



Economic evaluation in clinical trials. You can do it with SAS.



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This is going to hurt

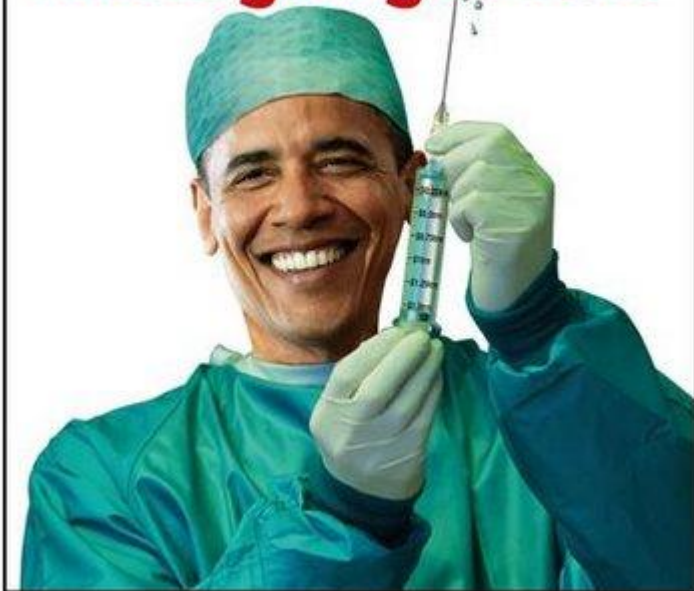




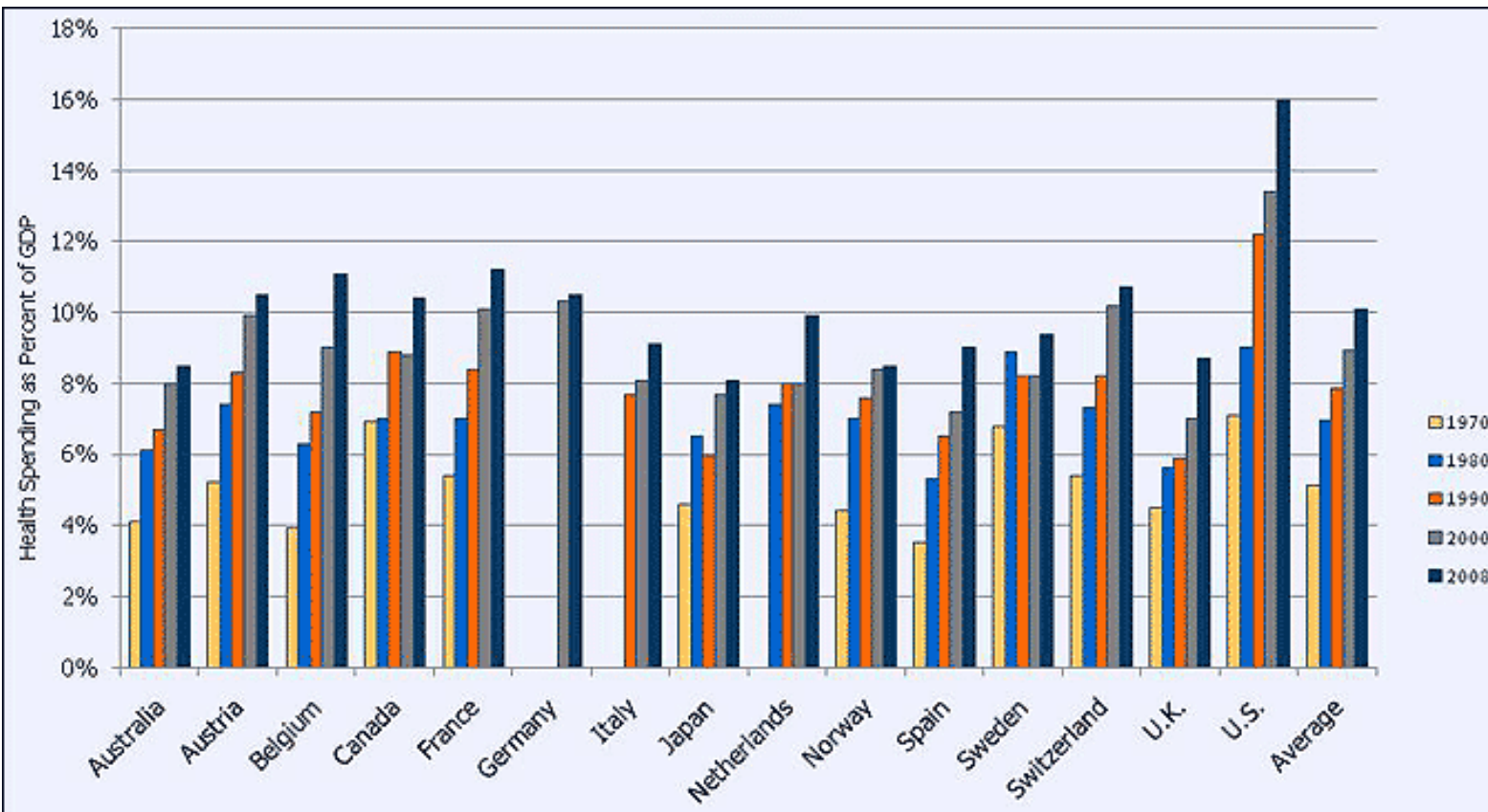
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Introduction to health economics



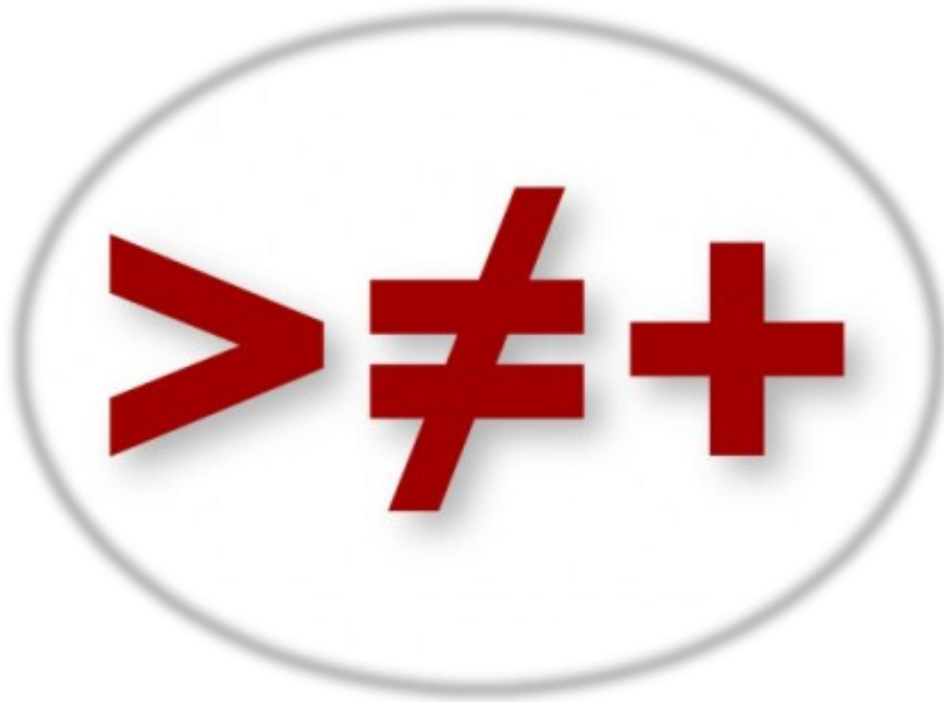
► Rising health care expenditures



Introduction to health economics



- ▶ **More** health care **expenditures** does **not** lead to **better** health



Introduction to health economics



- ▶ **Health economics** - not only efficacy and safety but also **justify the costs** of the new therapies





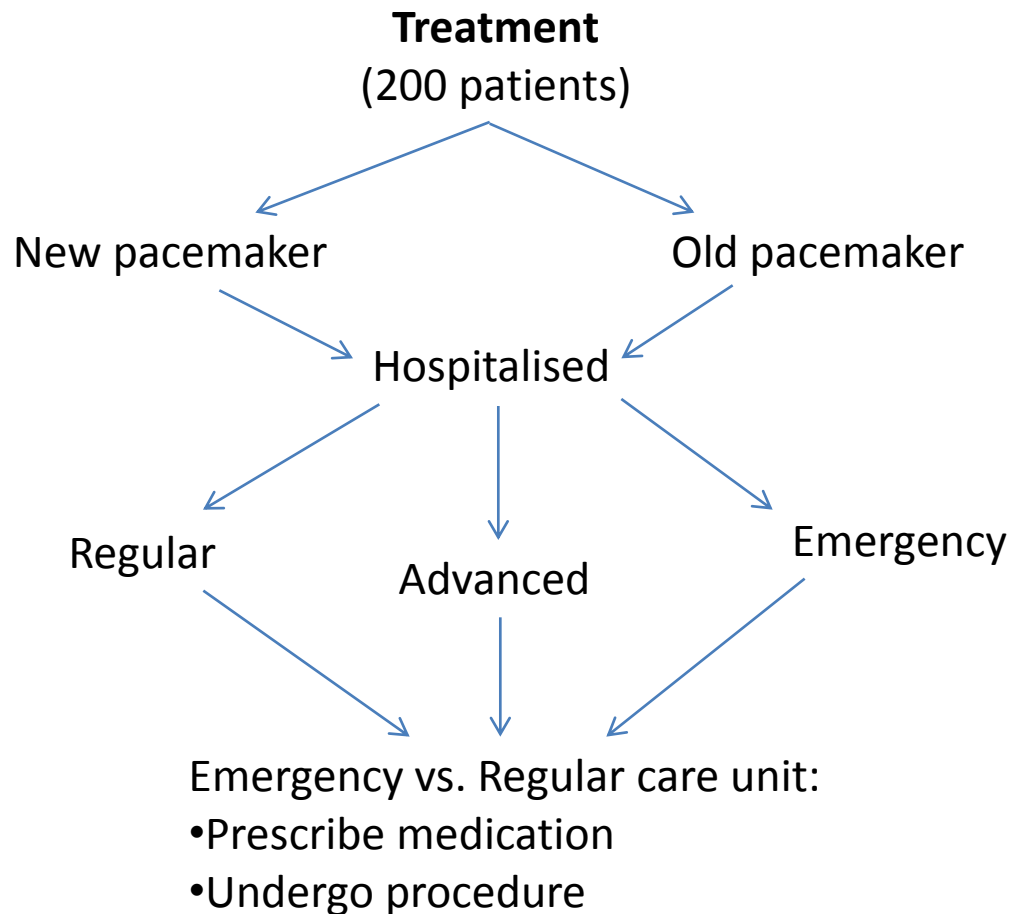
Economic Evaluation

- ▶ Cost Utility Analysis - comparing incremental **costs** and **effects** of a new drug with its best alternative:

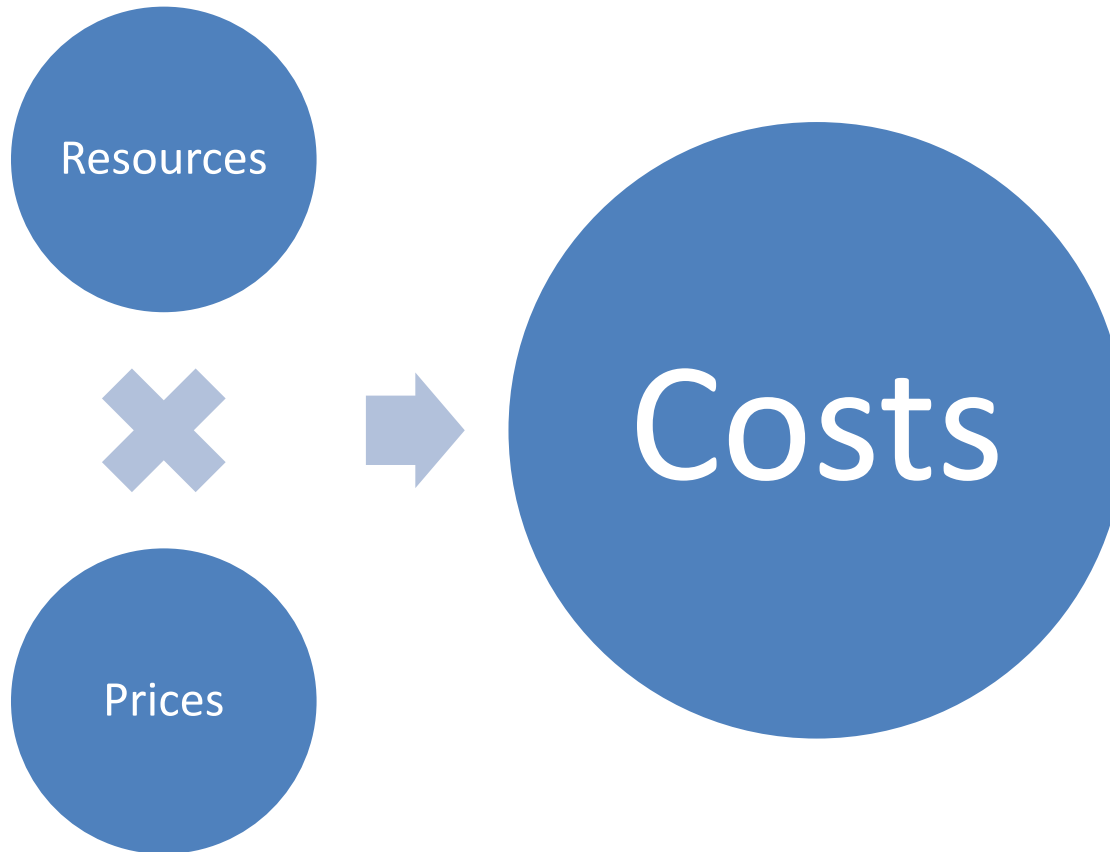
$$ICER = \frac{Costs_{treat} - Costs_{control}}{Effects_{treat} - Effects_{control}} = \frac{\Delta C}{\Delta Q}$$

- ▶ How much **more/less** you need **to pay** **for change in health** outcome

Economic Evaluation (example)



Costs of the drug



Costs of the drug





Measuring costs of the drug

- ▶ Resources: treatment, hospital days, care units, medications and procedures
- ▶ Data source –Hospitalisation (HO) and supplemental data for Hospitalisation (SUPPHO) SDTM domains
- ▶ HO:

STUDYID	DOMAIN	USUBJID	HOSEQ	HOTERM	HOSTDTC	HOENDTC	HODUR
PHUSE	HO	1	1	Hospitalization	2001-06-12	2001-06-15	3
PHUSE	HO	1	2	Hospitalization	2002-03-15	2002-03-18	3

- ▶ SUPPHO:

STUDYID	RDOMAIN	USUBJID	IDVAR	IDVARVAL	QNAM	QLABEL	QVAL
PHUSE	HO	1	HOSEQ	1	AEREFP	AE Reported This Episode	N
PHUSE	HO	1	HOSEQ	1	MEDSFL	Meds Prescribed	N
PHUSE	HO	1	HOSEQ	1	PROCFL	Procedures Performed	N
PHUSE	HO	1	HOSEQ	1	PROVNM	Provider Name	Advanced Hospital
PHUSE	HO	1	HOSEQ	1	SPUNCD	Specialized Unit Type	Emergency Unit
PHUSE	HO	1	HOSEQ	1	SPUNFL	Any Time in Spec. Unit	Y



Measuring costs of the drug

► Prices

	Hospital		
	Regular Hospital	Advanced Hospital	Emergency Hospital
Hospital Price	1000	2000	3000
Medication Price	712		
Procedure Price	2015		

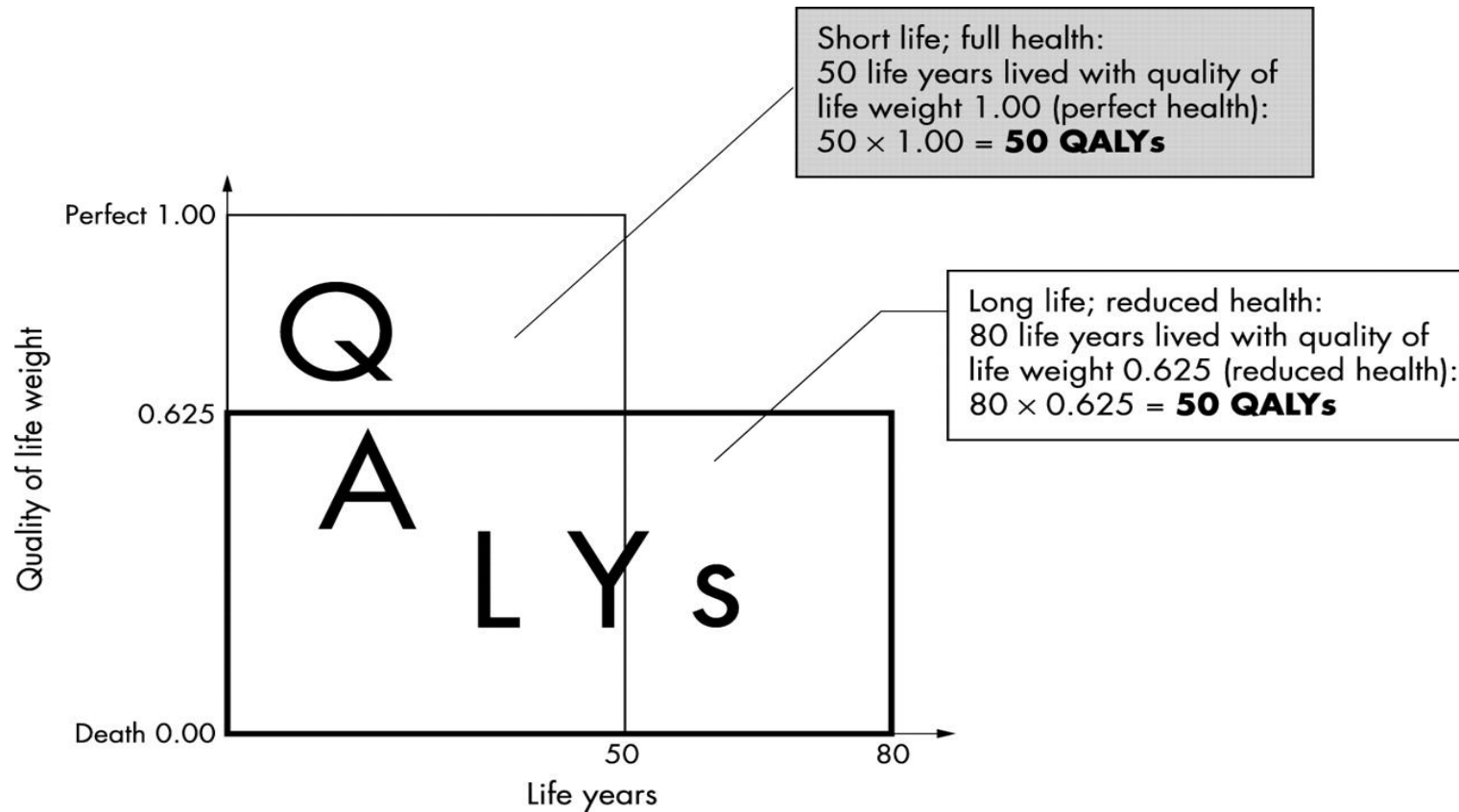
	Special Unit	
	Regular Unit	Emergency Unit
Special Unit Price	400	750

	Tretment	
	New Treatment	Old Treatment
Price	1500	2010

Effects of the drug



- ▶ Quality Adjusted Life Years (QALY)-generic measure of years lived after adjusting for the quality of life during that period





Measuring effects of the drug

► EQ-5D-3L

Mobility

I have no problems walking about	1
I have some problems walking about	2
I am confined to bed	3

Self-care

I have no problems with self-care	1
I have some problems with washing or dressing myself	2
I am unable to wash or dress myself	3

Usual activities (e.g. work, study, housework, family or leisure activities)

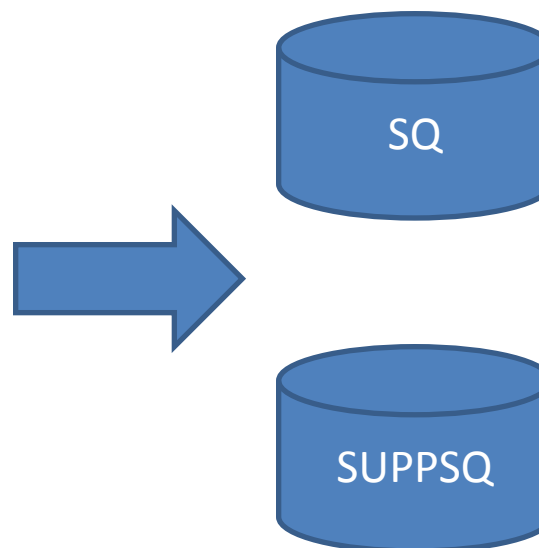
I have no problems with performing my usual activities	1
I have some problems with performing my usual activities	2
I am unable to perform my usual activities	3

Pain/discomfort

I have no pain or discomfort	1
I have moderate pain or discomfort	2
I have extreme pain or discomfort	3

Anxiety/depression

I am not anxious or depressed	1
I am moderately anxious or depressed	2
I am extremely anxious or depressed	3



Results



- ▶ Average effects:

ARMCD	mean_effect	std_effect	stdem_effect
New Drug	3.00267	0.1772582465	0.0177258247
Old Drug	0.97452	0.4773708611	0.0477370861

- ▶ Average costs:

ARMCD	mean_cost	std_cost	stdem_cost
New Drug	3820.74	1970.4482678	197.04482678
Old Drug	5281.46	2239.9963313	223.99963313

$$ICER = \frac{Costs_{treat} - Costs_{control}}{Effects_{treat} - Effects_{control}} = \frac{\Delta C}{\Delta Q}$$

- ▶ Difference in costs/effects and ICER:

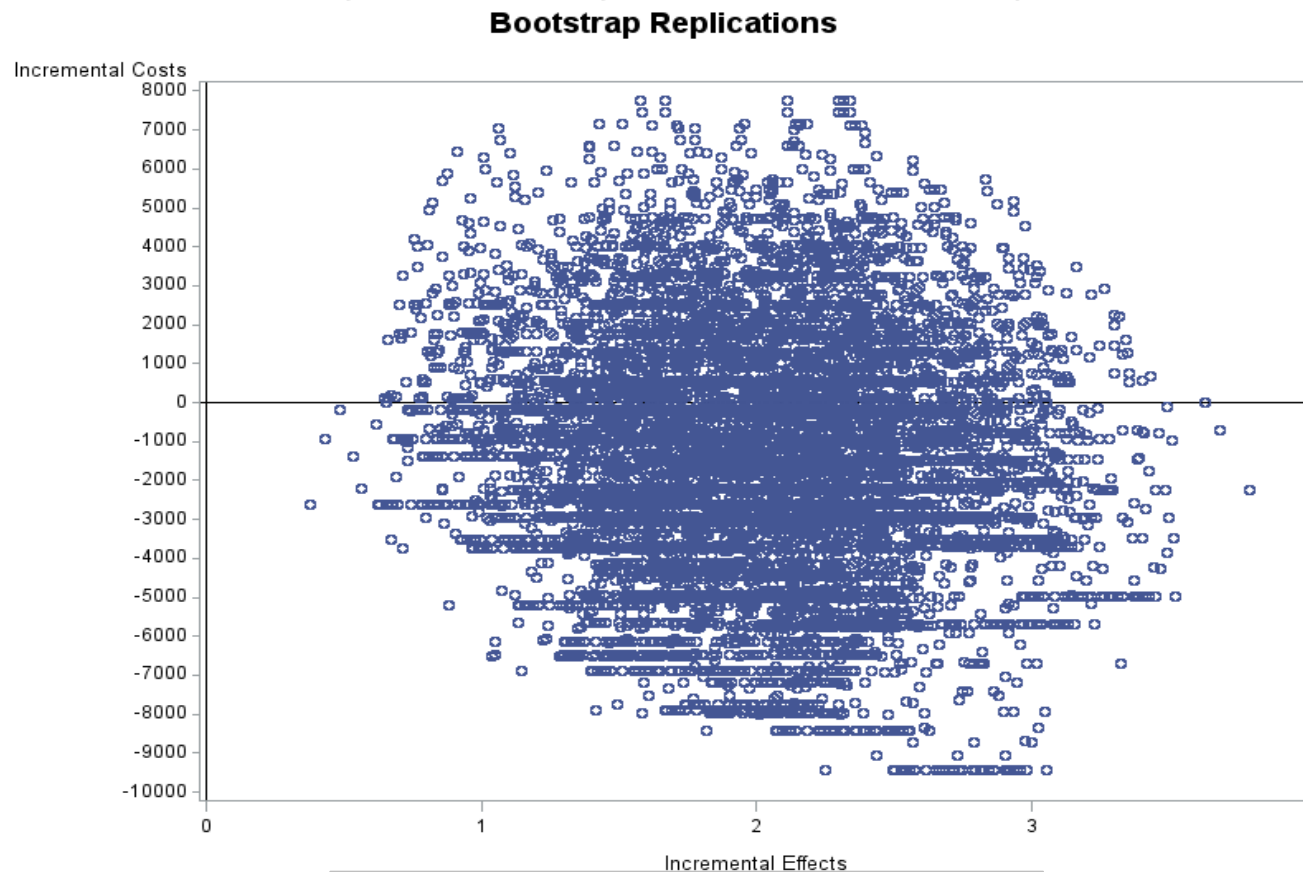
COSTDIF	EFETDIF	ICER
-1460.72	2.02815	-720.2228632

Sensitivity analysis



- ▶ Confidence Intervals
 - ▶ Non-parametric bootstrap to create N number of samples from the original sample
 - ▶ 2,5th and 97,5th percentiles represent the two-tailed 95% confidence interval

Sensitivity analysis(Example)

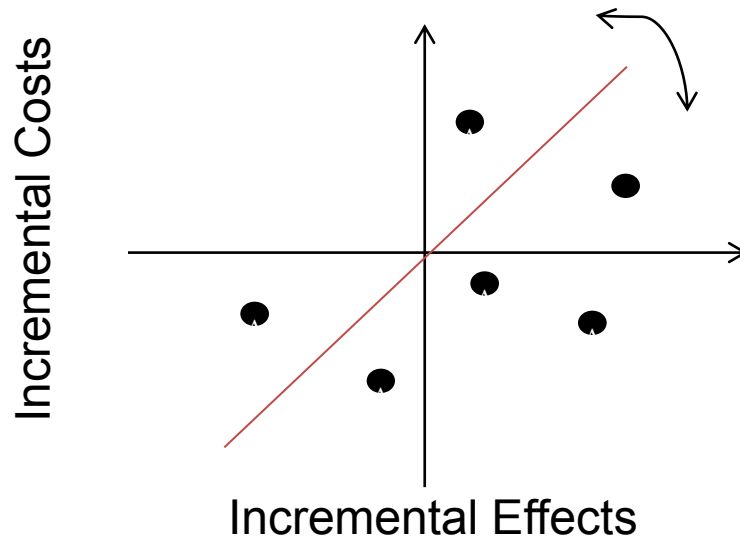


the mean, ICER	the 2.5000 percentile, ICER	the 97.5000 percentile, ICER
-712.9668681	-3822.064057	2593.0184805

Sensitivity analysis



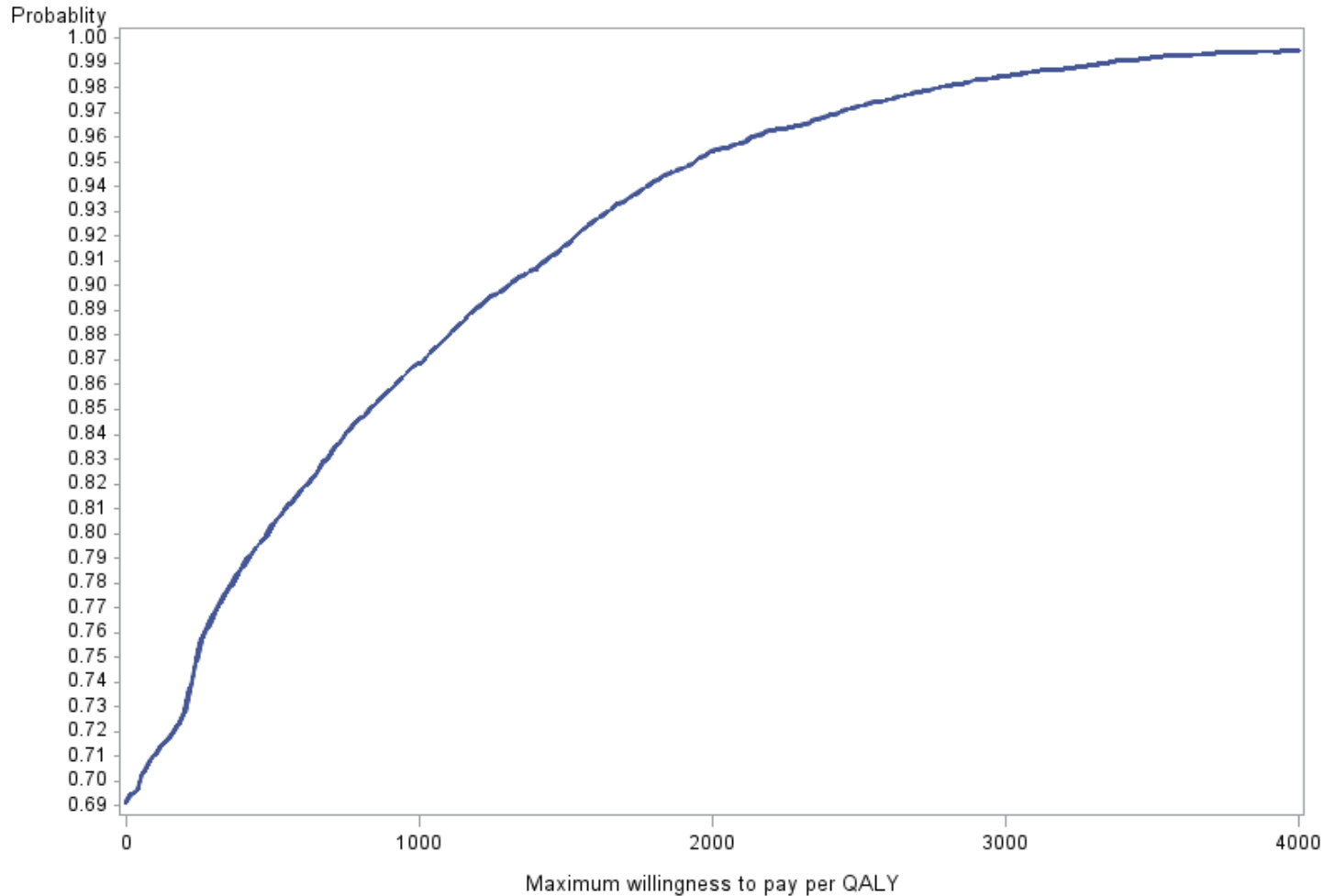
- ▶ Acceptability Curve-probability that the new treatment will be cost effective for an accepted amount of money the decision maker is willing to pay per additional QALY



Sensitivity analysis (example)



Acceptability Curve



Performance test



► Excel vs. SAS:

Iterations	Method	Software	Minutes	Percentage Change
10	Acceptabilty Curve	SAS	0:03	100%
	Acceptabilty Curve	Excel	0:06	
100	Acceptabilty Curve	SAS	0:05	20%
	Acceptabilty Curve	Excel	0:06	
10	Bootstrap	SAS	0:02	1550%
	Bootstrap	Excel	0:33	
100	Bootstrap	SAS	0:04	16150%
	Bootstrap	Excel	6:50	

Questions



- ▶ Thank you for your attention
- ▶ Visit our stand

