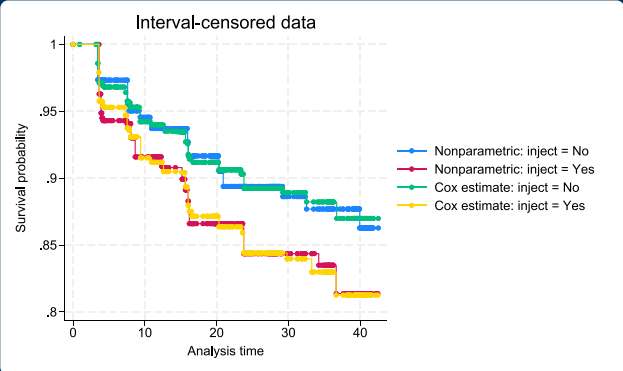


Interval-censored Cox model

- Genuine semiparametric modeling
- Left-censoring, right-censoring, interval-censoring
- Current-status and general interval-censored data
- Single- or multiple-record data **New**
- Stratified estimation
- Time-varying covariates **New**
- Two estimators for baseline hazard
- Robust and cluster—robust standard errors **New**
- Graphs of survivor, cumulative hazard, and hazard functions
- Residual diagnostics
- Graphical checks of proportional-hazards assumption
- Graphical checks of goodness of fit **New**



Do you know the exact failure times or event times?

You can fit the Cox proportional hazards model in Stata even if you don't.

Fit the model

The Cox proportional hazards model is widely used with right-censored event-time data because it does not require parameterization of the baseline hazard function and, under the proportional-hazards assumption, the hazard ratios are constant over time.

If we know the exact failure times, we can fit a Cox proportional hazards model using the `stcox` command. For instance, we can type

```
. stcox age_mean i.inject
```

to study the effect of mean age and injection status on failure times.

It is just as easy to fit a Cox proportional hazards model with interval-censored data, where we know only that the failure occurred sometime between two time points. With a single-record-per-subject data, we specify the variables containing the upper and lower endpoints for the failure time in `stintcox`'s `interval()` option.

```
. stintcox age_mean i.inject, interval(ltime rtime)
```

Viewer - view stintcox1.smcl

view stintcox1.smcl x

```

+
. stintcox age_mean i.inject, interval(ltime rtime)
note: using adaptive step size to compute derivatives.

Performing EM optimization (showing every 100 iterations):
Iteration 0:  Log likelihood = -1086.2564
Iteration 100: Log likelihood = -601.62673
Iteration 200: Log likelihood = -601.54523
Iteration 299: Log likelihood = -601.53336

Computing standard errors: ..... done

Interval-censored Cox regression          Number of obs   = 1,124
Baseline hazard: Reduced intervals       Uncensored      = 0
                                          Left-censored   = 41
                                          Right-censored  = 991
                                          Interval-cens.  = 92

Event-time interval:
  Lower endpoint: ltime
  Upper endpoint: rtime

Wald chi2(2) = 11.18
Prob > chi2  = 0.0037

Log likelihood = -601.53336
    
```

	Haz. ratio	OPG std. err.	z	P> z	[95% conf. interval]
age_mean	.9657816	.0124711	-2.70	0.007	.9416454 .9905365
inject Yes	1.590116	.2847623	2.59	0.010	1.11942 2.25873

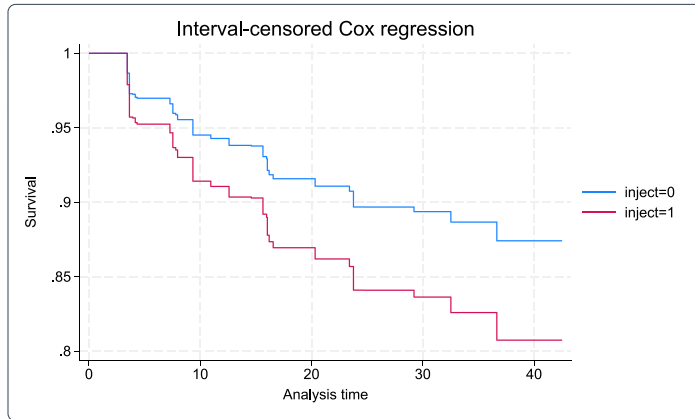
Note: Standard error estimates may be [more variable](#) for small datasets and datasets with low proportions of interval-censored observations.

CAP NUM INS

Graph the results

Use **stcurve** to plot the survivor, hazard, or cumulative hazard function.

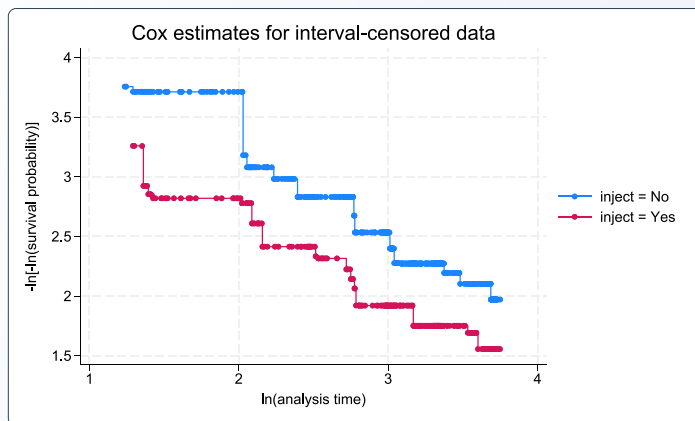
```
. stcurve, survival at(inject = (0 1))
```



Check the proportional-hazards assumption

We can assess the proportional-hazards assumption graphically using the **stintphplot** command.

```
. stintphplot, interval(ltime rtime) by(inject) adjustfor(age_mean)
```

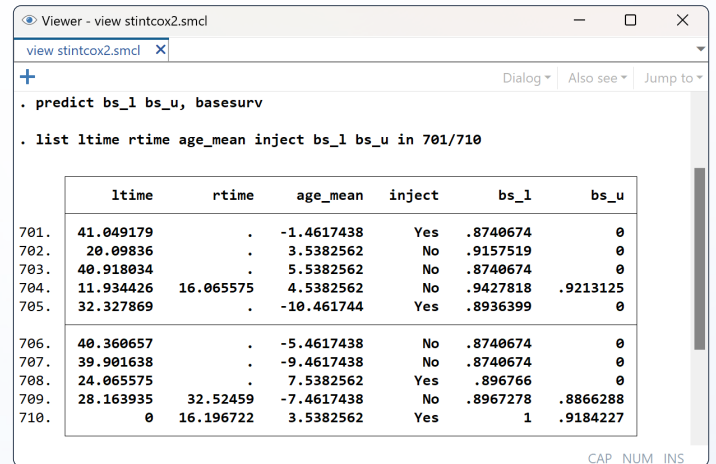


Or we can test this assumption when fitting the model. Specify the **tvco** option to interact covariates with time, and test for coefficients of time-interacted covariates equal to zero.

```
. stintcox age_mean i.inject, interval(ltime rtime) tvco(age_mean i.inject)
```

Predict baseline survivor function

For each individual, we can predict the baseline survivor functions corresponding to the lower and upper endpoints of our interval.



Type or point and click

stintcox - Cox proportional hazards model for interval-censored survival-time data dialog box. The dialog box allows users to specify data specification, independent variables, and options for the model.

Model: if/in Time varying SE/Robust Reporting EM options

Data specification

Single-record-per-subject specification

Lower endpoint of event-time interval: ltime Upper endpoint of event-time interval: rtime

Multiple-record-per-subject specification

Multiple-record ID variable: Examination time variable: Event status indicator variable:

Independent variables: (optional)

age_mean i.inject

Options

Strata variables:

Baseline hazard estimation

Use reduced set of time intervals Use all time intervals

Accuracy versus speed

Favor accuracy of results over speed Favor speed with possible reduced accuracy of results

Impute time-dependent covariates (if detected) between examination times using:

Nearest examination time on the left

Keep observations with system missing event status during estimation

Buttons: ? C OK Cancel Submit