

dampack: an R package for analyzing and visualizing cost- effectiveness analysis results

Janssen Decision Modeling in R Workshop

April 2021

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Introducing dampack

- **Motivation:** unmet need for CEA visualization tools in R
- R package available on CRAN
- Functionality:
 - Incremental cost-effectiveness analysis
 - One- and two-way sensitivity analyses visualization
 - Quantifying decision uncertainty (cost-effectiveness acceptability curve / expected loss curves)
 - Value of information analysis

Interfacing with dampack

Deterministic results

Strategy	Cost	Effectiveness (QALYs)
S1	\$64,624	12.34
S2	\$65,187	12.36
S3	\$64,435	12.26
⋮	⋮	⋮
s48	\$65,650	12.32

dampack

Probabilistic sensitivity analysis (PSA) dataset

					Costs (\$ - thousands)				Effectiveness (QALYs)			
Run #	p1	p2	p3	...	S1	S2	S3	...	S1	S2	S3	...
1	0.05	0.001	3.2		64.0	65.2	63.9		12.30	12.31	12.22	
2	0.14	0.003	3.5		64.6	65.6	64.4		12.17	12.21	12.10	
...			
999	0.50	0.009	3.0		65.6	66.1	65.5		11.63	11.65	11.55	
1000	0.12	0.01	3.9		65.2	66.2	65.0		12.35	12.41	12.28	

- Results visualization
Deterministic or derived from PSA dataset
 - ICERs
 - Cost-effectiveness plane
 - One-way and two-way sensitivity analysis
- Uncertainty analysis
Requires PSA dataset
 - Cost-effectiveness acceptability curve
 - Expected loss curves
 - Value of information analysis

Results visualization with dampack

- Cost-effectiveness table
 - Identification of dominated strategies
 - Calculation of incremental cost-effectiveness ratios (ICERs)

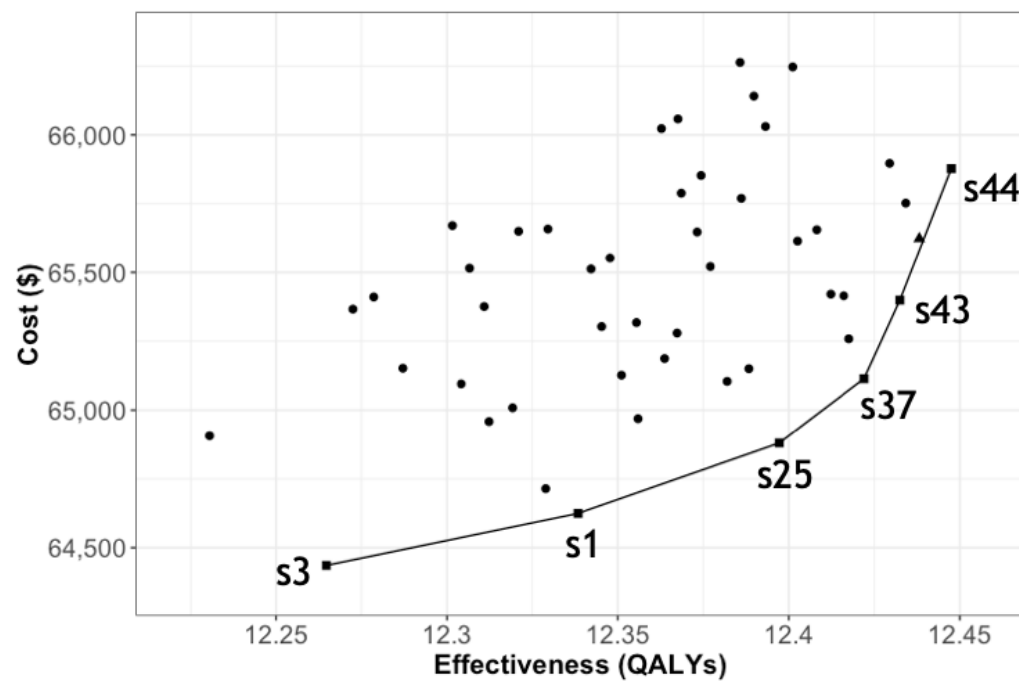
Strategy	Cost	Effect	Inc_Cost	Inc_Effect	ICER	Status
s3	64435	12.26	NA	NA	NA	ND
s1	64624	12.34	189	0.074	2567	ND
s25	64880	12.40	256	0.059	4347	ND
s37	65114	12.42	234	0.025	9426	ND
s43	65400	12.43	285	0.010	27232	ND
s44	65877	12.45	478	0.015	31822	ND
s38	65623	12.44	NA	NA	NA	ED
s27	64714	12.33	NA	NA	NA	D
s6	64906	12.23	NA	NA	NA	D
s9	64958	12.31	NA	NA	NA	D
s20	64960	12.26	NA	NA	NA	D

Strategies on the efficient frontier and associated ICERs

Dominated strategies and type of dominance

Results visualization with dampack

- Cost-effectiveness plane and efficient frontier



Run `calculate_icers()` to create a data object of class ICER.

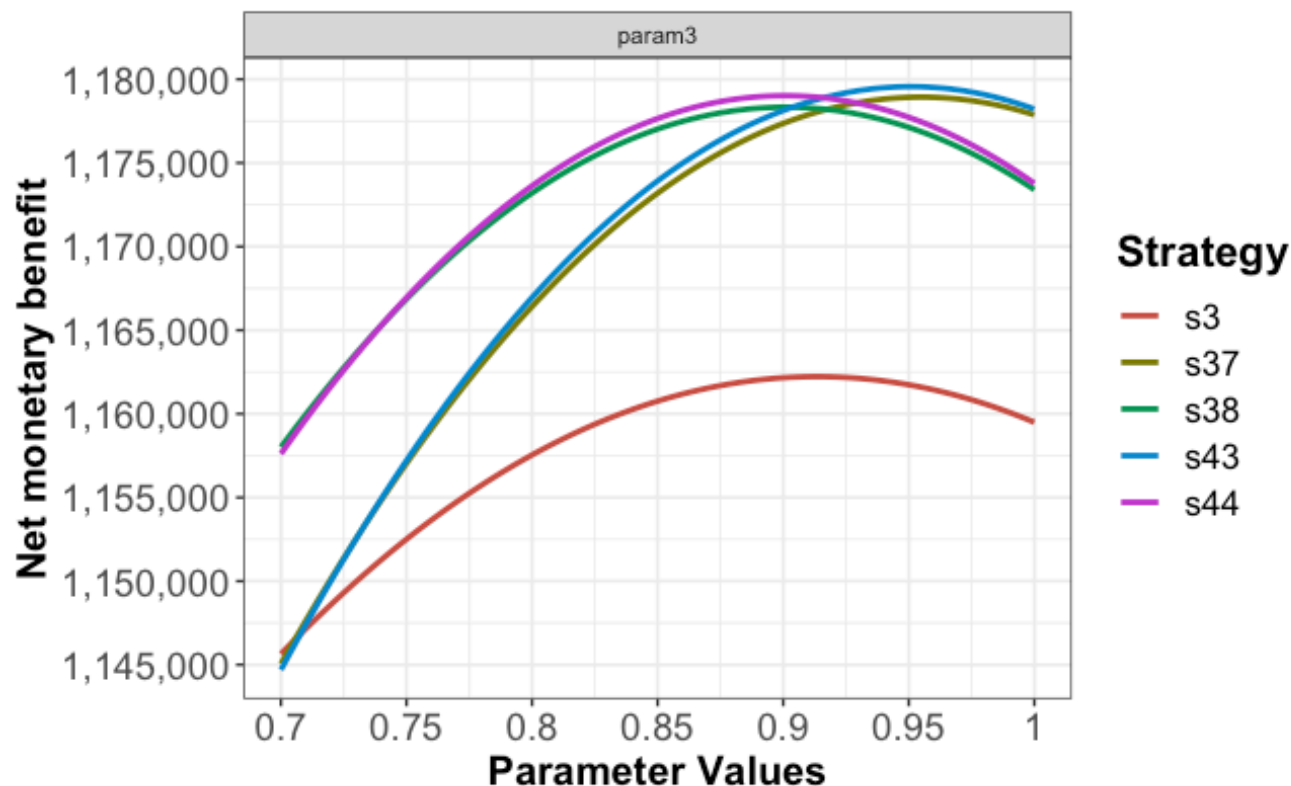
← Generated automatically by calling:
`plot(ICER object)`

Results visualization with dampack

- Deterministic sensitivity analyses
- Direct input from user
 - Table of outcomes for each strategy as parameters vary
- Derived from user-provided PSA dataset
 - Fit meta-model to PSA data
 - Reflects univariate and/or bivariate relationships between outcomes and parameters of interest

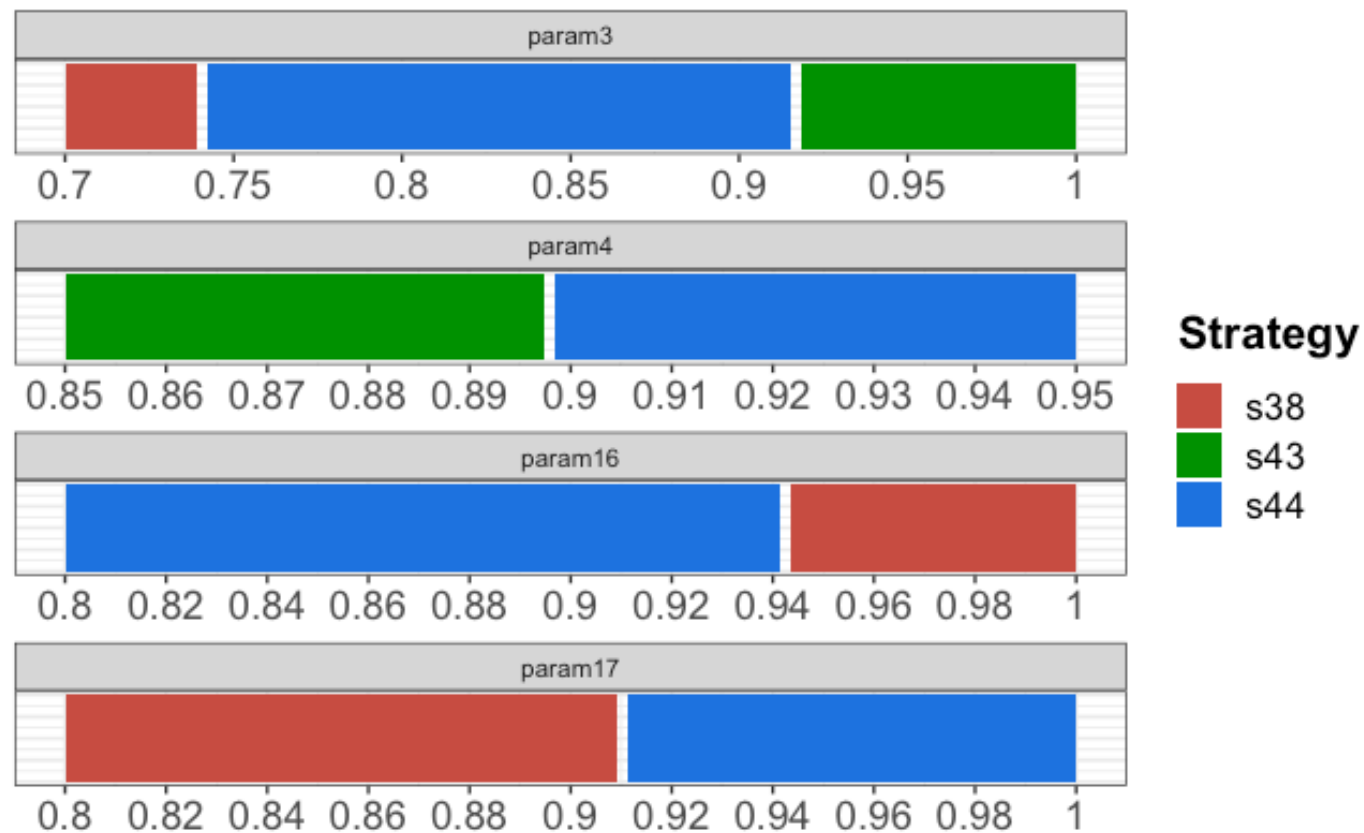
Results visualization with dampack

- Deterministic one-way sensitivity analyses



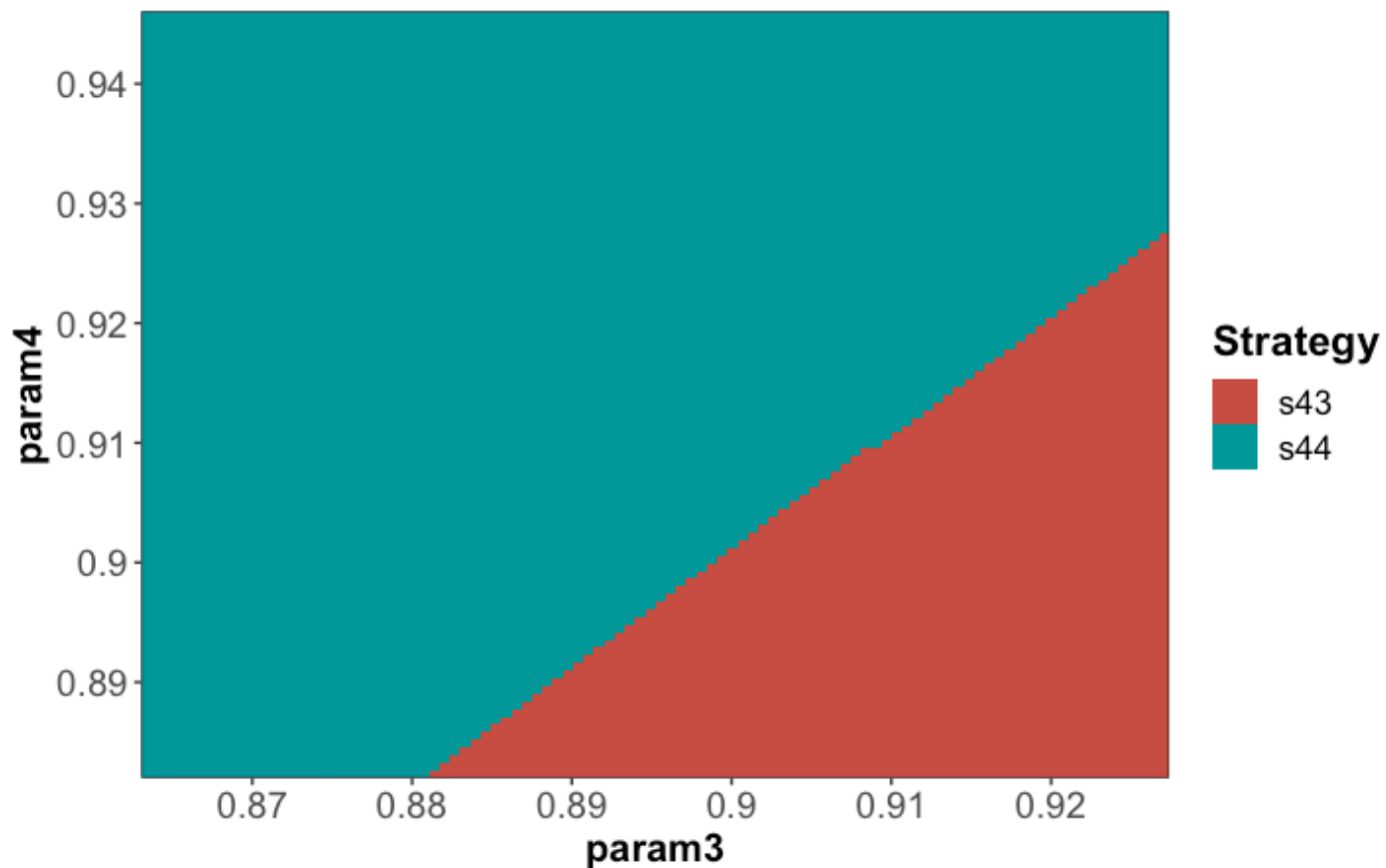
Results visualization with dampack

- Deterministic one-way sensitivity analyses



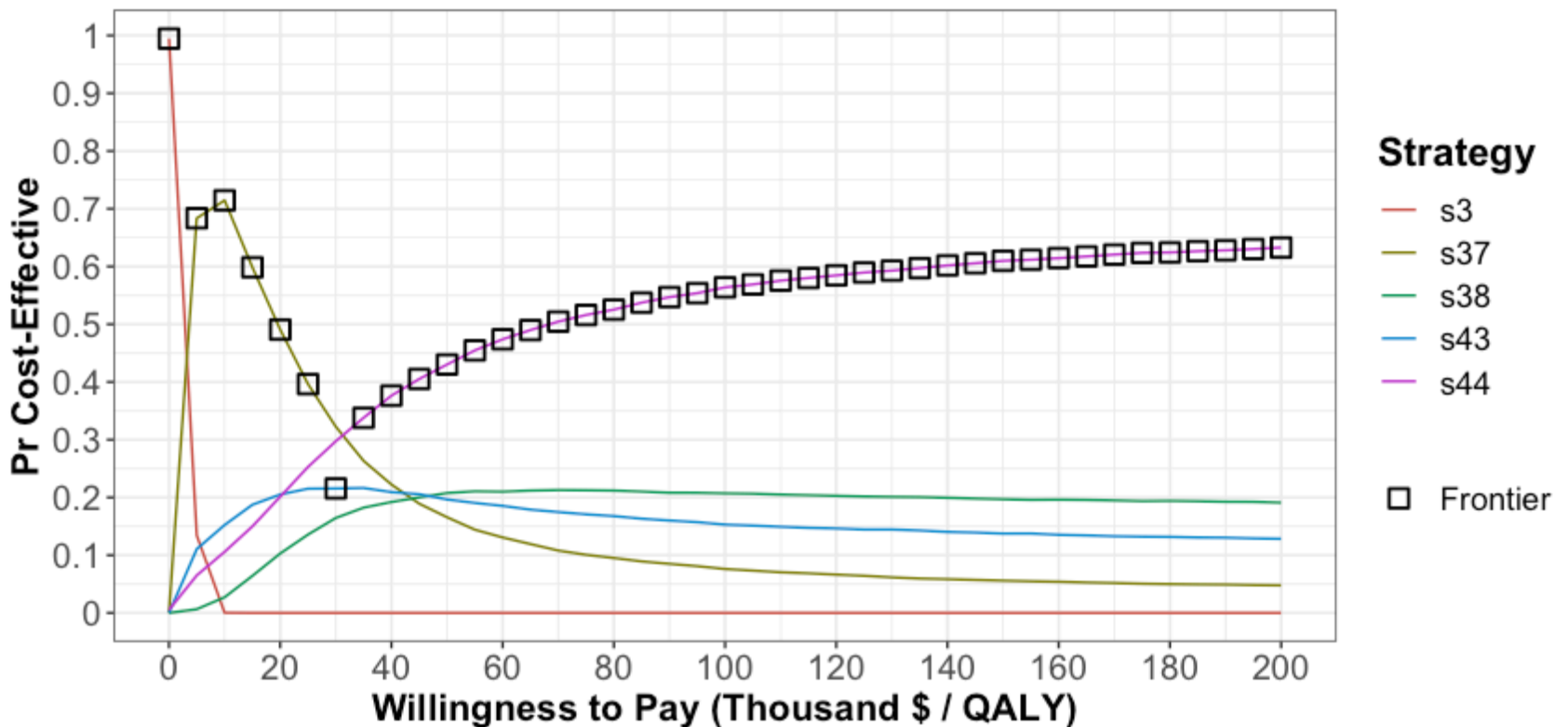
Results visualization with dampack

- Two-way sensitivity analyses



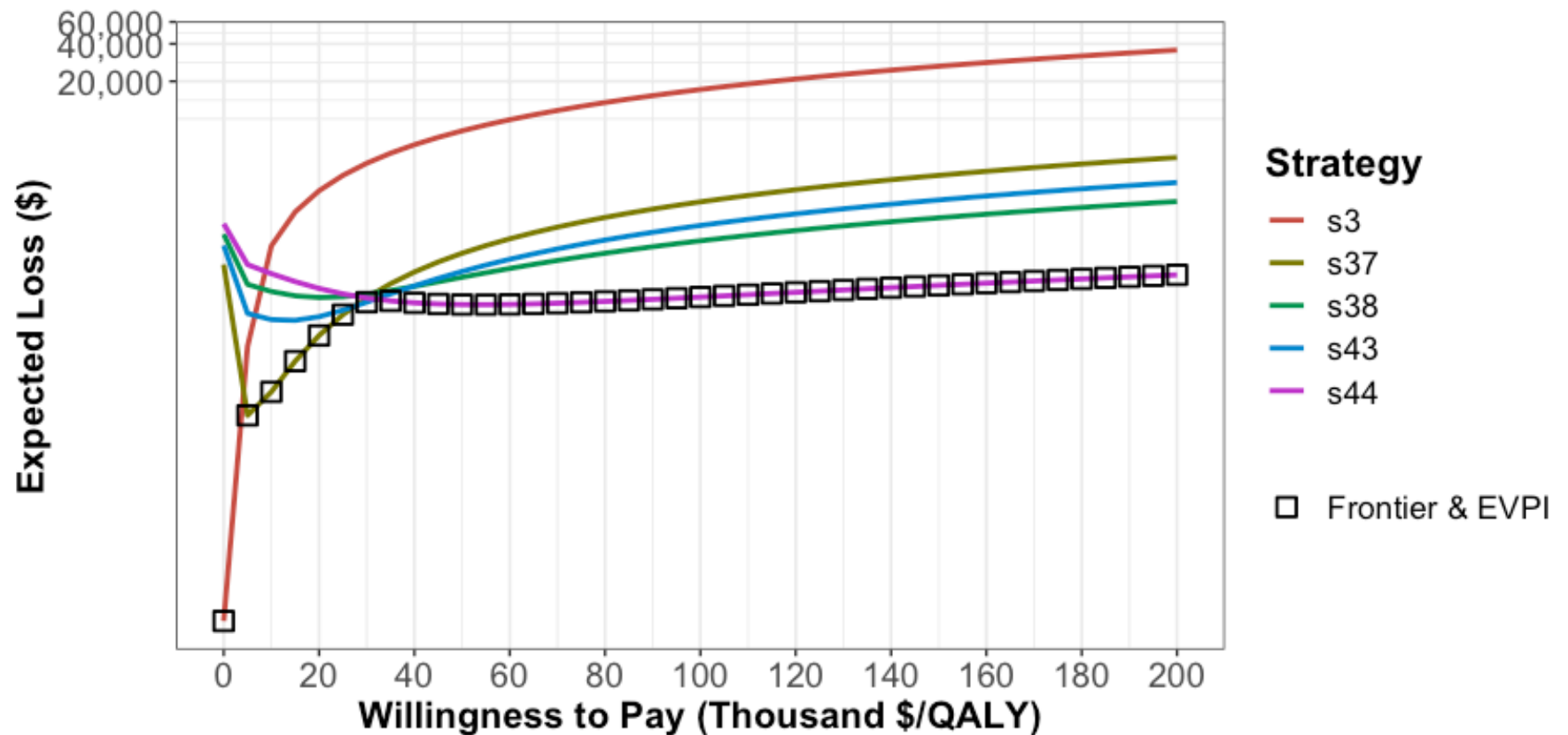
Uncertainty analysis with dampack

- Cost-effectiveness acceptability curve and frontier



Uncertainty analysis with dampack

- Expected loss curves and frontier



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