



@ Cancer Research UK Clinical Trials Unit
CRCTU

Integrated Quality Survival Product

Stata UK Meeting
12th September
Piers Gaunt

Cancer Trials

- ▶ **Generally measure Quality of Life (repeatedly over time) and Survival Data**
- ▶ **Need to combine both these measures together appropriately to understand impact of treatments/interventions**
- ▶ **Derive Quality-Adjusted Survival data, particularly important in Economic Evaluations**

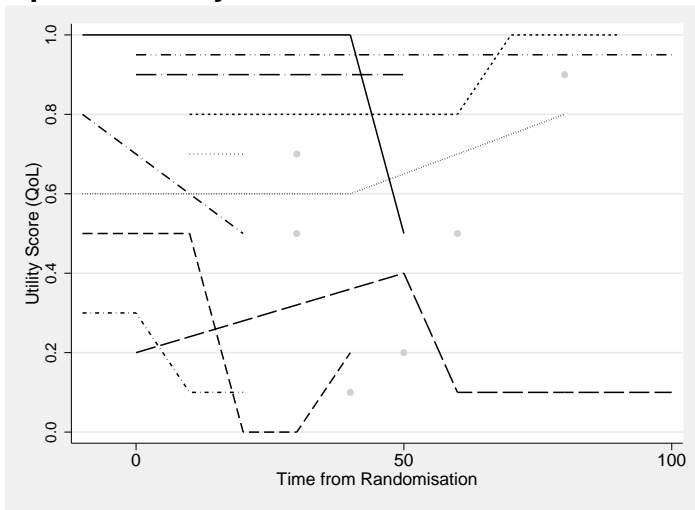
Integrated Quality-Survival Product

L J Billingham and K R Abrams
Simultaneous analysis of quality of life
and survival data
Stat Methods Med Res 2002; 11: 25-48

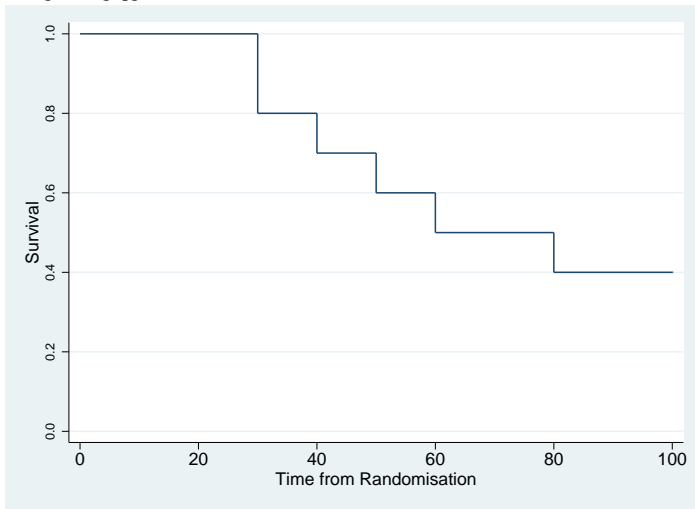
Simple methodology to combine longitudinal QoL
data with survival data at the group level.

$$QALY(x) = \int_0^x Q(t)S(t)dt \quad (1)$$

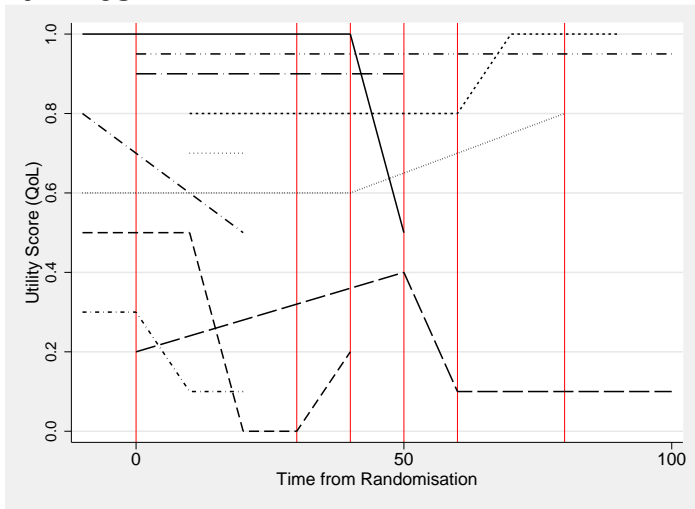
Example Summary QoL Data



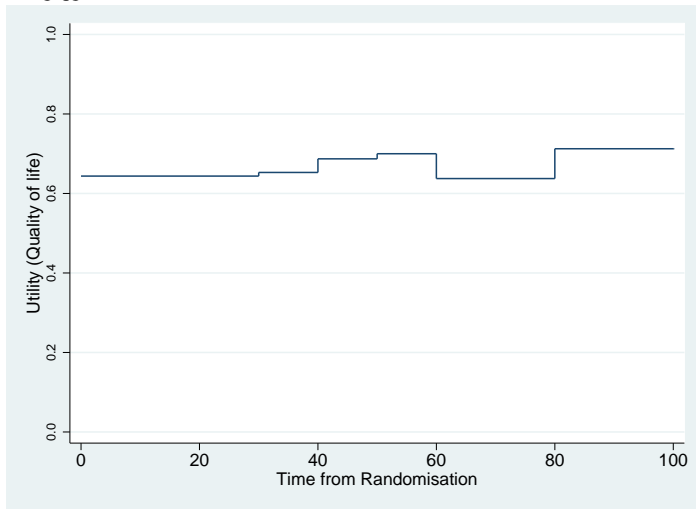
Survival Data



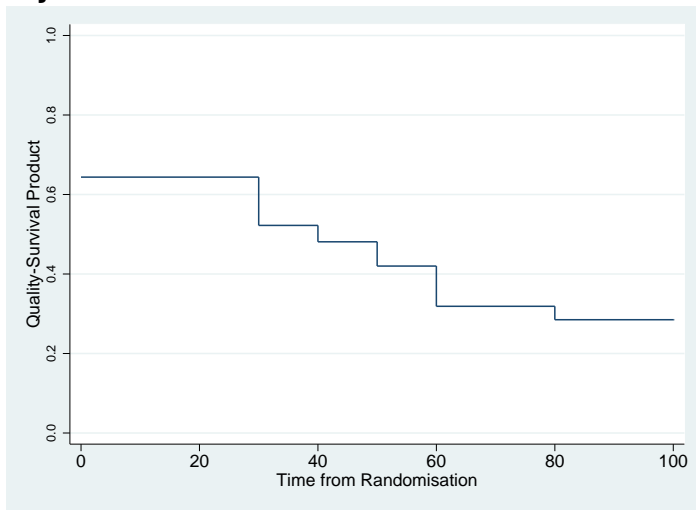
Event Times



QoL Data



Quality-Survival Product



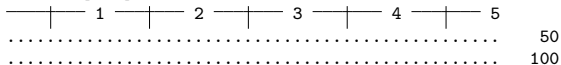
Integrated Quality Survival Product

- ▶ **Stata Program called stiqsp.**
 - ▶ **Data in long format and stset**
 - ▶ **Compulsory options**
 - ▶ **Requires specification of Patient Identifier variable, QoL variable, Time QoL measured variable**
 - ▶ **'Optional' options**
 - ▶ **by - e.g. treatment**
 - ▶ **cutoff - time duration**
 - ▶ **connection method**
 - ▶ **Also specify 3 'outfiles' for location of data, for storing results, bootstraps and graphical inputs**
 - ▶ **bootstrap reps, confidence interval**
 - ▶ **graphical options**

```
. stiqlsp, id(ID) qol(QOL) tqol(tQOL) reps(100) ///
>          outfile1(test1) outfile2(test2) outfile3(test3) cutoff(100)
```

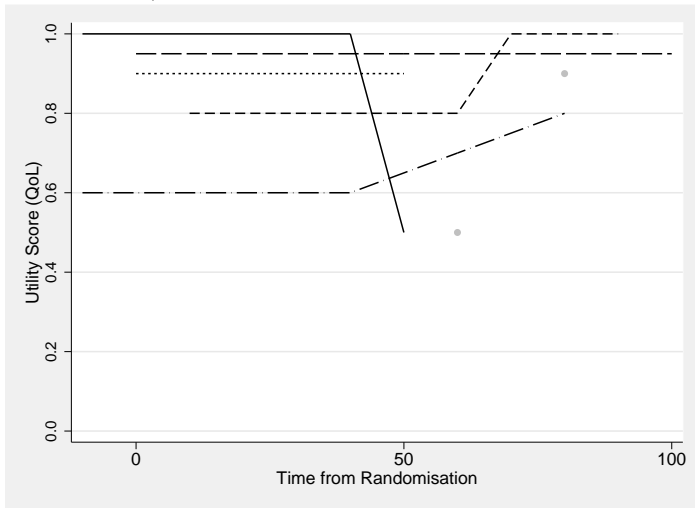
Results	QAL Time	Estimate
	QALD(100)	45.62036
	QALM(3.30)	1.498821
	QALY(0.30)	.1249017

Bootstrap replications: (100)

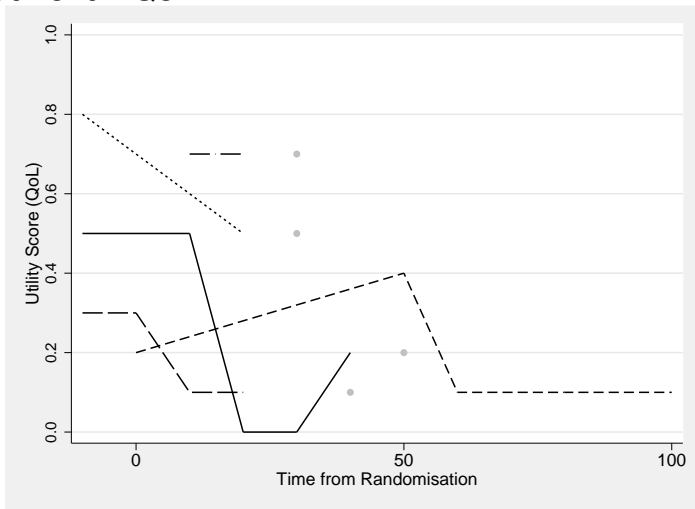


Bootstrap results	Mean	[95% Conf. Interval]	
	30.90746	-1.900864	63.71578
	1.01544	-.0624514	2.093332
	.08462	-.0052043	.1744443

Treatment 1 QoL



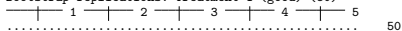
Treatment 2 QoL



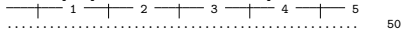
```
. stiqlsp, id(ID) qol(QOL) tqol(tQOL) by(TRTID) reps(50) ///
> outfile1(test1) outfile2(test2) outfile3(test3) cutoff(100)
```

Results	QAL Time	Estimate
Treatment 1 (good)	QALD(100)	75.81667
	QALM(3.30)	2.490897
	QALY(0.30)	.2075747
Treatment 2 (poor)	QALD(100)	18.83
	QALM(3.30)	.6186448
	QALY(0.30)	.0515537

Bootstrap replications: Treatment 1 (good) (50)

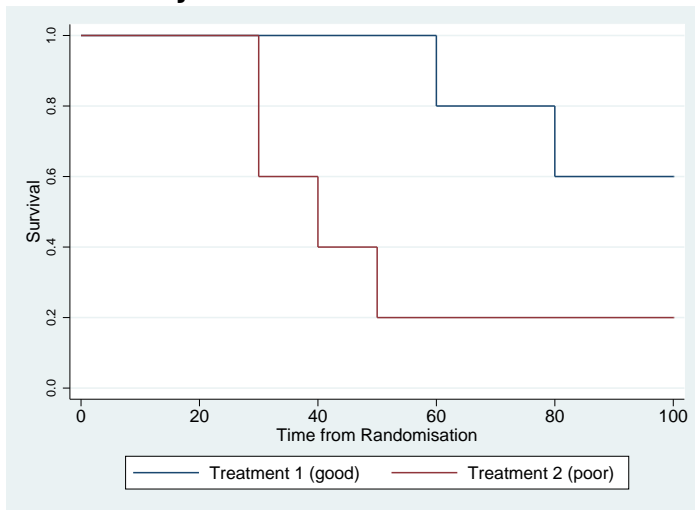


Bootstrap replications: Treatment 2 (poor) (50)

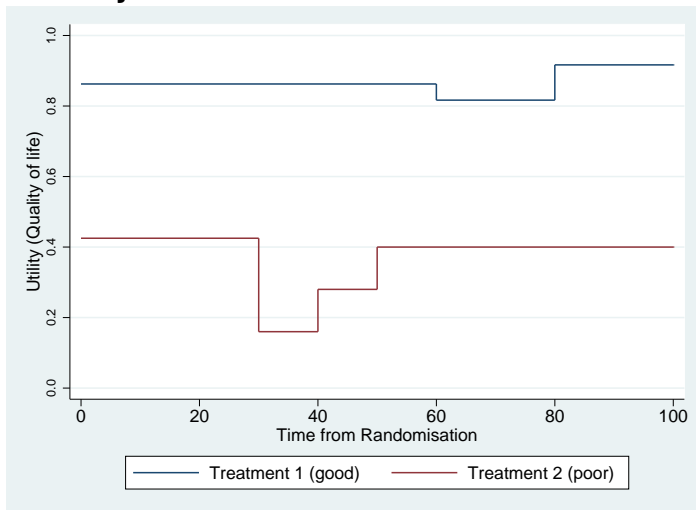


Bootstrap results	Mean	[95% Conf. Interval]	
Treatment 1 (good)	71.37293	41.31368	101.4322
	2.344901	1.357328	3.332474
	.1954084	.1131107	.2777062
Treatment 2 (poor)	4.202133	.1609812	8.243286
	.1380578	.0052889	.2708266
	.0115048	.0004407	.0225689

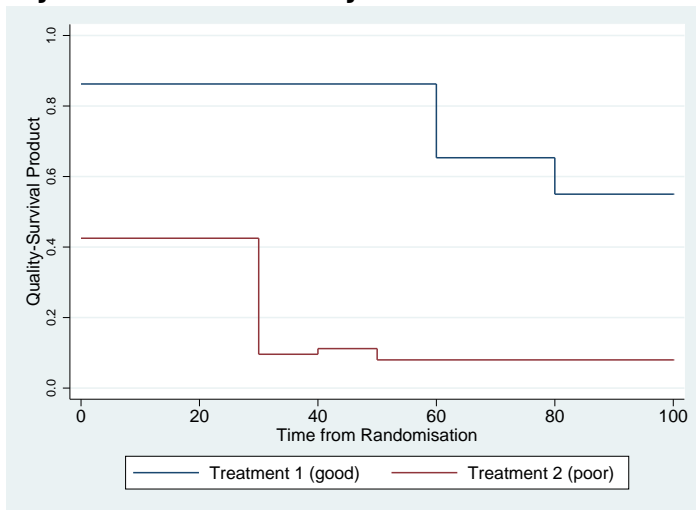
Survival Data by Treatment



QoL Data by Treatment



Quality-Survival Product by Treatment



Lung Cancer example

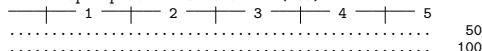
- ▶ 1363 patients (1236 deaths)
- ▶ All patients required to participate in the QoL study
- ▶ QoL measured frequently throughout treatment (every cycle) and End of Treatment.
- ▶ Also measured on follow up at 1 month intervals.
- ▶ Long format data.

Lung Cancer example

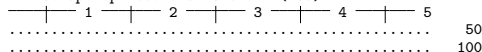
```
. stiqlsp, id(TNO) qol(UK_TT0) tqol(tQOLForm) by(TRT) reps(100) cutoff(365) ///
> prodgraphopts(leg(row(1))) ///
> qolgraphopts(leg(row(1))) ///
> survgraphopts(leg(row(1))) ///
> outfile1(LCdata1) outfile2(LCdata2) outfile3(LCdata3)
```

Results	QAL Time	Estimate
Chemo 1	QALD(365)	179.0527
	QALM(12.00)	5.882634
	QALY(1.00)	.4902195
Chemo 2	QALD(365)	162.8502
	QALM(12.00)	5.350315
	QALY(1.00)	.4458596
Chemo 3	QALD(365)	179.3569
	QALM(12.00)	5.892629
	QALY(1.00)	.4910524

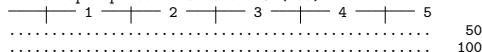
Bootstrap replications: Chemo 1 (100)



Bootstrap replications: Chemo 2 (100)

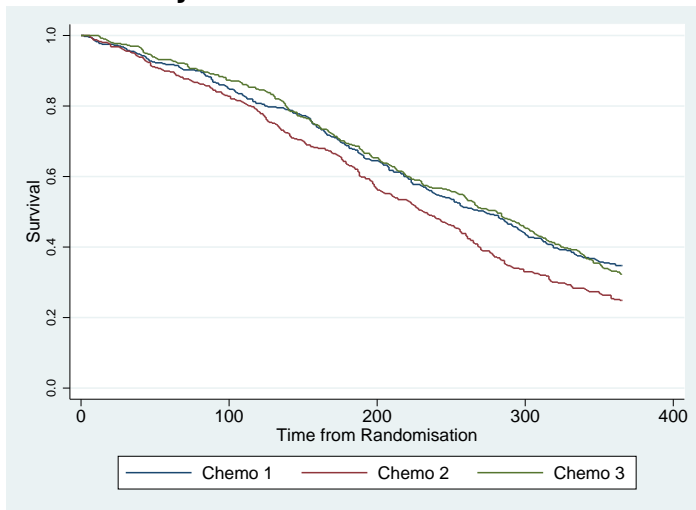


Bootstrap replications: Chemo 3 (100)

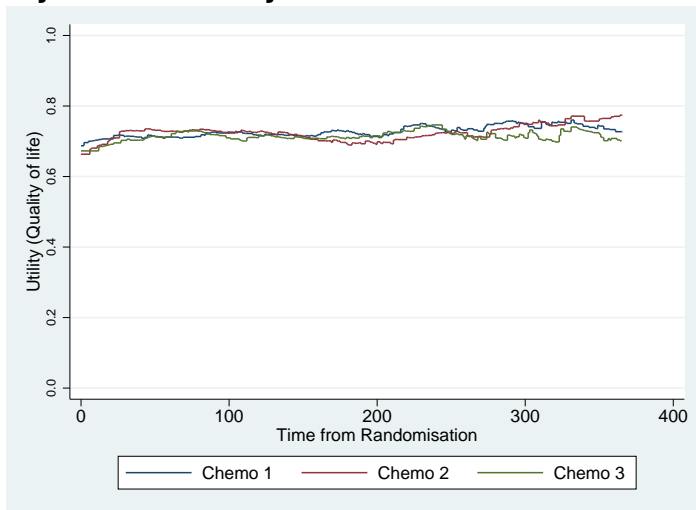


Bootstrap results	Mean	[95% Conf. Interval]	
Chemo 1	197.4722	188.8076	204.8092
	6.487795	6.203125	6.728844
	.5406495	.5169271	.560737
Chemo 2	167.4837	79.4655	231.5075
	5.502544	2.610776	7.605997
	.4585453	.2175647	.6338331
Chemo 3	208.8921	168.0427	258.4051
	6.862984	5.520911	8.489694
	.5719153	.4600759	.7074745

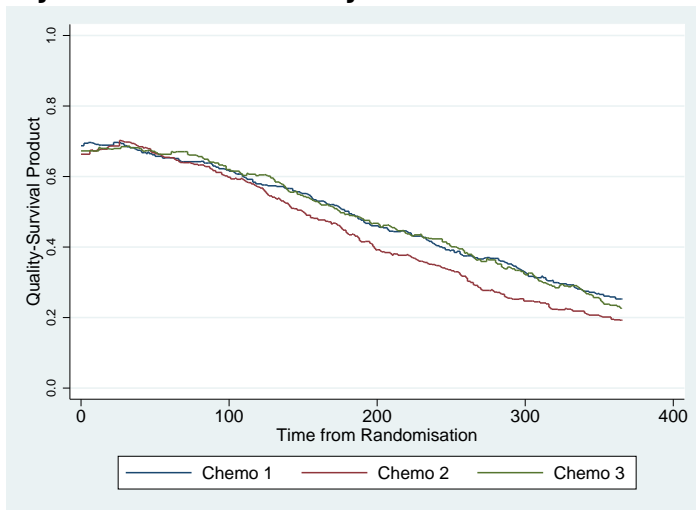
Survival Data by Treatment



Quality of Life Data by Treatment



Quality-Survival Product by Treatment



Future Work

- ▶ **Optimise (speed) and validate.**
- ▶ **Help file and Stata Journal submission**
- ▶ **Parametric approaches**
- ▶ **Provide more options and flexibility based on feedback.**