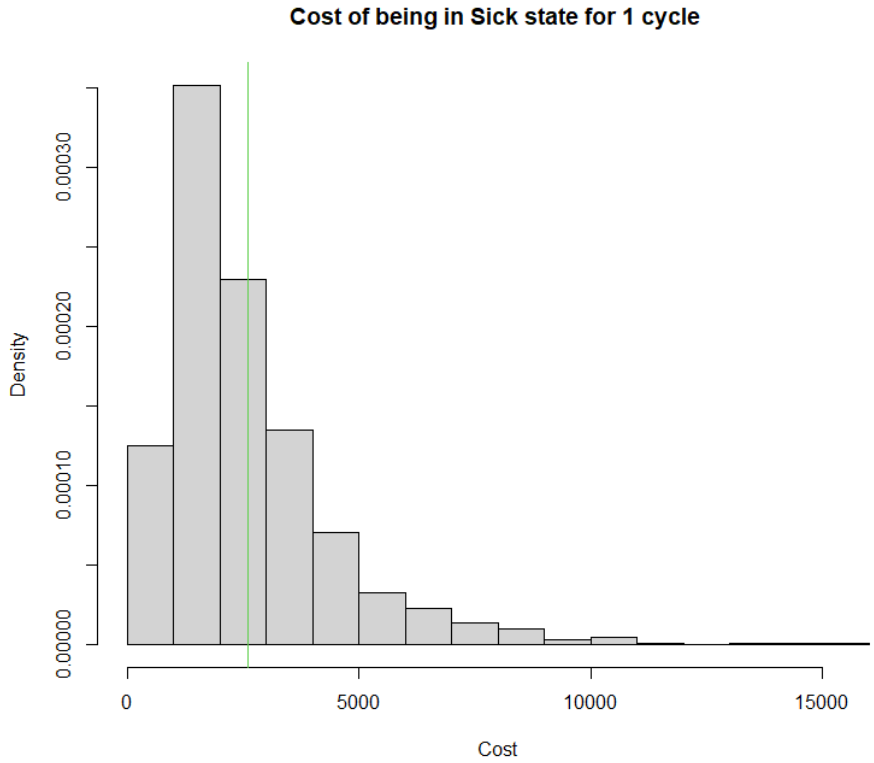
Costs

Individual level data

Non parametric methods

Regression modeling

id	progress_cost
1	1914.5048
1	4801.3077
2	2738.0233
2	1048.1428
3	1599.9259
3	550.7193
4	6286.6264
4	2972.1617
5	2346.3758
5	1647.7273
6	547.6525



Sample average of
Cost per unit of time

Censoring can be a problem!

Utilities

Costs

Individual level data

Non parametric methods

Regression modeling

id	progress_cost
1	1914.5048
1	4801.3077
2	2738.0233
2	1048.1428
3	1599.9259
3	550.7193
4	6286.6264
4	2972.1617
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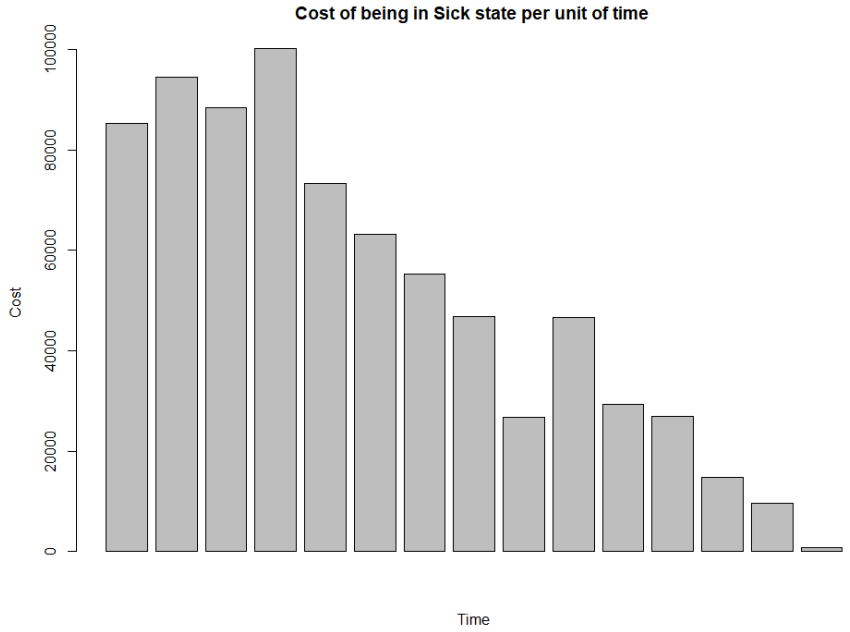
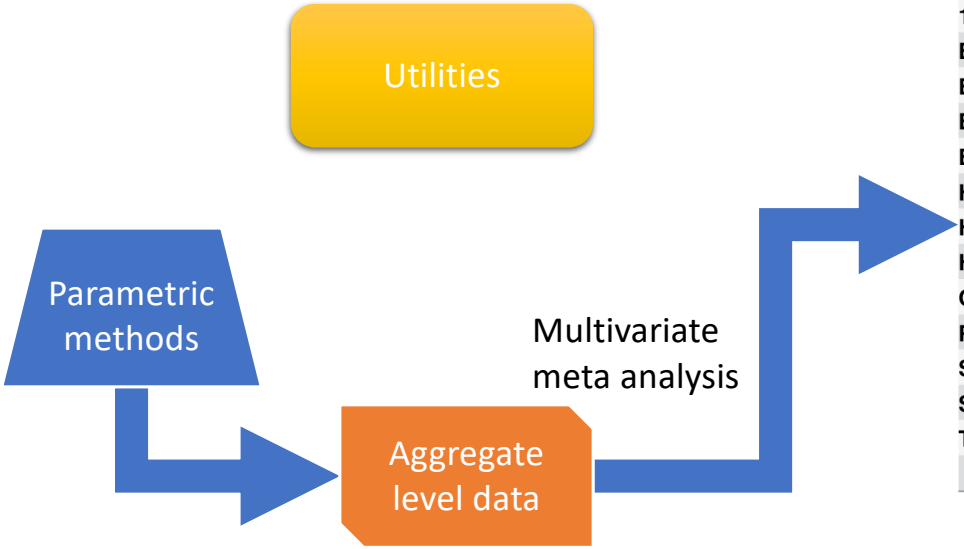


Generalized linear model with cycle variable to capture temporal effects

Time effect can be highly skewed!!



Instrument	N	Post-ACS subgroup	I^2_H	I^2_R	N	Stable angina subgroup
15D	1	**0.8816** (0.0074)			1	**0.8515** (0.0037)
EQ-5D Europe	1	**0.9170** (0.0105)				
EQ5D Korea						
EQ-5D UK	8	**0.7638** (0.0246)		99.3%	7	**0.7792** (0.0250)
EQ-5D US	3	**0.7662** (0.0308)		97.3%	1	**0.6950** (0.0201)
HALex						
HUI2						
HUI3	1	**0.7350** (0.0111)				
QWB	1	**0.6400** (0.0175)			2	**0.6517** (0.0097)
RS						
SF-6D					2	**0.6413** (0.0017)
SG					2	**0.8889** (0.0492)
TTO	1	**0.8700** (0.0026)				
			86.8%	70.7%		

doi:10.1371/journal.pone.0152030.t002