
```
log: /Users/baum/Desktop/Downloads/ec327surv.smcl
log type: smcl
opened on: 22 Apr 2007, 16:36:10
```

```
.
. // Example 1: Cox PH model, uncensored data
. webuse kva
(Generator experiment)

. // electrical generators' time to failure
. // at various levels of overload, with old (0) or new (1) style bearings
. l, sep(0)
```

	failtime	load	bearings
1.	100	15	0
2.	140	15	1
3.	97	20	0
4.	122	20	1
5.	84	25	0
6.	100	25	1
7.	54	30	0
8.	52	30	1
9.	40	35	0
10.	55	35	1
11.	22	40	0
12.	30	40	1

```
. stset failtime

failure event: (assumed to fail at time=failtime)
obs. time interval: (0, failtime]
exit on or before: failure
```

```
12 total obs.
0 exclusions
```

```
12 obs. remaining, representing
12 failures in single record/single failure data
896 total analysis time at risk, at risk from t = 0
earliest observed entry t = 0
last observed exit t = 140
```

```
. stcox load bearings
```

```
      failure _d: 1 (meaning all fail)  
analysis time _t: failtime
```

```
Iteration 0: log likelihood = -20.274897  
Iteration 1: log likelihood = -10.515114  
Iteration 2: log likelihood = -8.8700259  
Iteration 3: log likelihood = -8.5915211  
Iteration 4: log likelihood = -8.5778991  
Iteration 5: log likelihood = -8.577853  
Refining estimates:  
Iteration 0: log likelihood = -8.577853
```

```
Cox regression -- Breslow method for ties
```

```
No. of subjects =          12          Number of obs =          12  
No. of failures =          12  
Time at risk   =          896  
  
Log likelihood = -8.577853          LR chi2(2) =          23.39  
                                Prob > chi2 =          0.0000
```

_t	Haz. Ratio	Std. Err.	z	P> z	[95% Conf. Interval]
load	1.52647	.2188172	2.95	0.003	1.152576 2.021653
bearings	.0636433	.0746609	-2.35	0.019	.0063855 .6343223

```
. // controlling for overload, the new-style bearings reduce hazard  
. // (hazard ratio < 1) and lead to a longer survival time  
.   
.   
. // Example 2: Cox PH model, censored data  
. webuse drugtr, clear  
(Patient Survival in Drug Trial)  
  
. // Of the 48 cancer patients, 28 receive treatment (drug=1). Time to death  
. // is measured in months. studytime is the month of death or the last month  
. // observed, if right-censored. died=1 indicates patient deaths.  
. stset studytime, failure(died)  
  
      failure event: died != 0 & died < .  
obs. time interval: (0, studytime]  
exit on or before: failure
```

```

48 total obs.
0 exclusions

```

```

48 obs. remaining, representing
31 failures in single record/single failure data
744 total analysis time at risk, at risk from t = 0
      earliest observed entry t = 0
      last observed exit t = 39

```

```
. stcox drug age, basesurv(s) basehc(h)
```

```

      failure _d: died
analysis time _t: studytime

```

```

Iteration 0: log likelihood = -99.911448
Iteration 1: log likelihood = -83.551879
Iteration 2: log likelihood = -83.324009
Iteration 3: log likelihood = -83.323546
Refining estimates:
Iteration 0: log likelihood = -83.323546

```

```
Cox regression -- Breslow method for ties
```

```

No. of subjects =          48          Number of obs =          48
No. of failures =          31
Time at risk    =          744
Log likelihood  = -83.323546          LR chi2(2)    =          33.18
                                          Prob > chi2    =          0.0000

```

_t	Haz. Ratio	Std. Err.	z	P> z	[95% Conf. Interval]	
drug	.1048772	.0477017	-4.96	0.000	.0430057	.2557622
age	1.120325	.0417711	3.05	0.002	1.041375	1.20526

```

. // The drug results in a lower hazard (longer survival time) while older
. // patients are more likely to die.
. stcurve,survival at1(drug=0) at2(drug=1) saving(surv1,replace)
(file surv1.gph saved)

```

```

. graph display, ysize(7) xsize(9)

. graph export surv1.pdf, replace

. stcurve, hazard at1(drug=0) at2(drug=1) yscale(log) saving(surv2,replace)
(file surv2.gph saved)

. graph display, ysize(7) xsize(9)

. graph export surv2.pdf, replace

. // the smoothed log(hazard) functions are parallel given the PH model
.
. // Example 3: Cox PH model, discrete time-varying covariates
. webuse stan3, clear
(Heart transplant data)

. // 103 patients admitted to Stanford heart transplant program.
. // Two-thirds received a transplant. Some patients died while waiting
. // or left the program. Patients receiving transplants have two records
. // the second with posttran=1) so that covariate is time-varying.
. // surg indicates that the patient had had prior heart surgery.
. stset t1, failure(died) id(id)

           id:  id
failure event:  died != 0 & died < .
obs. time interval:  (t1[_n-1], t1]
exit on or before:  failure

```

```

172 total obs.
  0 exclusions

```

```

172 obs. remaining, representing
103 subjects
 75 failures in single failure-per-subject data
31938.1 total analysis time at risk, at risk from t =      0
                                     earliest observed entry t =      0
                                     last observed exit t =    1799

```

```

. stcox age posttran surgery year, basesurv(s)

```

```

failure _d:  died
analysis time _t:  t1
           id:  id

```

```

Iteration 0:  log likelihood = -298.31514
Iteration 1:  log likelihood = -289.7344
Iteration 2:  log likelihood = -289.53498
Iteration 3:  log likelihood = -289.53378
Iteration 4:  log likelihood = -289.53378
Refining estimates:
Iteration 0:  log likelihood = -289.53378

```

Cox regression -- Breslow method for ties

```
No. of subjects =      103          Number of obs =      172
No. of failures =       75
Time at risk   =    31938.1
Log likelihood =   -289.53378      LR chi2(4)      =    17.56
                                          Prob > chi2    =    0.0015
```

_t	Haz. Ratio	Std. Err.	z	P> z	[95% Conf. Interval]	
age	1.030224	.0143201	2.14	0.032	1.002536	1.058677
posttran	.9787243	.3032597	-0.07	0.945	.5332291	1.796416
surgery	.3738278	.163204	-2.25	0.024	.1588759	.8796
year	.8873107	.059808	-1.77	0.076	.7775022	1.012628

```
. // Older patients have higher hazards. Patients tend to do better over
. // time (year) and if they had had prior surgery. Whether a patient
. // receives a transplant does not significantly affect the hazard rate.
. stcoxkm, by(surgery) m(O O S T) msize(small small small small) saving(surv3,repla
> ce)
```

```
          failure _d:  died
          analysis time _t:  t1
                   id:  id
(file surv3.gph saved)

. graph display, ysize(7) xsize(9)

. graph export surv3.pdf, replace

.

. // Example 4: Weibull model, uncensored data
. webuse kva, clear
(Generator experiment)

. // electrical generators' time to failure
. streg load bearings, distribution(weibull)
```

```
          failure _d:  1 (meaning all fail)
          analysis time _t:  failtime
```

Fitting constant-only model:

```
Iteration 0:  log likelihood = -13.666193
Iteration 1:  log likelihood = -9.7427276
Iteration 2:  log likelihood = -9.4421169
Iteration 3:  log likelihood = -9.4408287
Iteration 4:  log likelihood = -9.4408286
```

Fitting full model:

```

Iteration 0: log likelihood = -9.4408286
Iteration 1: log likelihood = -2.078323
Iteration 2: log likelihood = 5.2226016
Iteration 3: log likelihood = 5.6745808
Iteration 4: log likelihood = 5.6934031
Iteration 5: log likelihood = 5.6934189
Iteration 6: log likelihood = 5.6934189

```

Weibull regression -- log relative-hazard form

```

No. of subjects = 12          Number of obs = 12
No. of failures = 12
Time at risk = 896
LR chi2(2) = 30.27
Log likelihood = 5.6934189    Prob > chi2 = 0.0000

```

_t	Haz. Ratio	Std. Err.	z	P> z	[95% Conf. Interval]	
load	1.599315	.1883807	3.99	0.000	1.269616	2.014631
bearings	.1887995	.1312109	-2.40	0.016	.0483546	.7371644
/ln_p	2.051552	.2317074	8.85	0.000	1.597414	2.505691
p	7.779969	1.802677			4.940241	12.25202
1/p	.1285352	.0297826			.0816192	.2024193

```

. // relative to the Cox PH model estimated above, the parametric model's
. // estimate of p >1 means that the hazard of failure increases
. // (dramatically) with time.
. predict time, time
(option median time assumed; predicted median time)

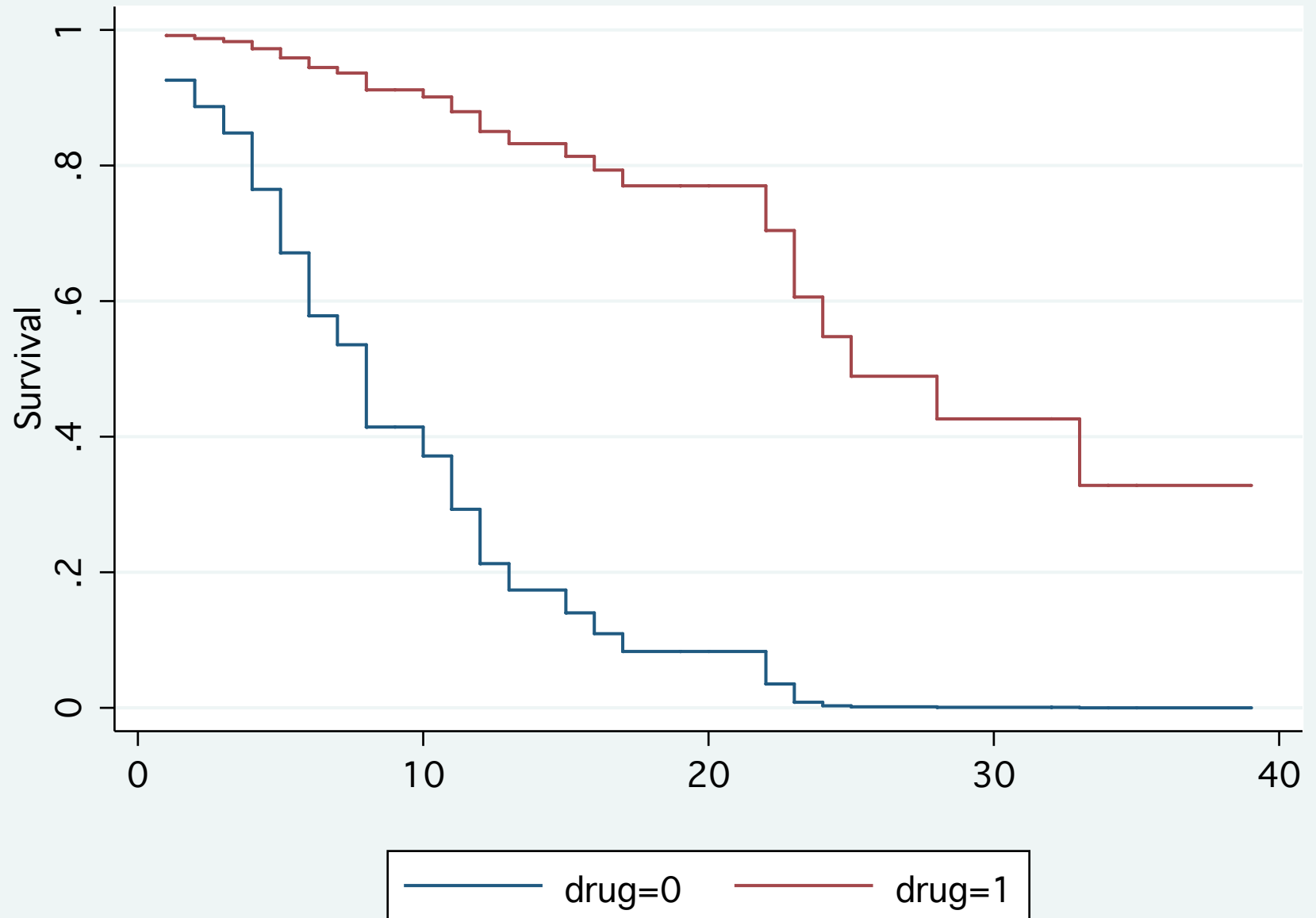
. // display predicted median time to failure and actual survival time
. l failtime time, sep(0)

```

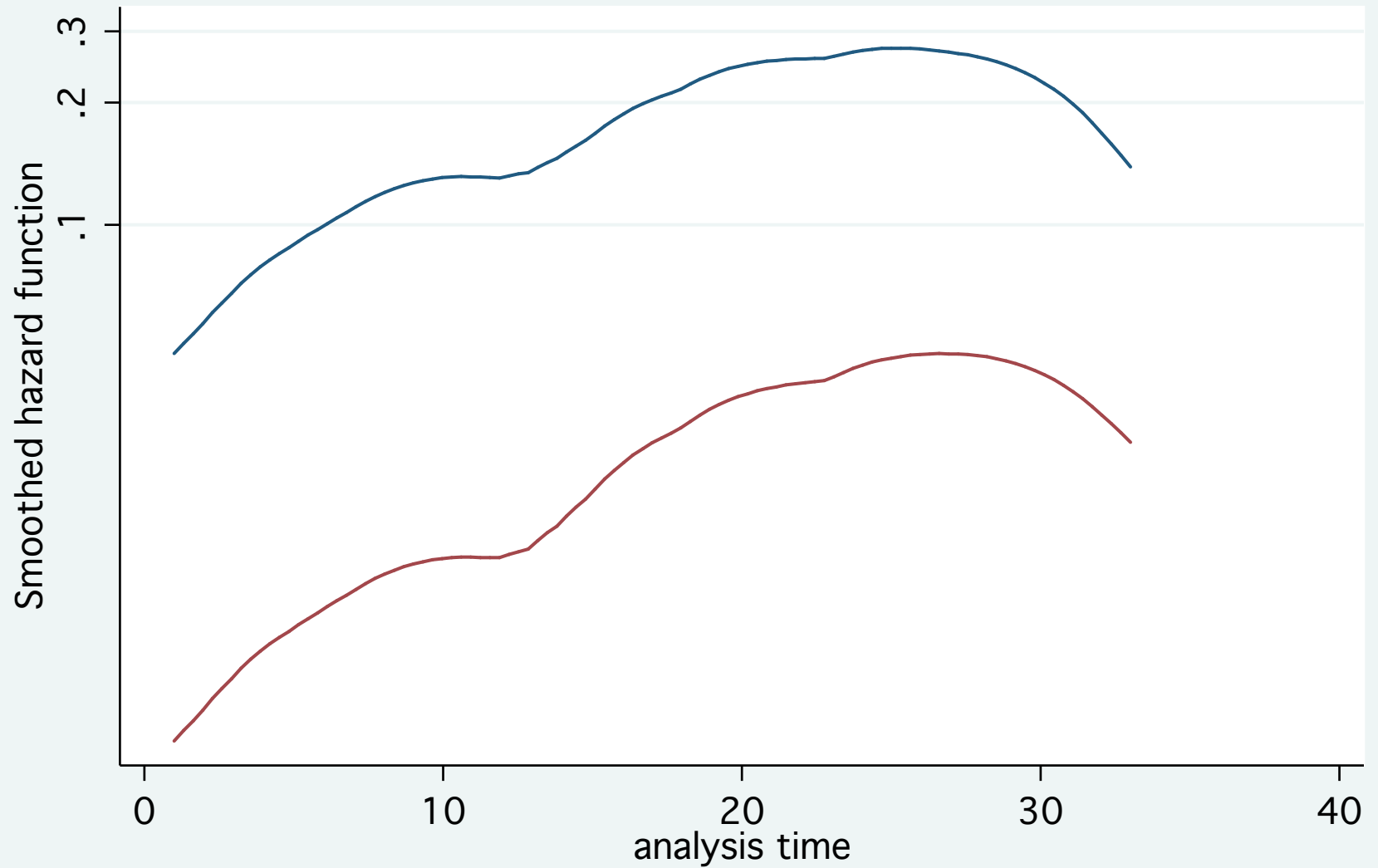
	failtime	time
1.	100	127.5586
2.	140	158.0407
3.	97	94.32922
4.	122	116.8707
5.	84	69.75619
6.	100	86.42554
7.	54	51.5845
8.	52	63.91145
9.	40	38.1466
10.	55	47.26233
11.	22	28.2093
12.	30	34.95036

.
. log close
 log: /Users/baum/Desktop/Downloads/ec327surv.smcl
 log type: smcl
closed on: 22 Apr 2007, 16:36:24

Cox proportional hazards regression



Cox proportional hazards regression



— drug=0 — drug=1

