Presentation 12-04

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Introduction

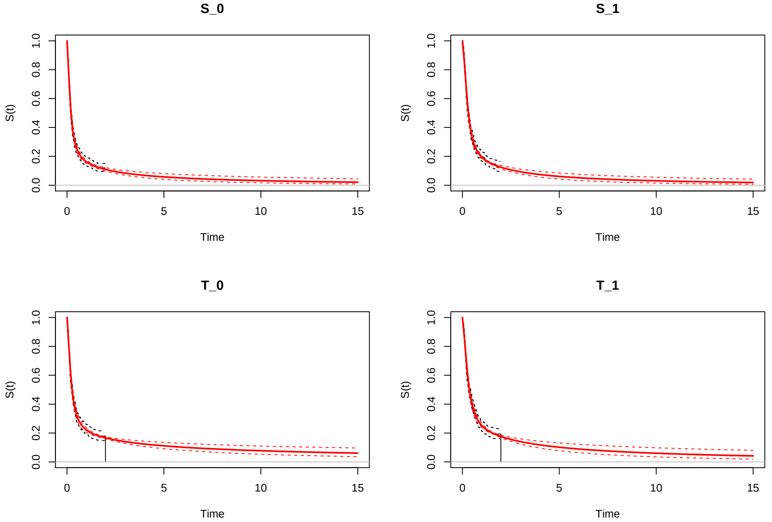
- Interval censoring versus right censoring in Ovarian data set:
  - Goodness of fit
  - Sensitivity analysis
- Gaussian copula model adapted for $Pr(PFS = OS) > 0$
  - Analysis of Ovarian data set with this adapted model

Section 1

Interval vs. Right Censoring

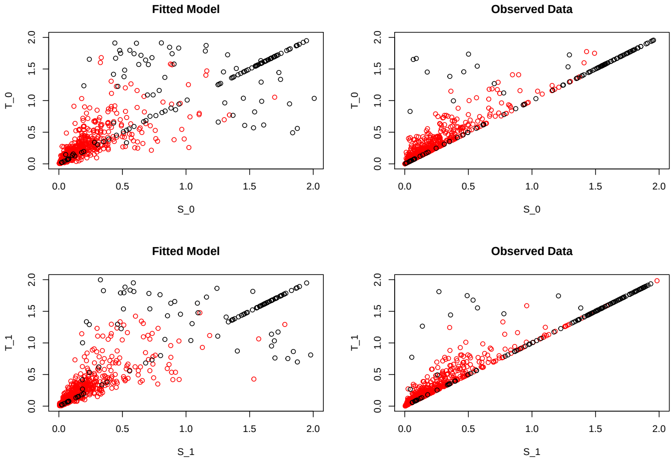
Goodness of Fit (Right Censoring)

- Very long survival for small subgroup



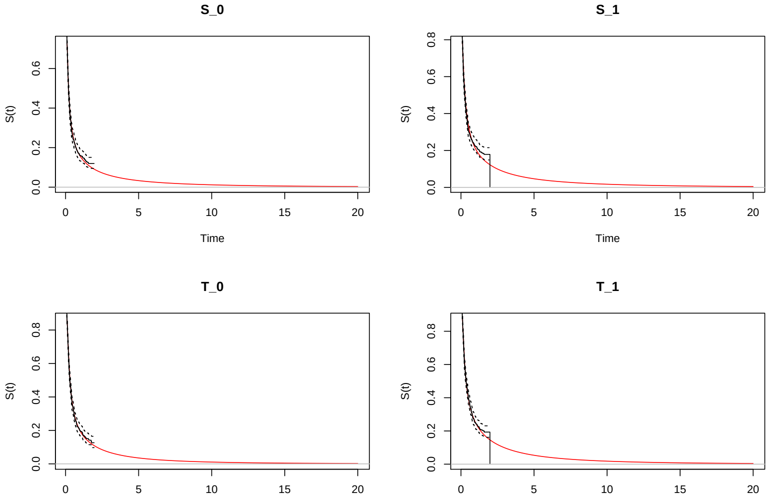
Goodness of Fit (Right Censoring)

- Sample from fitted models
  - censoring times sampled from corresponding estimated distribution
- Lack of fit



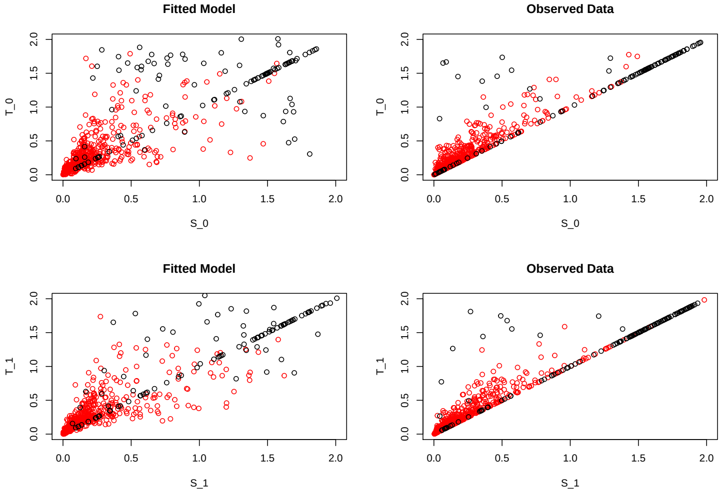
Goodness of Fit (Interval Censoring)

- max OS: 20 years
- max PFS: 15 years

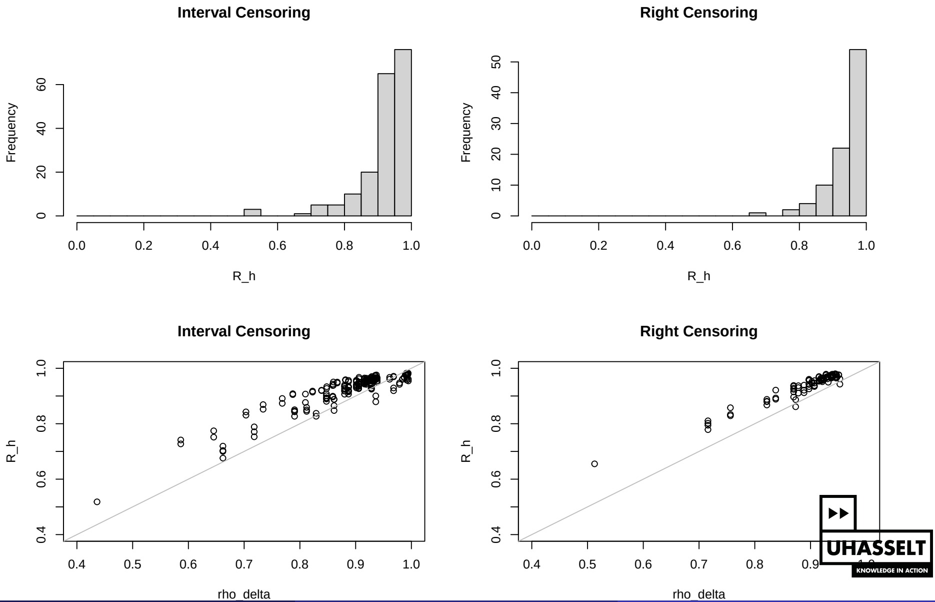


Goodness of Fit (Interval Censoring)

- Again clear lack of fit



Comparison of Sensitivity Analysis

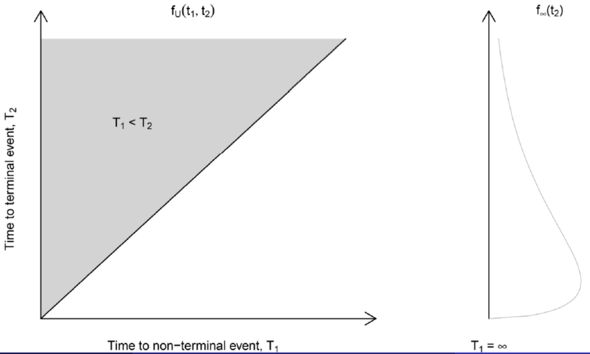


Section 2

Adapted Gaussian Copula Model

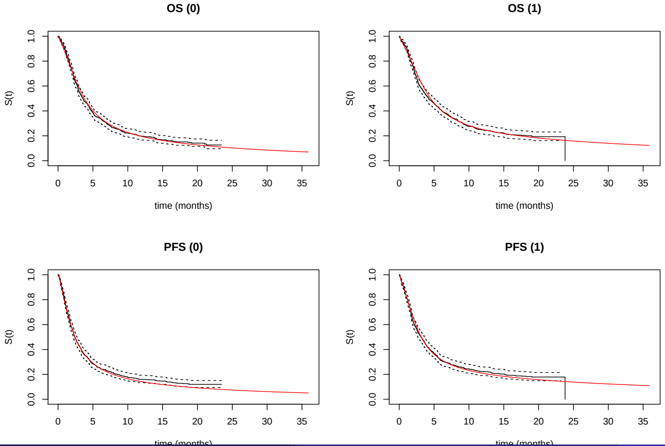
Model Description

- Gaussian Copula model with TTP (T_1) instead of PFS (T_1^*)
- OS corresponds to T_2
- Latent value for T_1 if $T_1 > T_2$
- model for (TTP, OS) induces model for (PFS, OS): $T_1^* = \min(T_1, T_2)$
  - if $T_1 > T_2$: $Pr(T_1^* = t, T_2 = t) = Pr(T_1 > t, T_2 = t) = f_\infty(t)$
  - if $T_1 \leq T_2$: $Pr(T_1^* = t_1, T_2 = t_2) = Pr(T_1 = t, T_2 = t)$



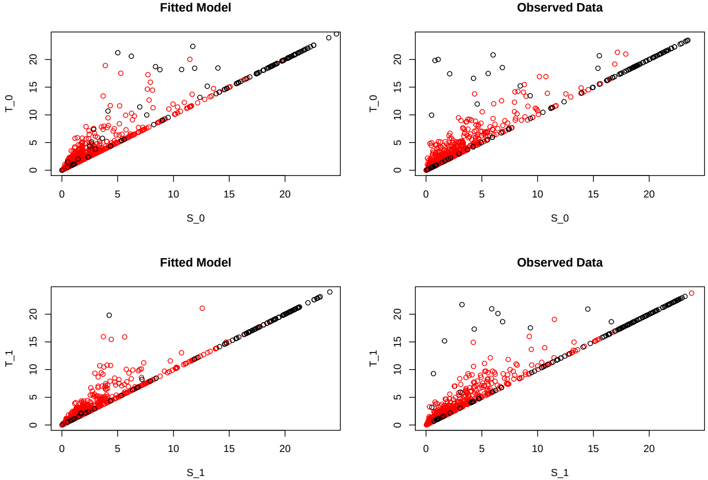
Goodness of Fit

- Survival function for TTP ($Pr(T_1 > t_1)$) not observable (latent variable)
  - Survival function for PFS is observable
  - $Pr(T_1^* > t_1) = Pr(\min(T_1, T_2) > t_1) = Pr(T_1 > t_1, T_2 > t_1)$



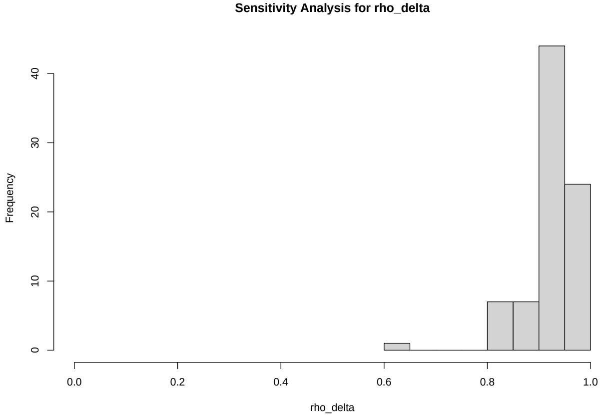
Goodness of Fit (ctd.)

- Much better fit than when ignoring time-orderings



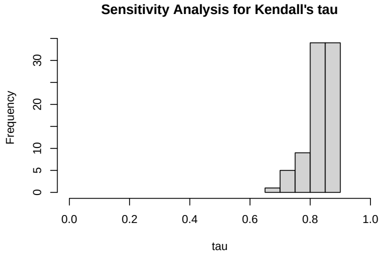
Sensitivity Analysis

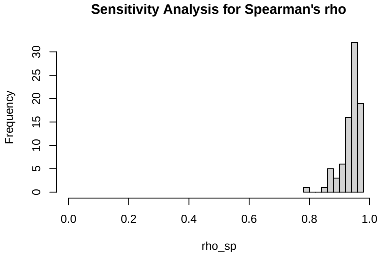
$$\rho_\Delta = cor(q_{S_1} - q_{S_0}, q_{T_1} - q_{T_0}) = \frac{\rho_{S_0,T_0} + \rho_{S_1,T_1} - \rho_{S_0,T_1} - \rho_{S_1,T_0}}{2\sqrt{(1-\rho_{T_0,T_1})(1-\rho_{S_0,S_1})}}$$



Sensitivity Analysis (ctd.)

$$\rho_{sp} = cor(R(\Delta S), R(\Delta T))$$
$$\tau = P((\Delta S_1 - \Delta S_2)(\Delta T_1 - \Delta T_2) > 0) - P((\Delta S_1 - \Delta S_2)(\Delta T_1 - \Delta T_2) < 0)$$





Sensitivity Analysis (ctd.)