NSWPCN Predictor Training

January 31, 2015

1 Preparation

```
library(survival)

## Loading required package:  splines

library(glmulti)

## Loading required package:  rJava
## Loading required package:  methods

library(flexsurv)
library(randomForestSRC)

## Loading required package:  parallel
##
##  randomForestSRC 1.6.0
##
##  Type rfsrc.news() to see new features, changes, and bug fixes.
##

library(reshape2)
library(plyr)
library(ggplot2)

library(MASS)
library(boot)

##
## Attaching package:  'boot'
##
## The following object is masked from 'package:survival':
##
##    aml

library(timeROC)

## Loading required package:  pec
## Loading required package:  mvtnorm
## Loading required package:  timereg

source("stdca.R")

load("03_NSWPCN_subset.rda")
```

2 Cohort selection and transformation

```
x = data[,c("Patient.Sex", "History.Diagnosis.AgeAt.Cent", "Path.LocationBody", "Path.Size.Cent", "Path.
colnames(x) = c("SexM", "AgeCent", "LocBody", "SizeCent", "Ca199", "A2", "A4")
x$SexM = x$Sex == "M"
x$Ca199 = x$Ca199 > 100

y = Surv(as.numeric(data$History.Death.Date - data$History.Diagnosis.Date), data$History.DSDeath.Event)
# Note no surgery dates, though for almost all pts there were only a few days difference.

temp = NA
temp = ls()
rm(list = temp[!(temp %in% c("x", "y"))])

sel = !is.na(y[,1]) & !is.na(y[,2]) & !is.na(x$A2) & !is.na(x$A4) & !is.na(x$LocBody)
x = x[sel,]
y = y[sel,]
rm(sel)

# Remove CA-19-9 measurements as they're mostly missing
x = x[,colnames(x) != "Ca199"]

data = as.data.frame(cbind(Time = y[,1], DSD = y[,2], x))
rm(x, y)
data$DSD = data$DSD == 1
```

3 Data splitting

There's going to be an awful lot of model manipulation and black magic going on. Create a holdout validation set for final model comparison and selection.

```
set.seed(20150110)
sel.val = sample.int(nrow(data), floor(nrow(data)/4))
sel.val = 1:nrow(data) %in% sel.val
mean(sel.val)

## [1] 0.25

data.val = data[sel.val,,drop = FALSE]
data = data[!sel.val,,drop = FALSE]
```

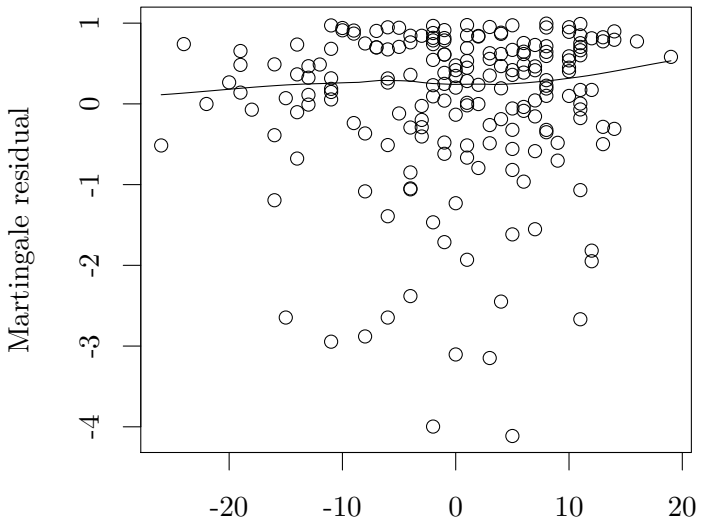
4 EDA

Use the CPH model as a convenient framework for EDA.

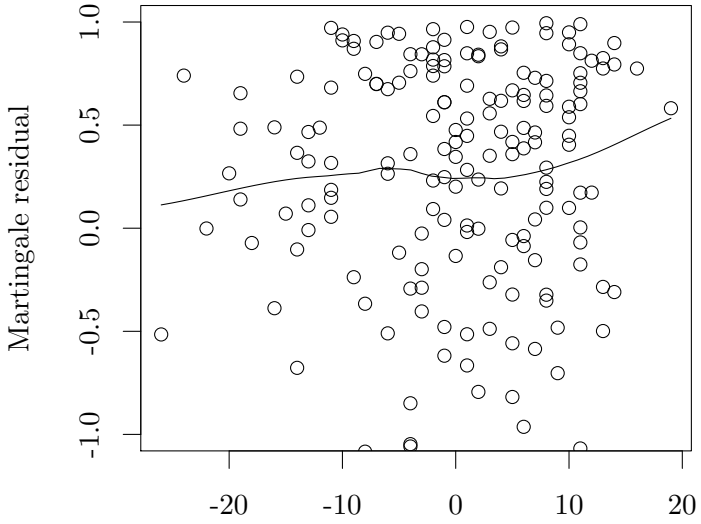
4.1 Functional form

Investigate functional form with martingale residuals.

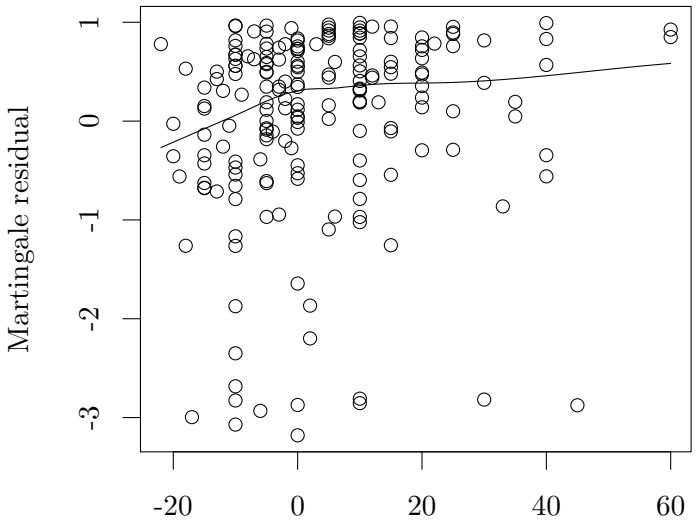
```
fit.cph.NoAge = coxph(Surv(Time, DSD) ~ SexM + LocBody + SizeCent + A2 + A4, data = data)
scatter.smooth(data$AgeCent, resid(fit.cph.NoAge, type = "martingale"), xlab = "", ylab = "Martingale re
```



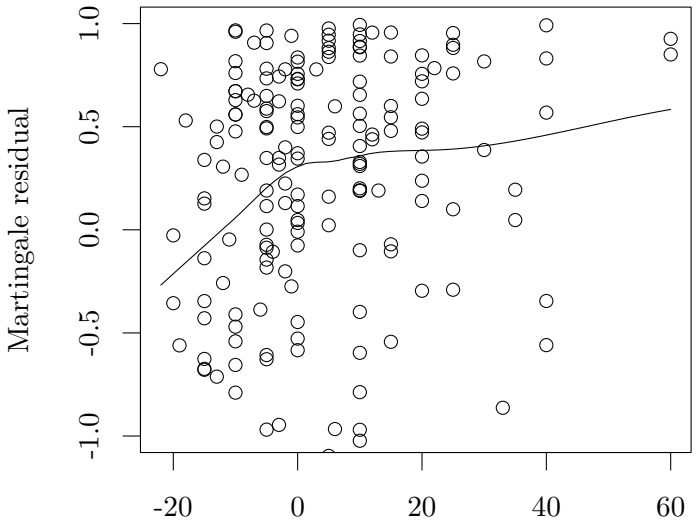

```
scatter.smooth(data$AgeCent, resid(fit.cph.NoAge, type = "martingale"), xlab = "", ylab = "Martingale re
```




```
fit.cph.NoSize = coxph(Surv(Time, DSD) ~ SexM + AgeCent + LocBody + A2 + A4, data = data)
scatter.smooth(data$SizeCent, resid(fit.cph.NoSize, type = "martingale"), xlab = "", ylab = "Martingale
```




```
scatter.smooth(data$SizeCent, resid(fit.cph.NoSize, type = "martingale"), xlab = "", ylab = "Martingale
```



It looks like age has a minor nonlinear component, with a small uptick at advanced age. Very minor though. The size relationship appears to have a knee, close to size == 0, around which the relationship is approximately linear.

Model age as: $AgeCent + AgeCent^2$ Model size as: $SizeCent + SizeCentI(SizeCent > 0) \equiv SizeCent + SizeCent_+$

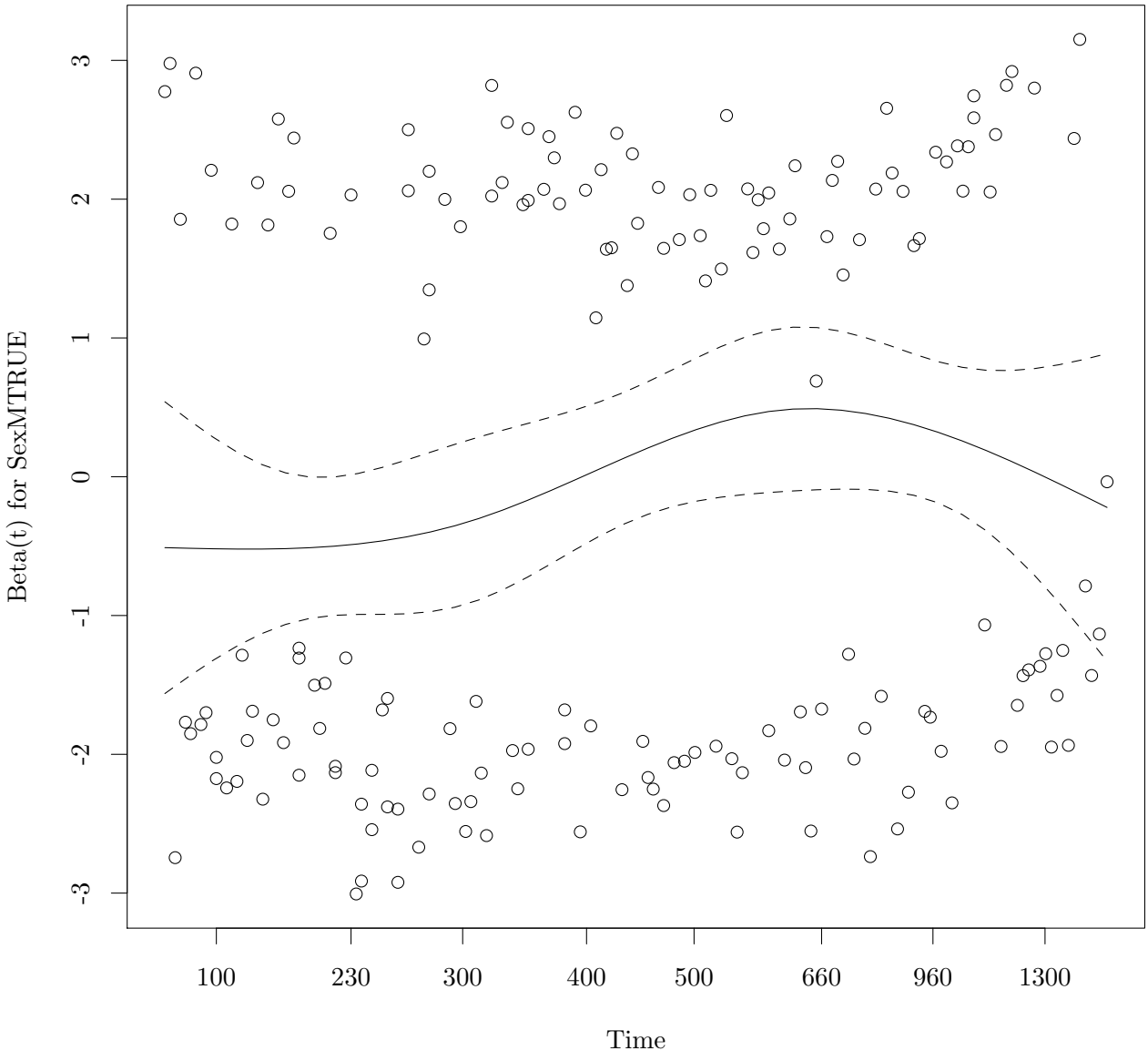
```
data$SizePlus = pmax(data$SizeCent, 0)
data$AgeCent2 = data$AgeCent^2
```

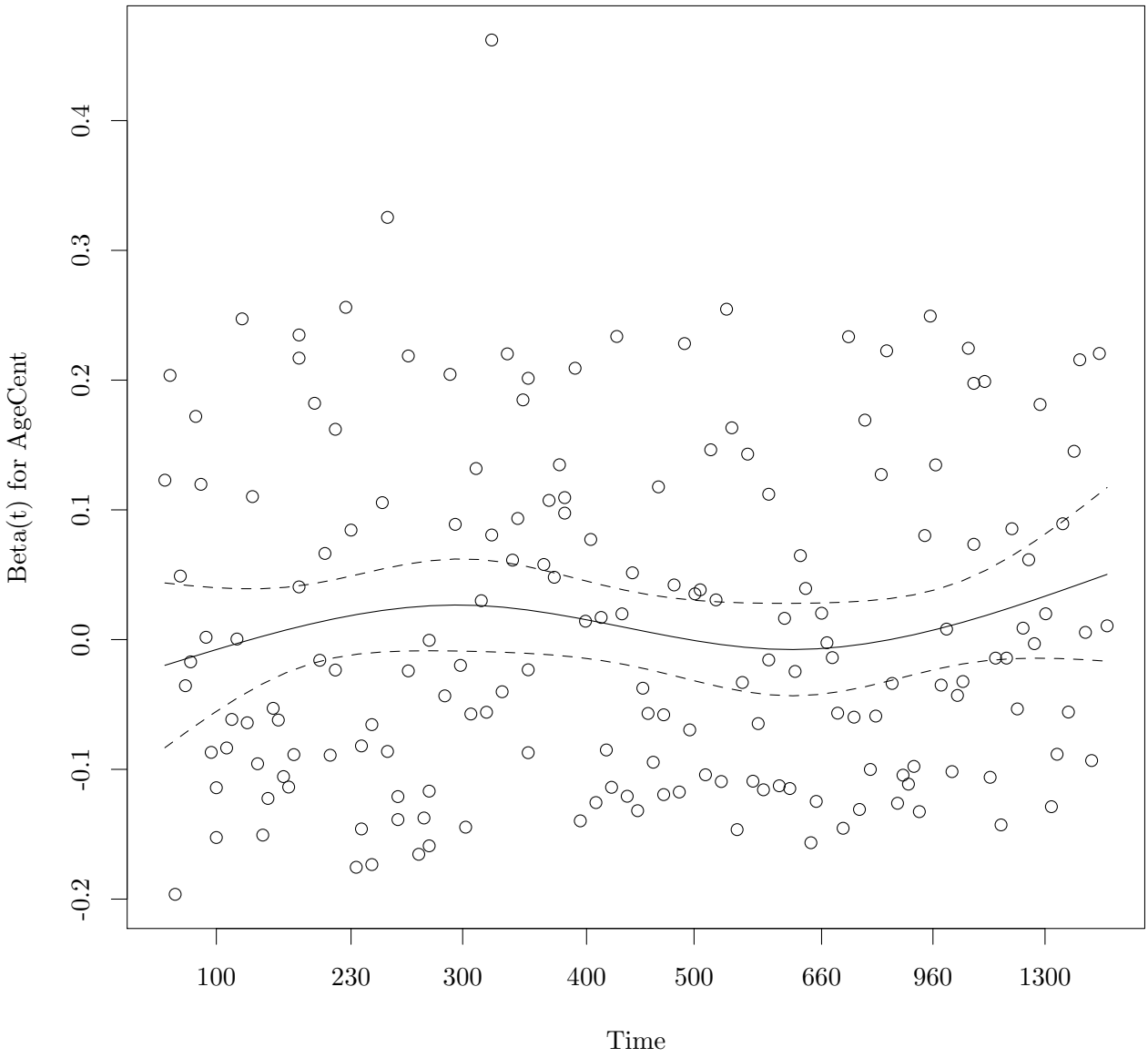
4.2 PH assumption: full model

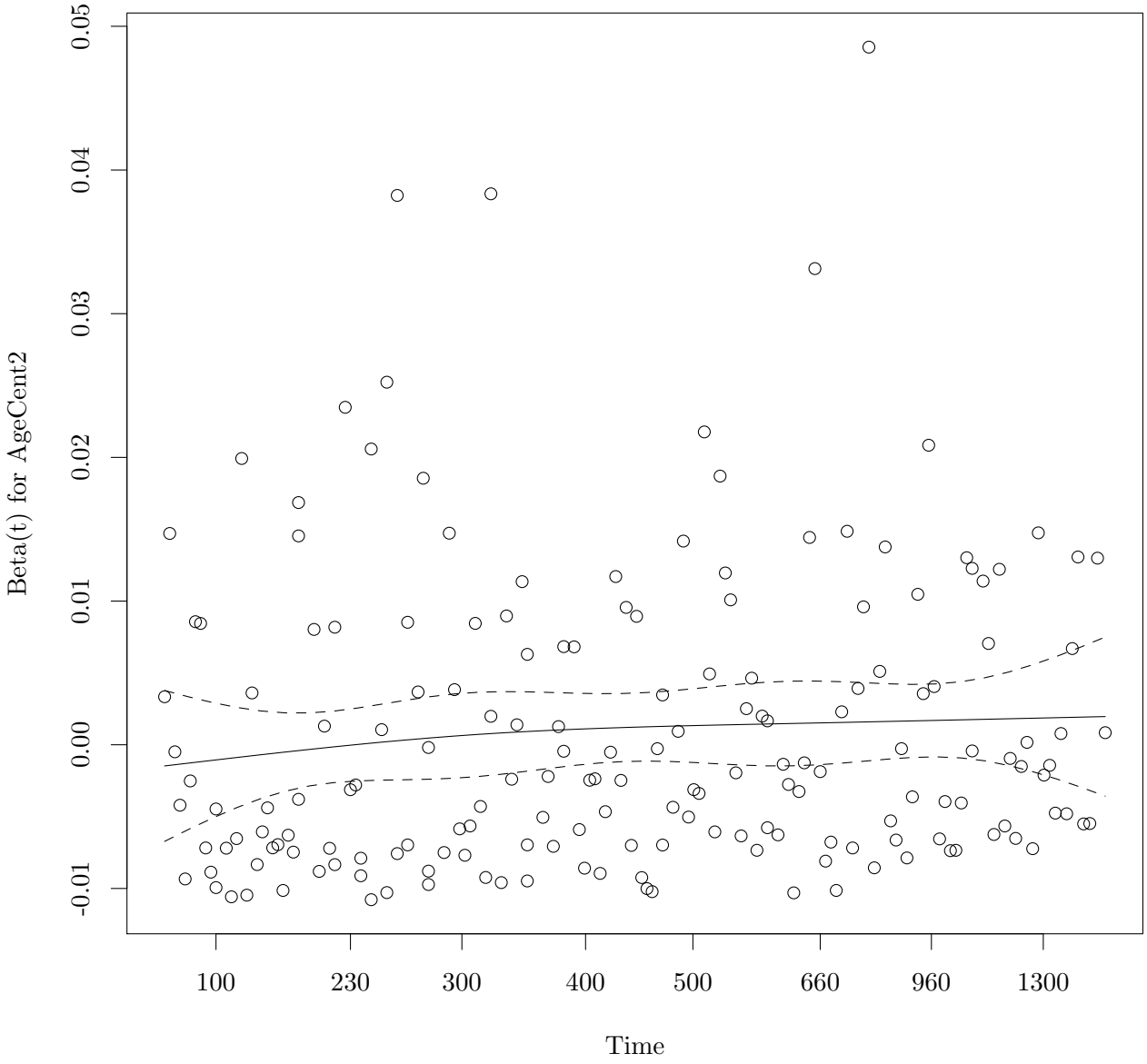
```
fit.cph = coxph(Surv(Time, DSD) ~ SexM + AgeCent + AgeCent2 + LocBody + SizeCent + SizePlus + A2 + A4, d
cox.zph(fit.cph)

##                 rho    chisq      p
## SexMTRUE     0.13992  3.53766 0.0600
## AgeCent      0.02818  0.14713 0.7013
```

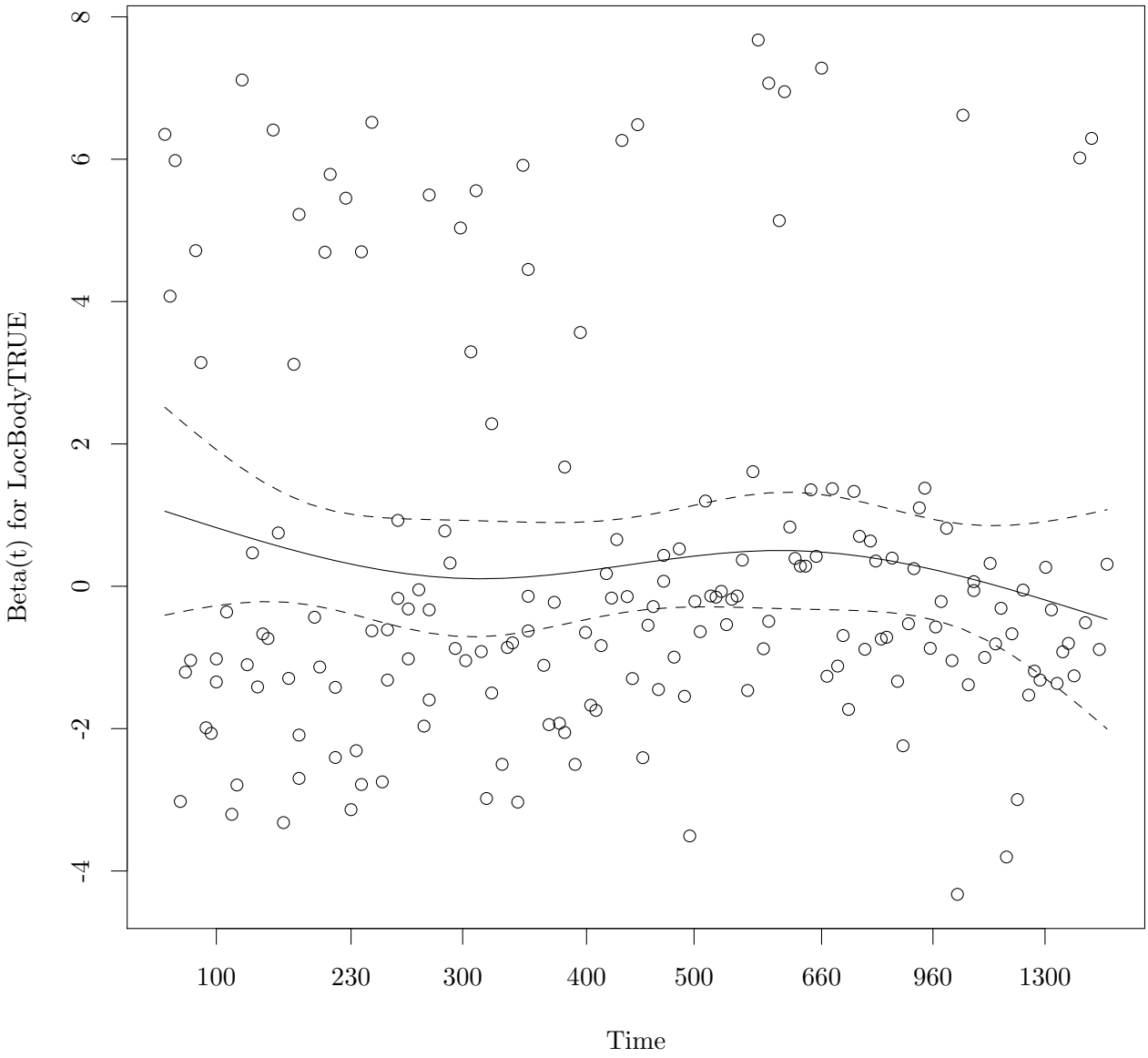
```
## AgeCent2     0.08589  1.33984 0.2471
## LocBodyTRUE -0.06556  0.68391 0.4082
## SizeCent    -0.05543  0.56590 0.4519
## SizePlus     0.00516  0.00482 0.9447
## A2TRUE      -0.01836  0.06213 0.8032
## A4TRUE      -0.11773  2.37767 0.1231
## GLOBAL            NA 15.64353 0.0478
```

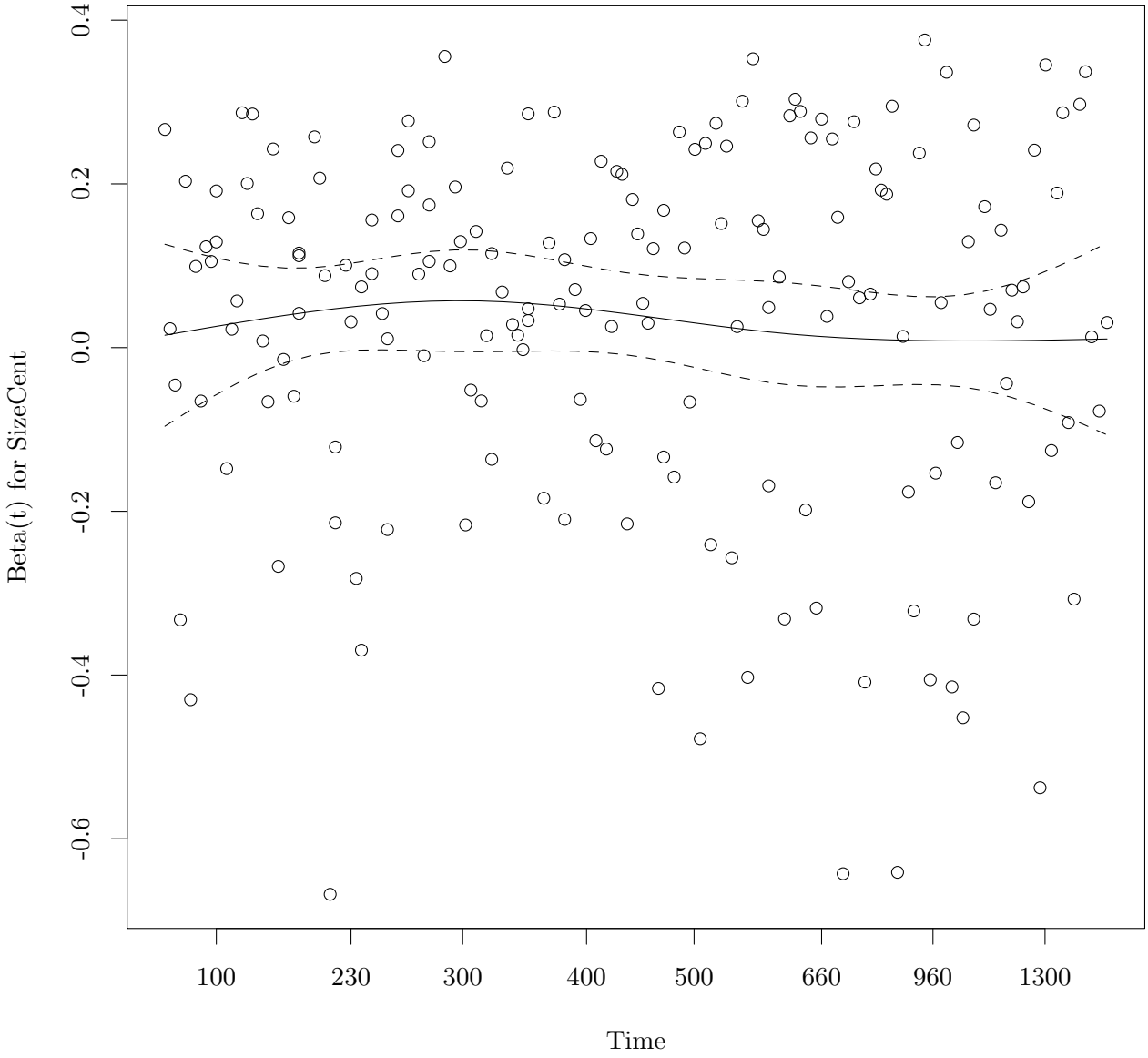
```
plot(cox.zph(fit.cph))
```

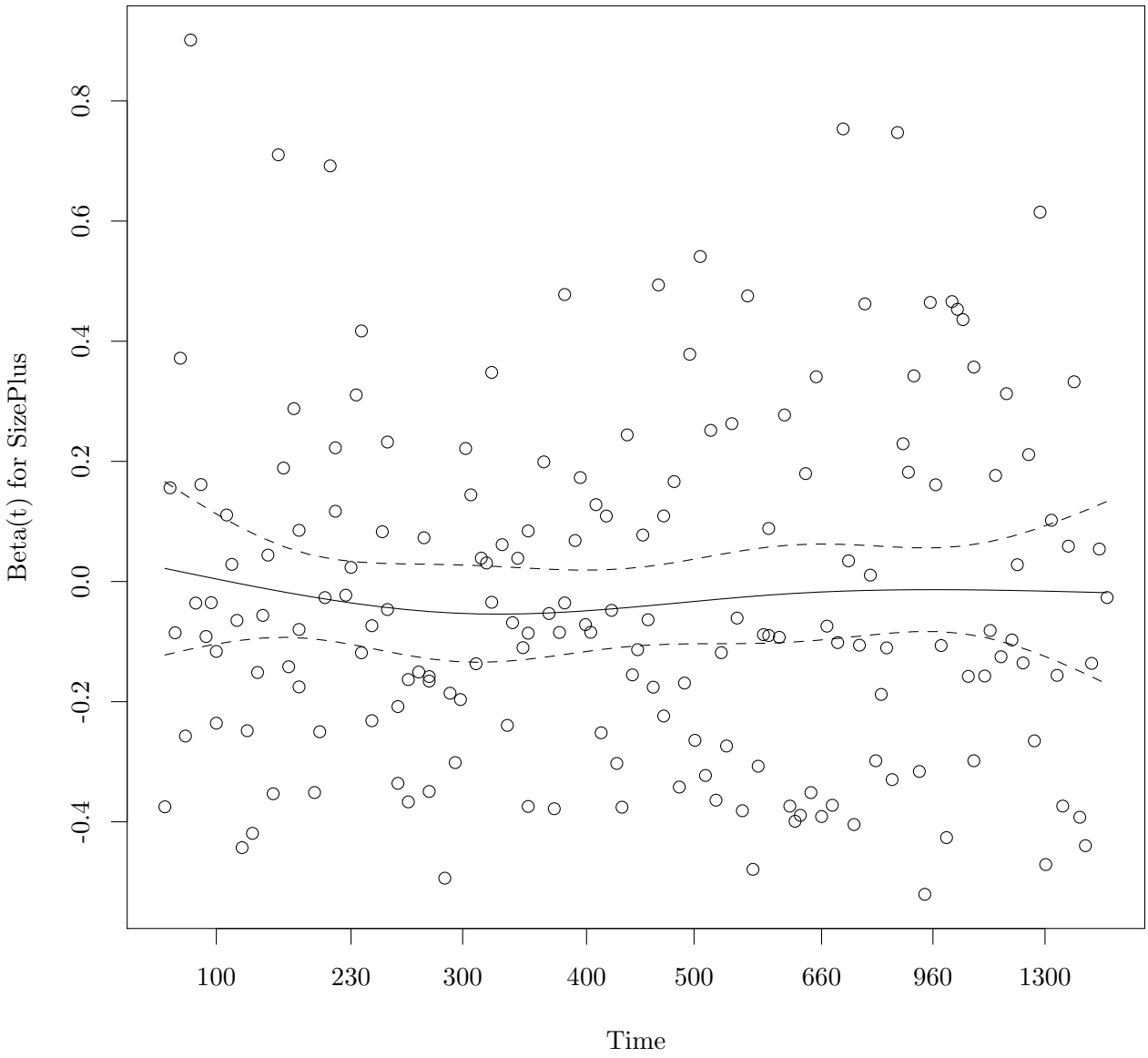


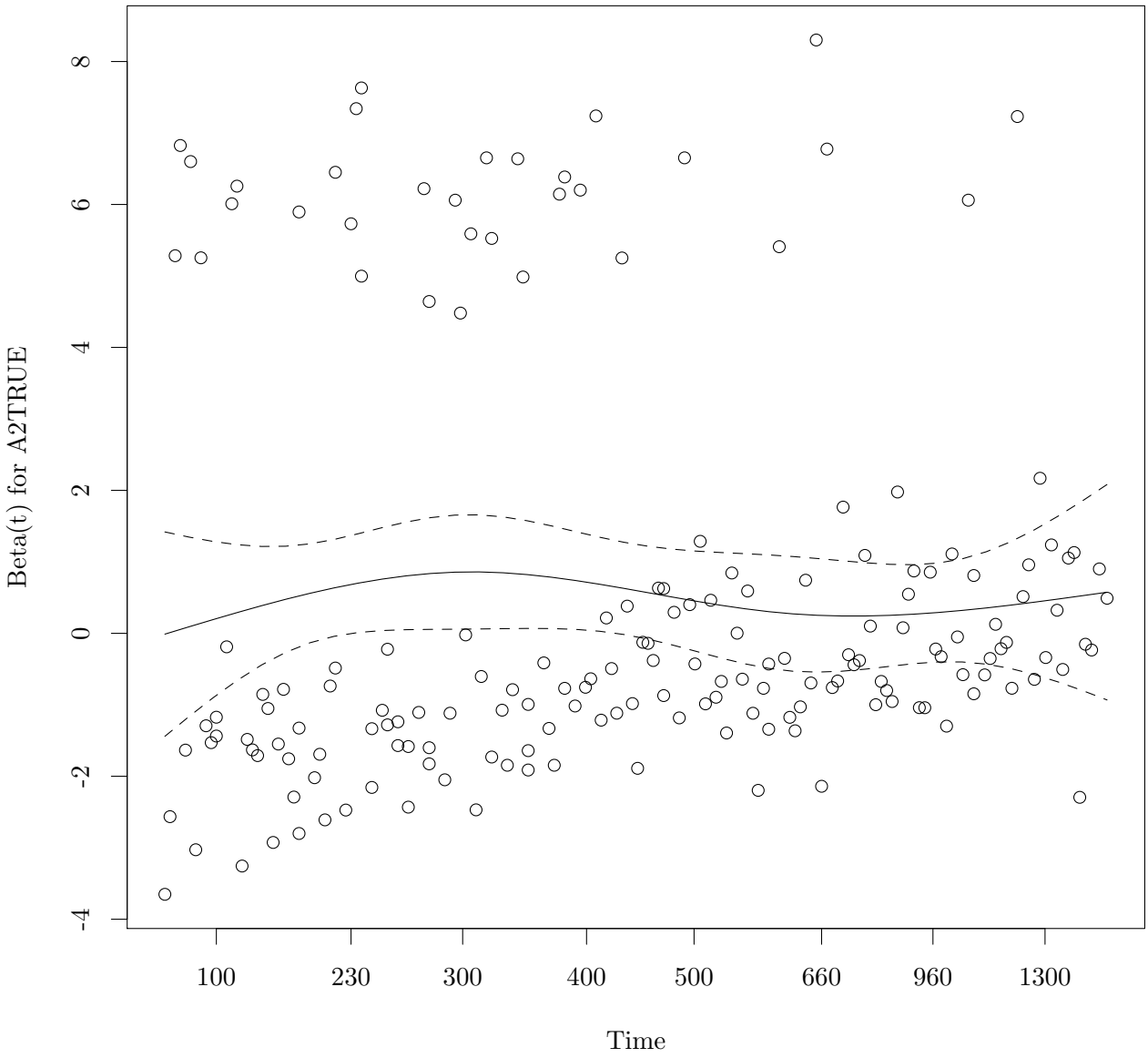

Beta(t) for AgeCent
0.4
0.3
0.2
0.1
0.0
-0.1
-0.2
100
230
300
400
500
660
960
1300
Time

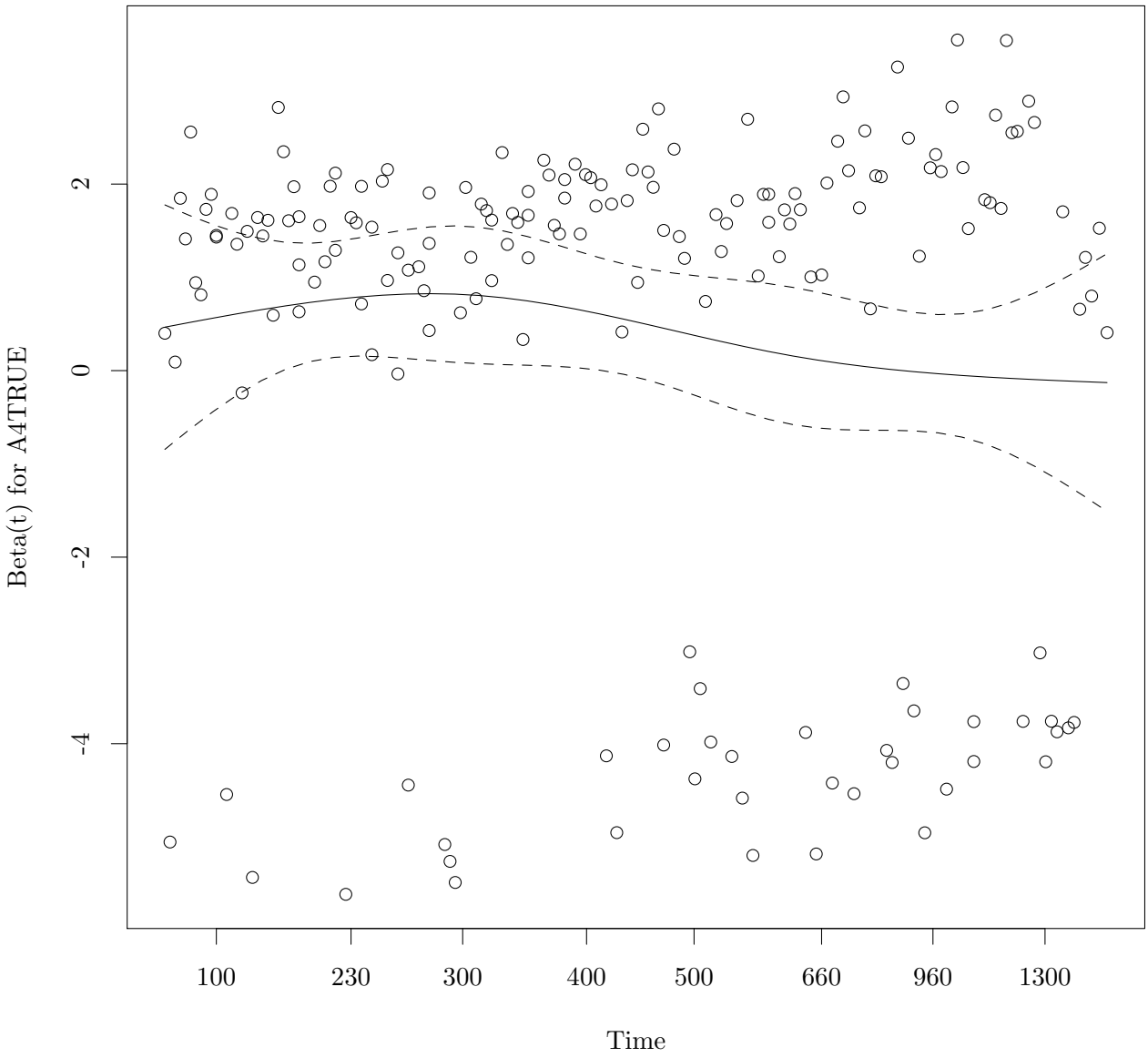

Beta(t) for AgeCent2
0.05
0.04
0.03
0.02
0.01
0.00
-0.01
100
230
300
400
500
660
960
1300
Time


Beta(t) for LocBodyTRUE
8
6
4
2
0
-2
-4
100
230
300
400
500
660
960
1300
Time


Beta(t) for SizeCent
0.4
0.2
0.0
-0.2
-0.4
-0.6
100
230
300
400
500
660
960
1300
Time


Beta(t) for SizePlus
-0.4
-0.2
0.0
0.2
0.4
0.6
0.8
100
230
300
400
500
660
960
1300
Time

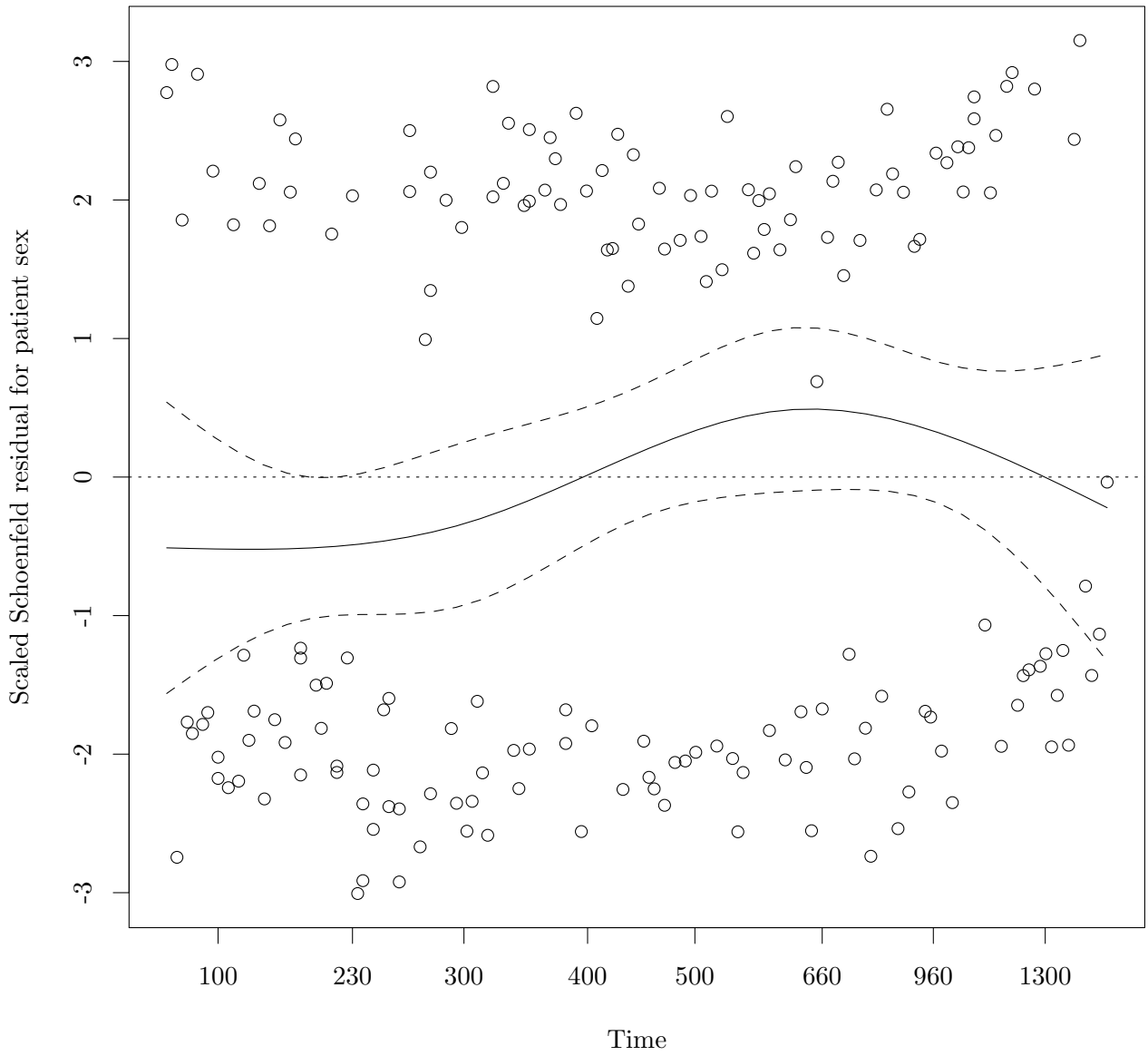

Beta(t) for A2TRUE
8
6
4
2
0
-2
-4
100
230
300
400
500
660
960
1300
Time




```
temp = function (x, resid = TRUE, se = TRUE, df = 4, nsmo = 40, var, ...) {
    xx <- x$x
    yy <- x$y
    d <- nrow(yy)
    df <- max(df)
    nvar <- ncol(yy)
    pred.x <- seq(from = min(xx), to = max(xx), length = nsmo)
    temp <- c(pred.x, xx)
    lmat <- ns(temp, df = df, intercept = TRUE)
    pmat <- lmat[1:nsmo, ]
    xmat <- lmat[-(1:nsmo), ]
    qmat <- qr(xmat)
    if (qmat$rank < df)
        stop("Spline fit is singular, try a smaller degrees of freedom")
    if (se) {
        bk <- backsolve(qmat$qr[1:df, 1:df], diag(df))
        xtx <- bk %*% t(bk)
```

```
        seval <- d * ((pmat %*% xtx) * pmat) %*% rep(1, df)
    }
    ylab <- paste("Beta(t) for", dimnames(yy)[[2]])
    if (missing(var))
        var <- 1:nvar
    else {
        if (is.character(var))
            var <- match(var, dimnames(yy)[[2]])
        if (any(is.na(var)) || max(var) > nvar || min(var) <
            1)
            stop("Invalid variable requested")
    }
    if (x$transform == "log") {
        xx <- exp(xx)
        pred.x <- exp(pred.x)
    }
    else if (x$transform != "identity") {
        xtime <- as.numeric(dimnames(yy)[[1]])
        indx <- !duplicated(xx)
        apr1 <- approx(xx[indx], xtime[indx], seq(min(xx), max(xx),
            length = 17)[2 * (1:8)])
        temp <- signif(apr1$y, 2)
        apr2 <- approx(xtime[indx], xx[indx], temp)
        xaxisval <- apr2$y
        xaxislab <- rep("", 8)
        for (i in 1:8) xaxislab[i] <- format(temp[i])
    }
    for (i in var) {
        y <- yy[, i]
        yhat <- pmat %*% qr.coef(qmat, y)
        if (resid)
            yr <- range(yhat, y)
        else yr <- range(yhat)
        if (se) {
            temp <- 2 * sqrt(x$var[i, i] * seval)
            yup <- yhat + temp
            ylow <- yhat - temp
            yr <- range(yr, yup, ylow)
        }
        if (x$transform == "identity")
            plot(range(xx), yr, type = "n", ...)
        else if (x$transform == "log")
            plot(range(xx), yr, type = "n", log = "x", ...)
        else {
            plot(range(xx), yr, type = "n", axes = FALSE, ...)
            axis(1, xaxisval, xaxislab)
            axis(2)
            box()
        }
        if (resid)
            points(xx, y)
        lines(pred.x, yhat)
        if (se) {
```

```
            lines(pred.x, yup, lty = 2)
            lines(pred.x, ylow, lty = 2)
        }
    }
}

temp(cox.zph(fit.cph), var = 1, ylab = "Scaled Schoenfeld residual for patient sex", xlab = "Time")
abline(h = 0, lty = "dotted")
```



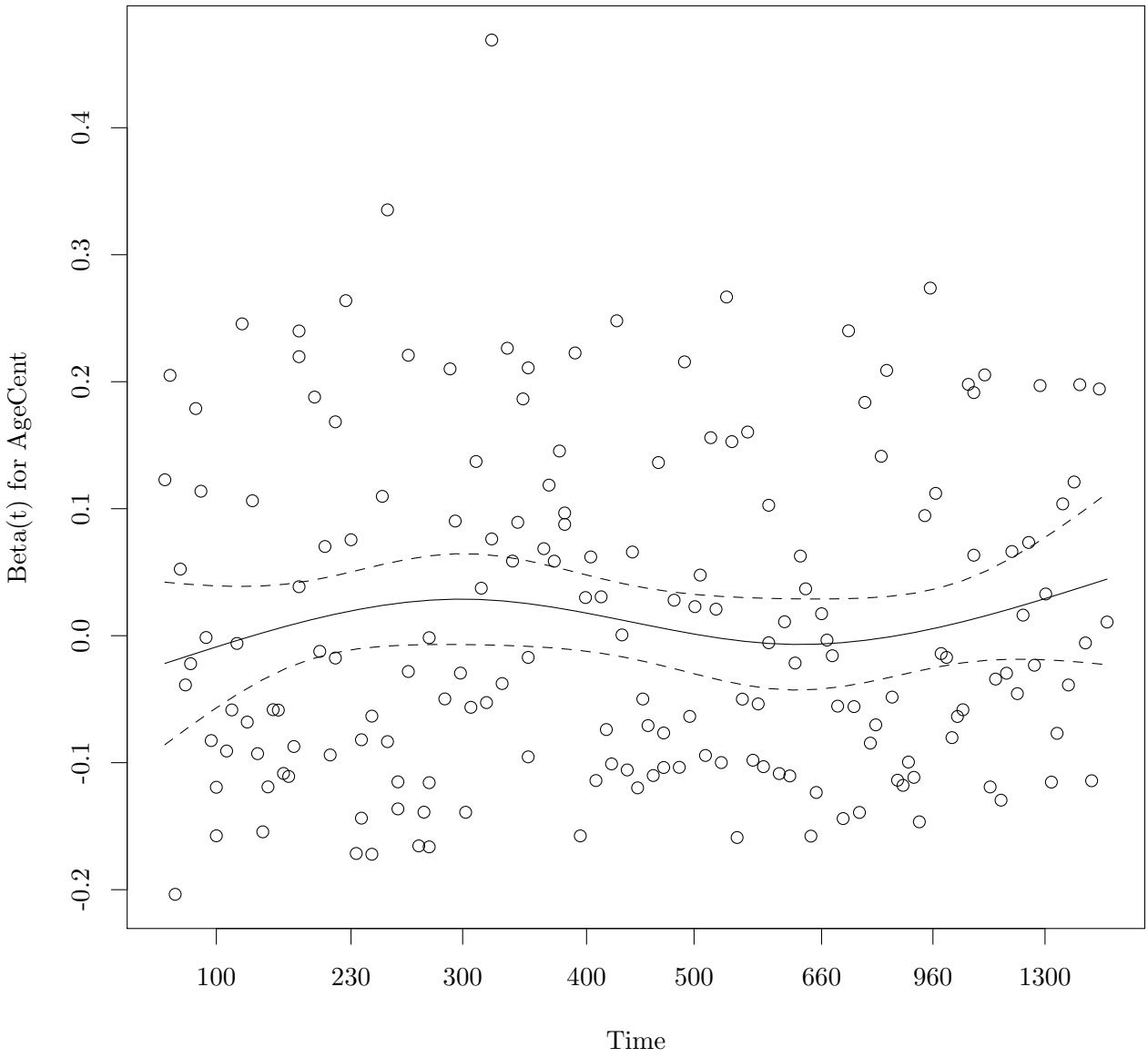
Looks like there's a violation of CPH with gender. Not unexpected. First check whether there is any evidence of gender interaction.

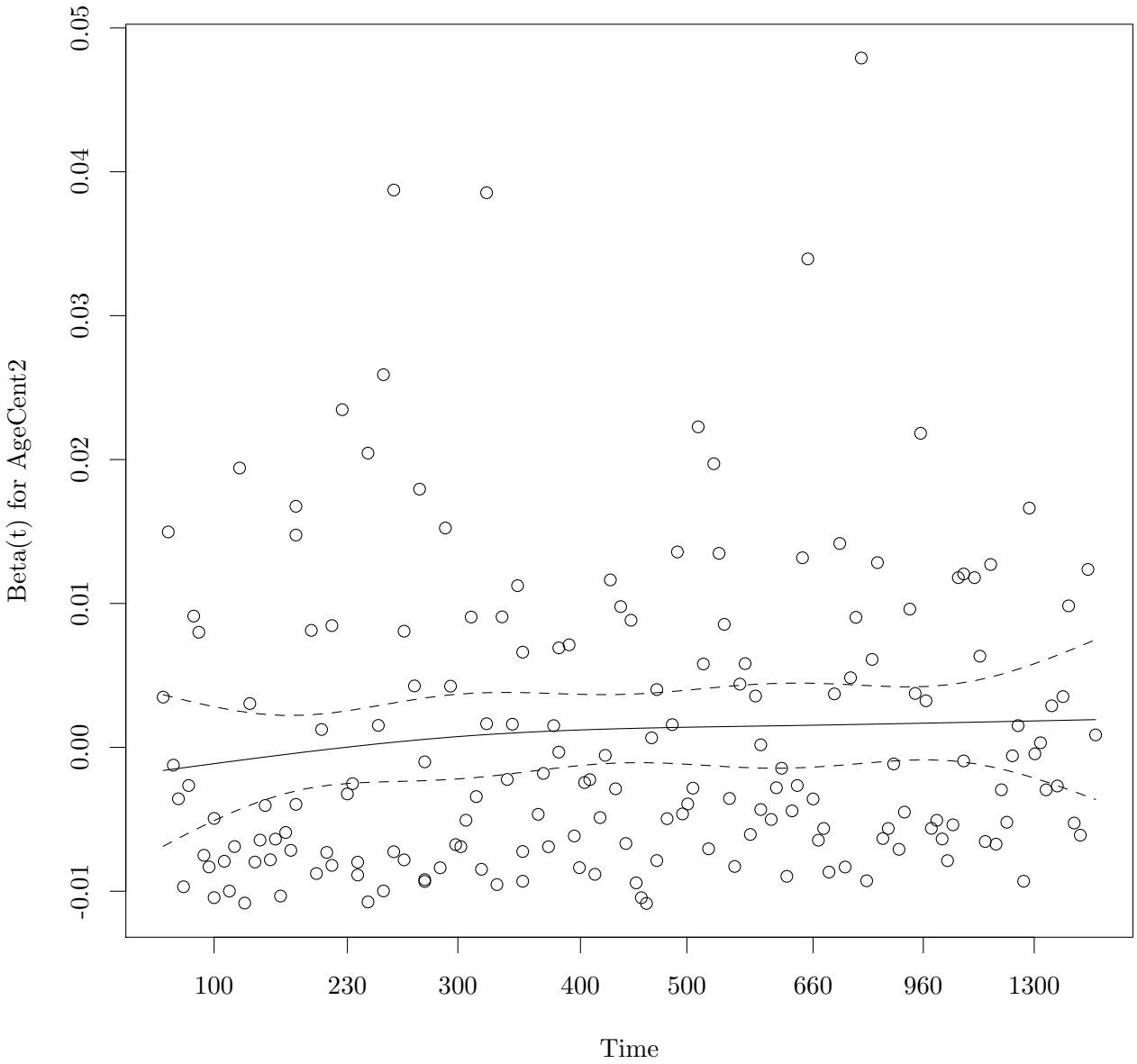
```
anova(coxph(Surv(Time, DSD) ~ SexM*(AgeCent + AgeCent2 + LocBody + SizeCent + SizePlus + A2 + A4), data

## Analysis of Deviance Table
##  Cox model: response is Surv(Time, DSD)
## Terms added sequentially (first to last)
##
```

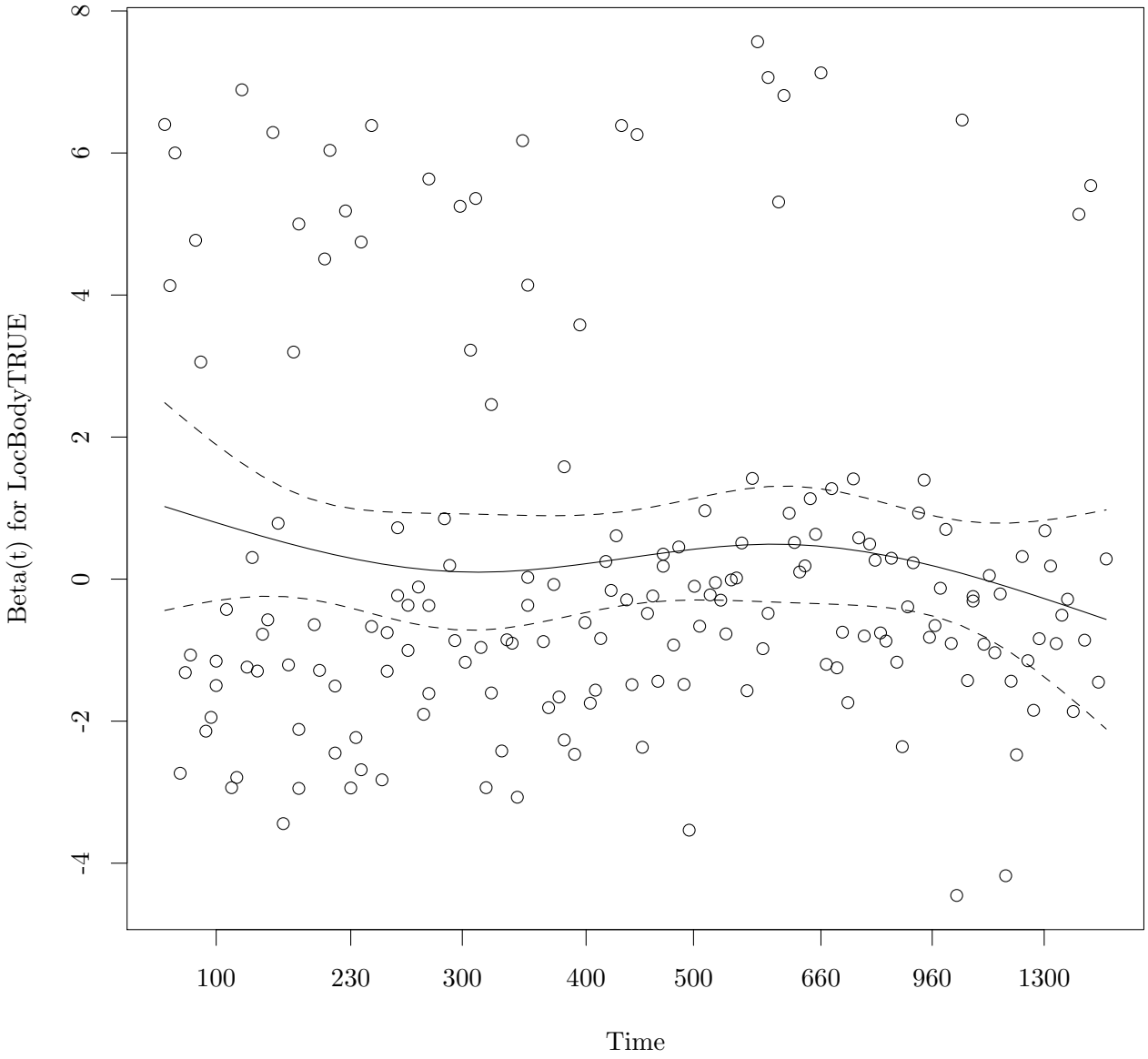
```
##                loglik Chisq Df Pr(>|Chi|)
## NULL             -781
## SexM             -781  0.20  1     0.6574
## AgeCent          -781  0.49  1     0.4835
## AgeCent2         -780  1.62  1     0.2029
## LocBody          -777  6.69  1     0.0097
## SizeCent         -774  4.83  1     0.0280
## SizePlus         -772  5.07  1     0.0244
## A2               -769  5.14  1     0.0234
## A4               -767  4.79  1     0.0286
## SexM:AgeCent     -767  0.00  1     0.9726
## SexM:AgeCent2    -767  0.15  1     0.7016
## SexM:LocBody     -767  0.02  1     0.8955
## SexM:SizeCent    -766  1.85  1     0.1733
## SexM:SizePlus    -765  0.93  1     0.3350
## SexM:A2          -764  2.24  1     0.1343
## SexM:A4          -764  0.05  1     0.8151
```

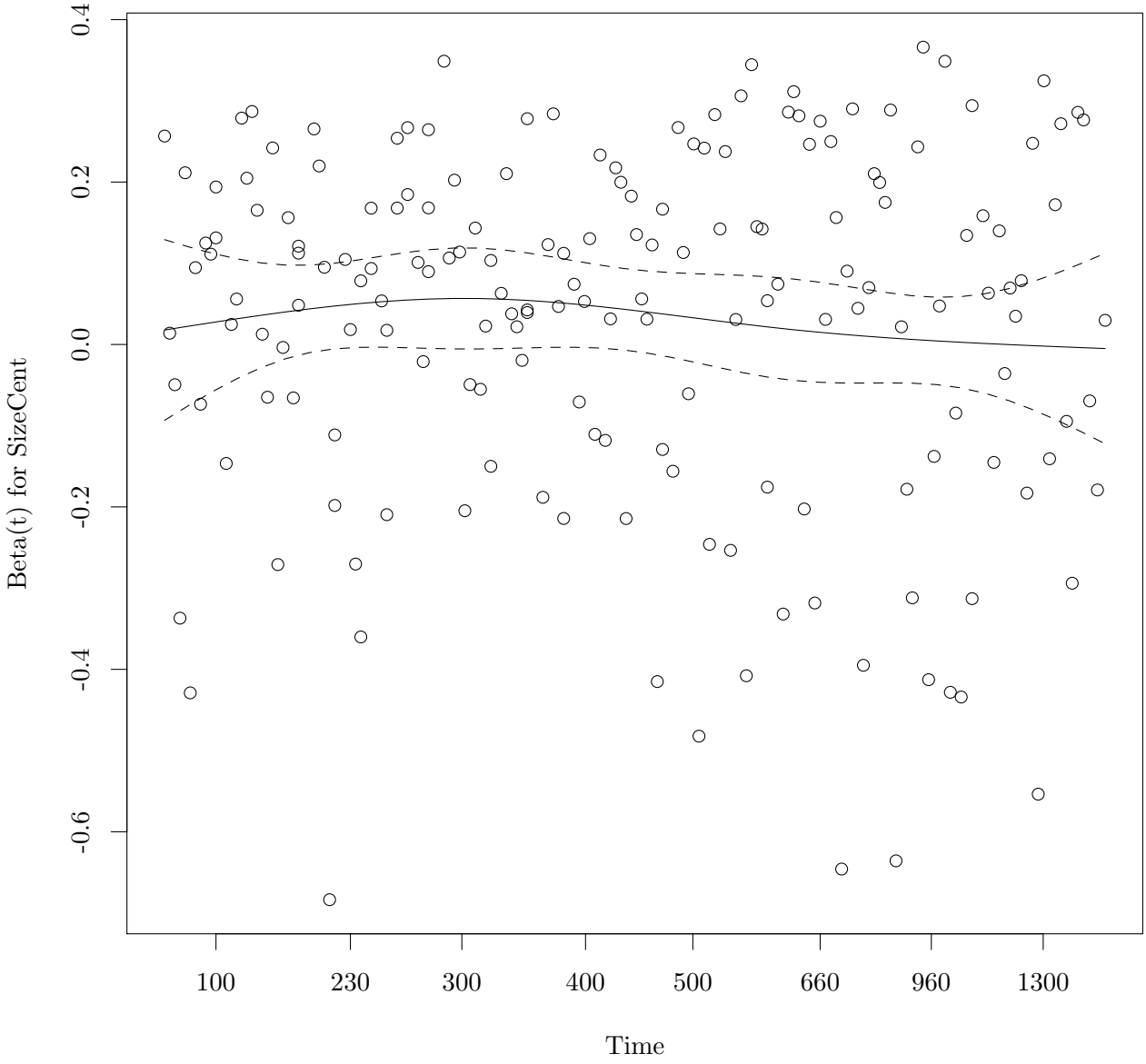
Nope, good. We're not interested in gender effects so just stratify.

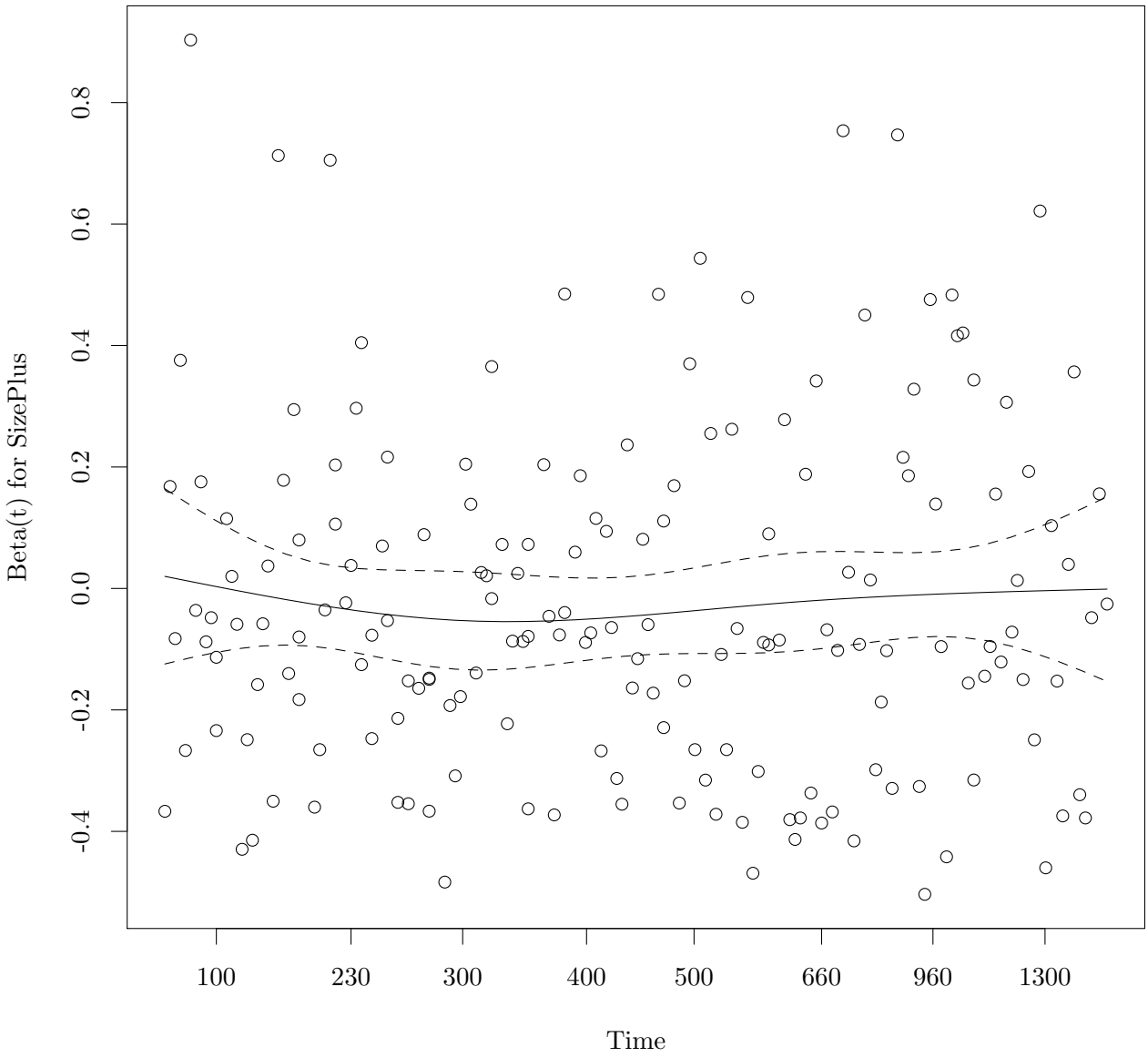
```
fit.cph = coxph(Surv(Time, DSD) ~ strata(SexM) + AgeCent + AgeCent2 + LocBody + SizeCent + SizePlus + A2
cox.zph(fit.cph)

##                 rho   chisq      p
## AgeCent      0.0198  0.0726 0.7876
## AgeCent2     0.0855  1.3234 0.2500
## LocBodyTRUE -0.0716  0.7957 0.3724
## SizeCent    -0.0676  0.8362 0.3605
## SizePlus     0.0152  0.0412 0.8392
## A2TRUE      -0.0146  0.0392 0.8431
## A4TRUE      -0.1152  2.2494 0.1337
## GLOBAL           NA 12.0728 0.0982

plot(cox.zph(fit.cph))
```

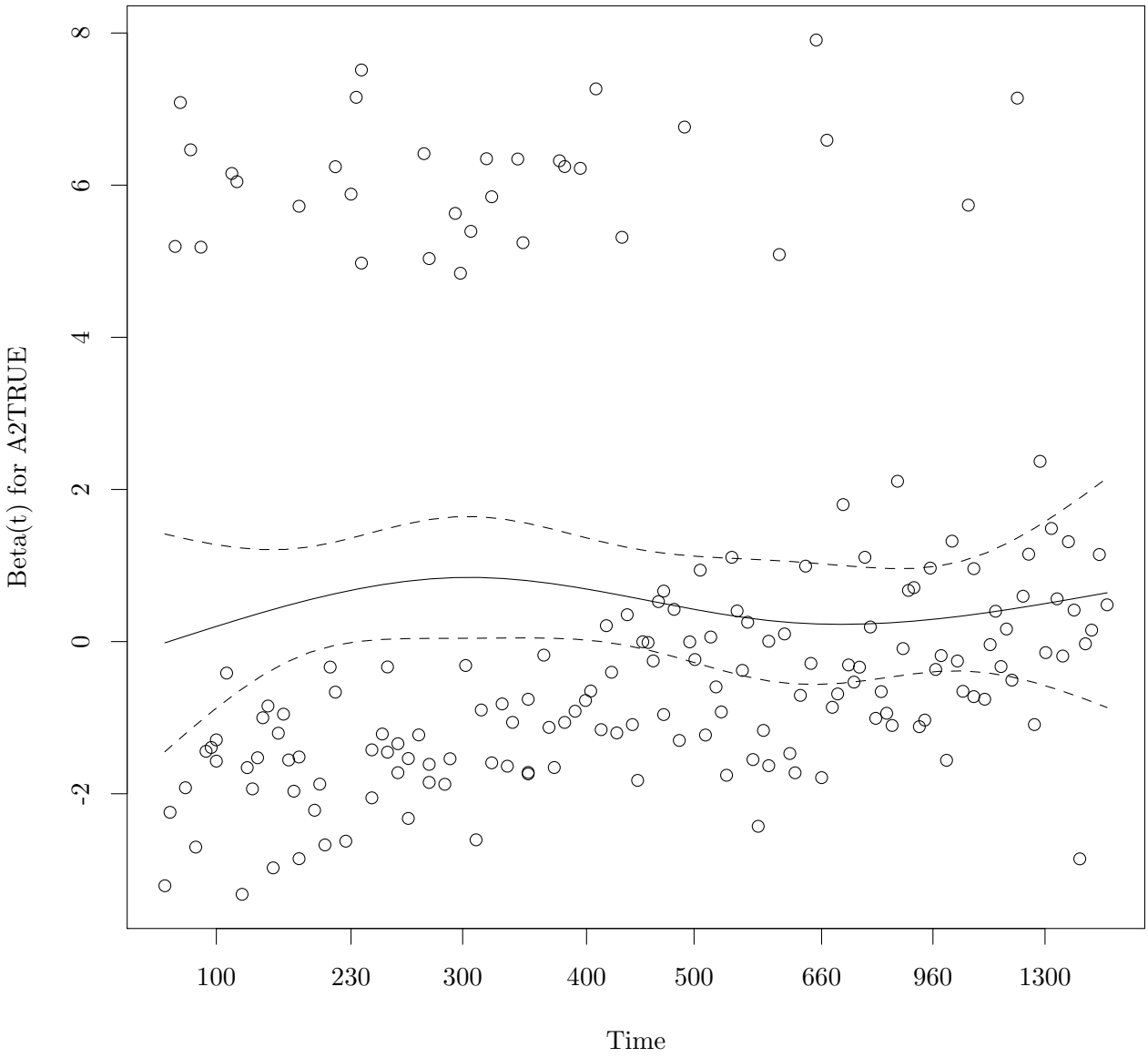

Beta(t) for AgeCent
-0.2
-0.1
0.0
0.1
0.2
0.3
0.4
100
230
300
400
500
660
960
1300
Time

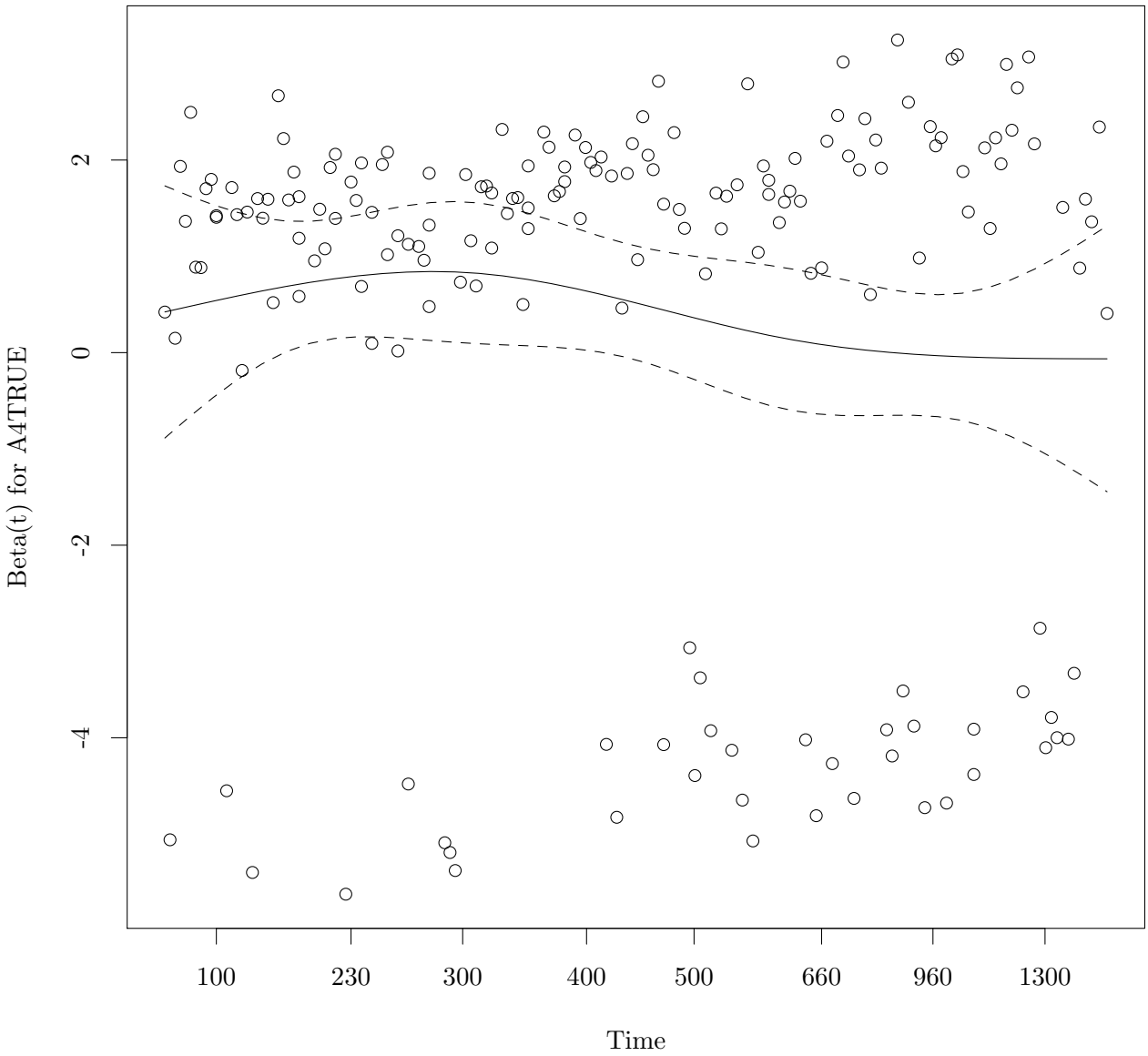

Beta(t) for AgeCent2
0.05
0.04
0.03
0.02
0.01
0.00
-0.01
100
230
300
400
500
660
960
1300
Time


Beta(t) for LocBodyTRUE
8
6
4
2
0
-2
-4
100
230
300
400
500
660
960
1300
Time


Beta(t) for SizeCent
0.4
0.2
0.0
-0.2
-0.4
-0.6
100
230
300
400
500
660
960
1300
Time

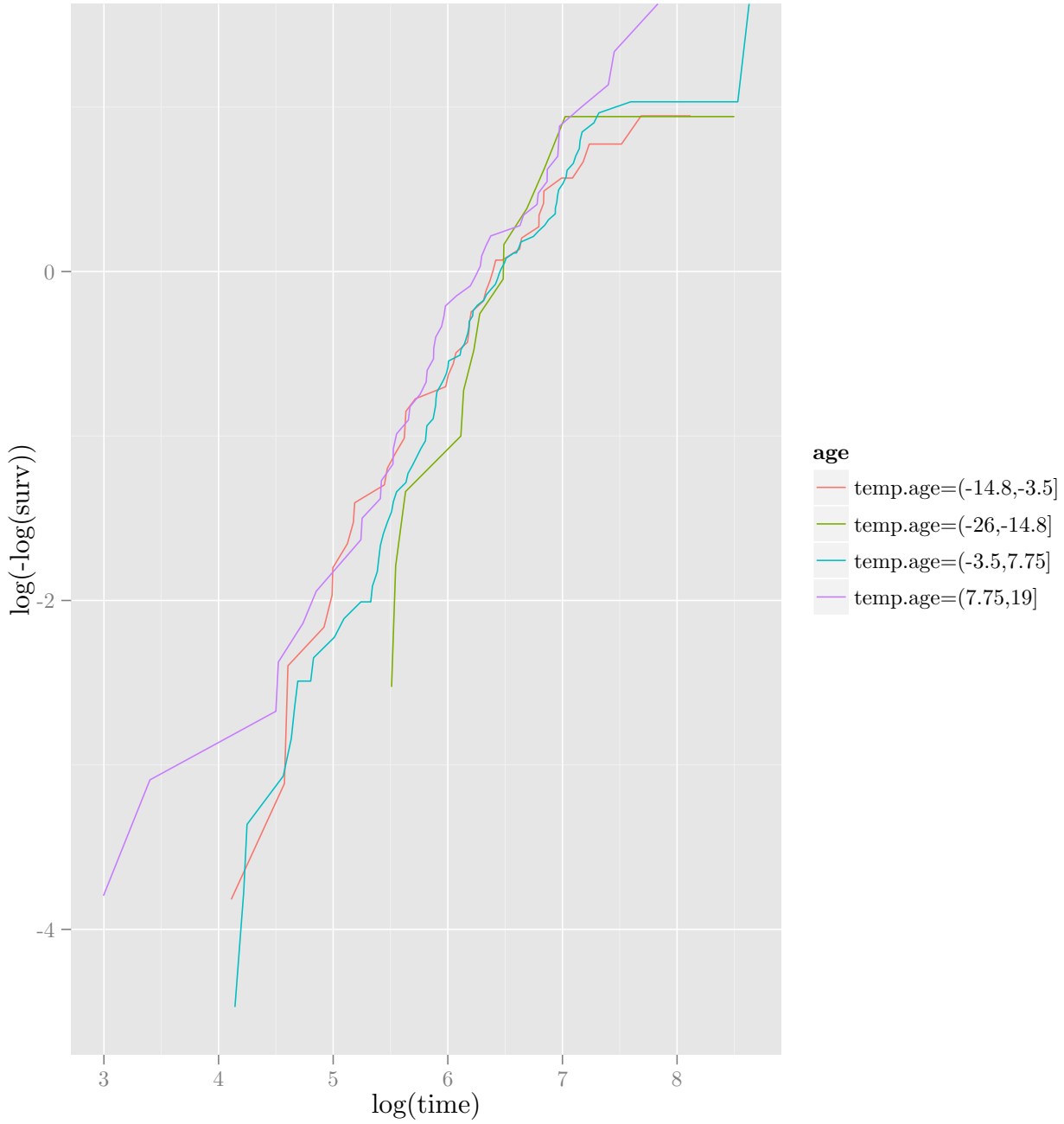

Beta(t) for SizePlus
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
100
230
300
400
500
660
960
1300
Time


Beta(t) for A2TRUE
8
6
4
2
0
-2
100
230
300
400
500
660
960
1300
Time



Looks good. Slight snifter with age but I'm not particularly concerned. Split into age groups and do KM plots to verify.

```
temp.age = cut(data$AgeCent, 4)
temp = survfit(Surv(Time, DSD) ~ temp.age, data)
ggplot(data.frame(surv = temp$surv, time = temp$time, age = rep(names(temp$strata), temp$strata)), aes(y
```

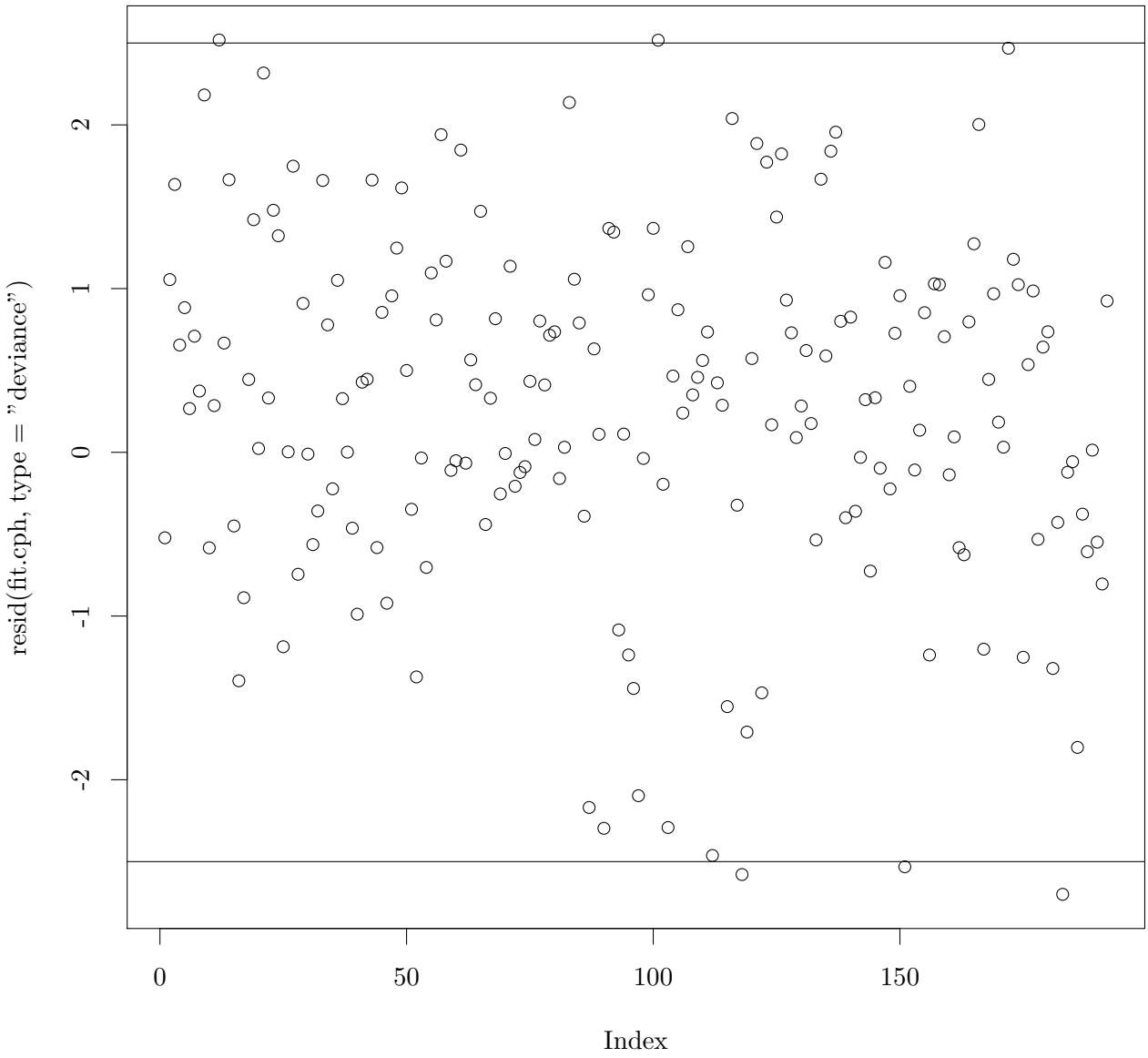


Not perfect but it'll do.

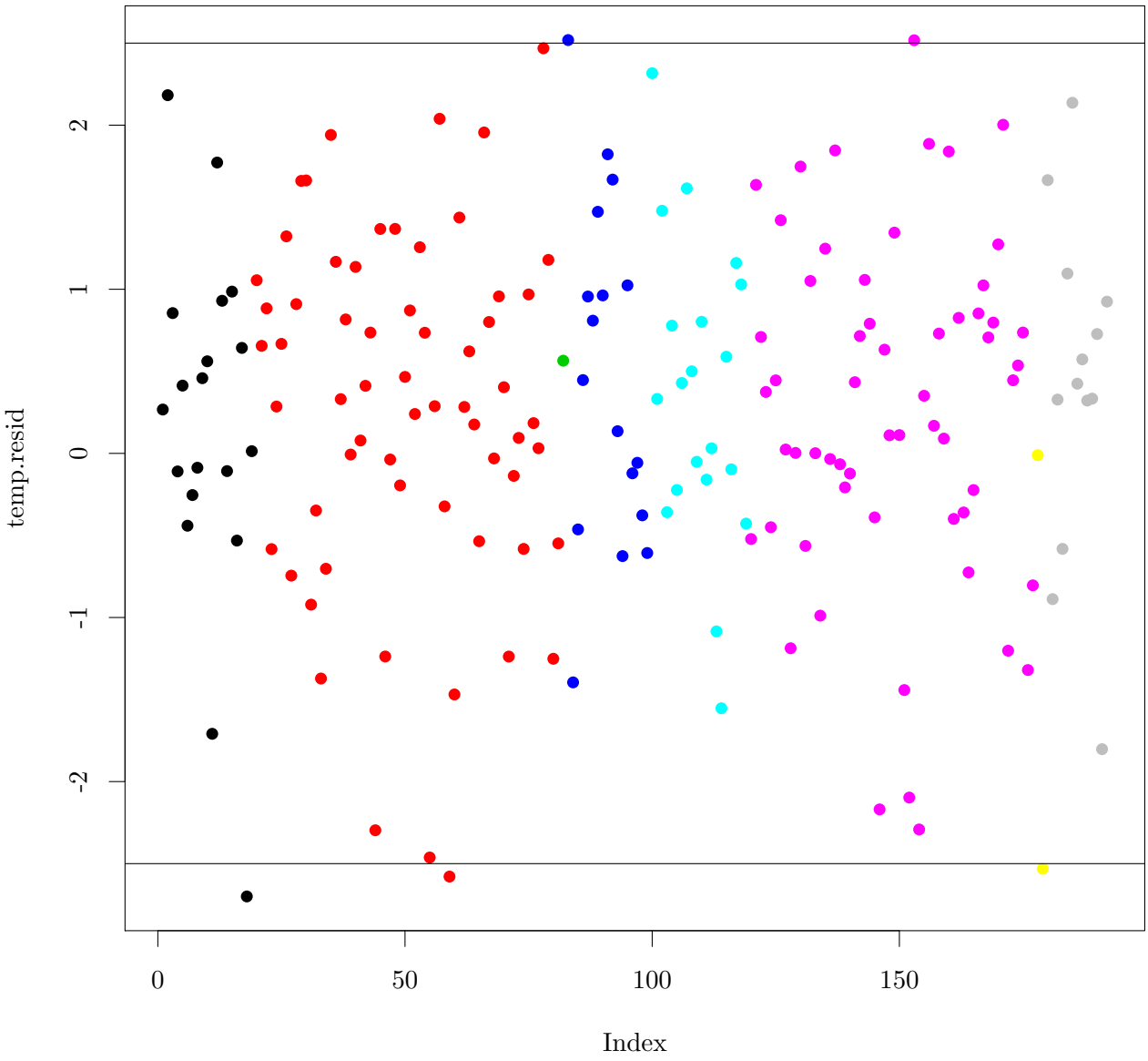
4.3 Outliers: full model

Look at deviance residuals, both marginally and stratified by major subgroups.

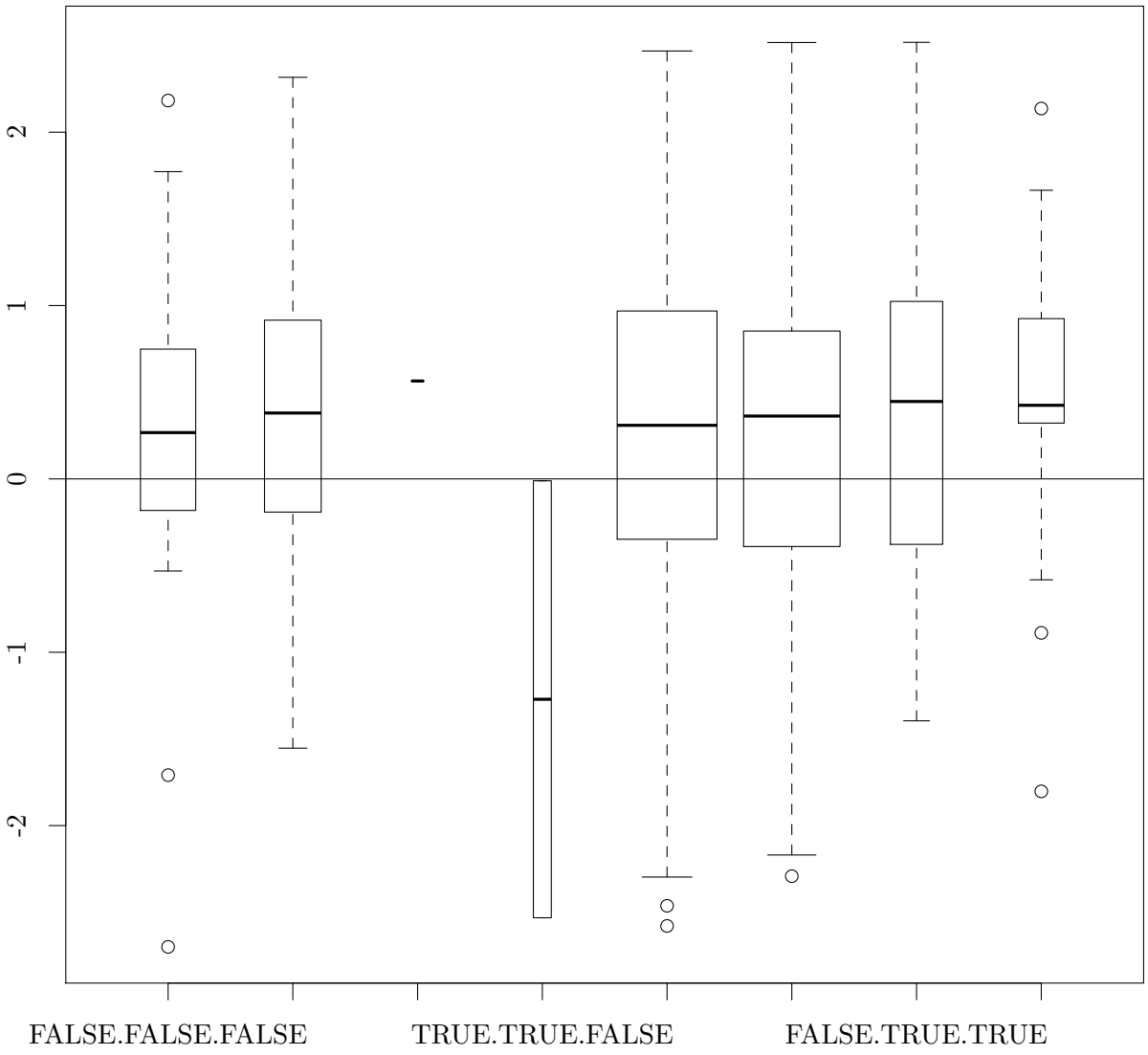
```
plot(resid(fit.cph, type = "deviance"))
abline(h = c(-2.5, 2.5))
```



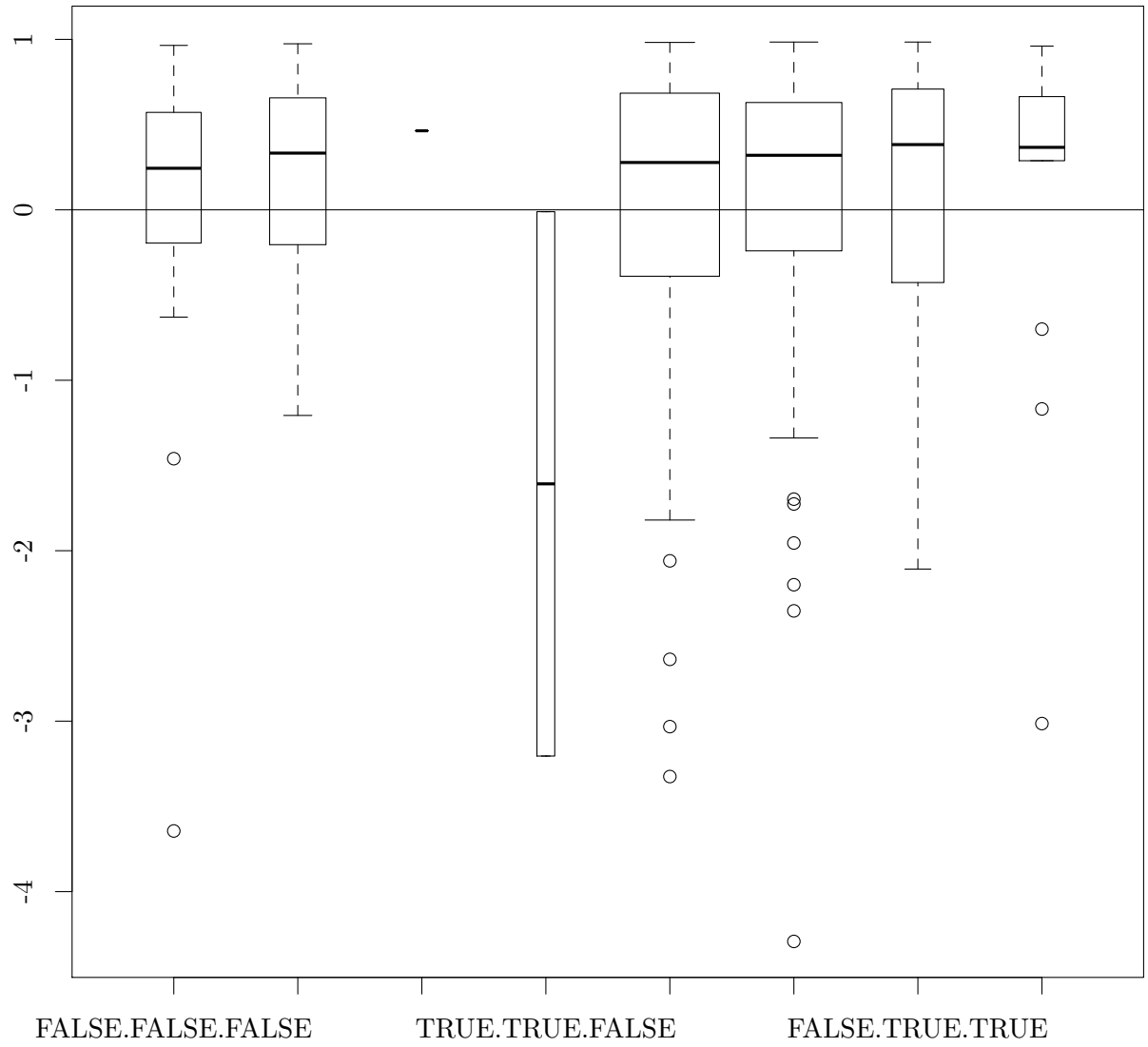

```
temp.ord = order(data$SexM, data$A2, data$A4)
temp.resid = resid(fit.cph, type = "deviance")[temp.ord]
temp.col = (4*data$SexM + 2*data$A2 + data$A4 + 1)[temp.ord]
plot(temp.resid, col = temp.col, pch = 16)
abline(h = c(-2.5, 2.5))
```




```
boxplot(resid(fit.cph, type = "deviance") ~ data$SexM + data$A2 + data$A4, varwidth = TRUE)
abline(h = 0)
```

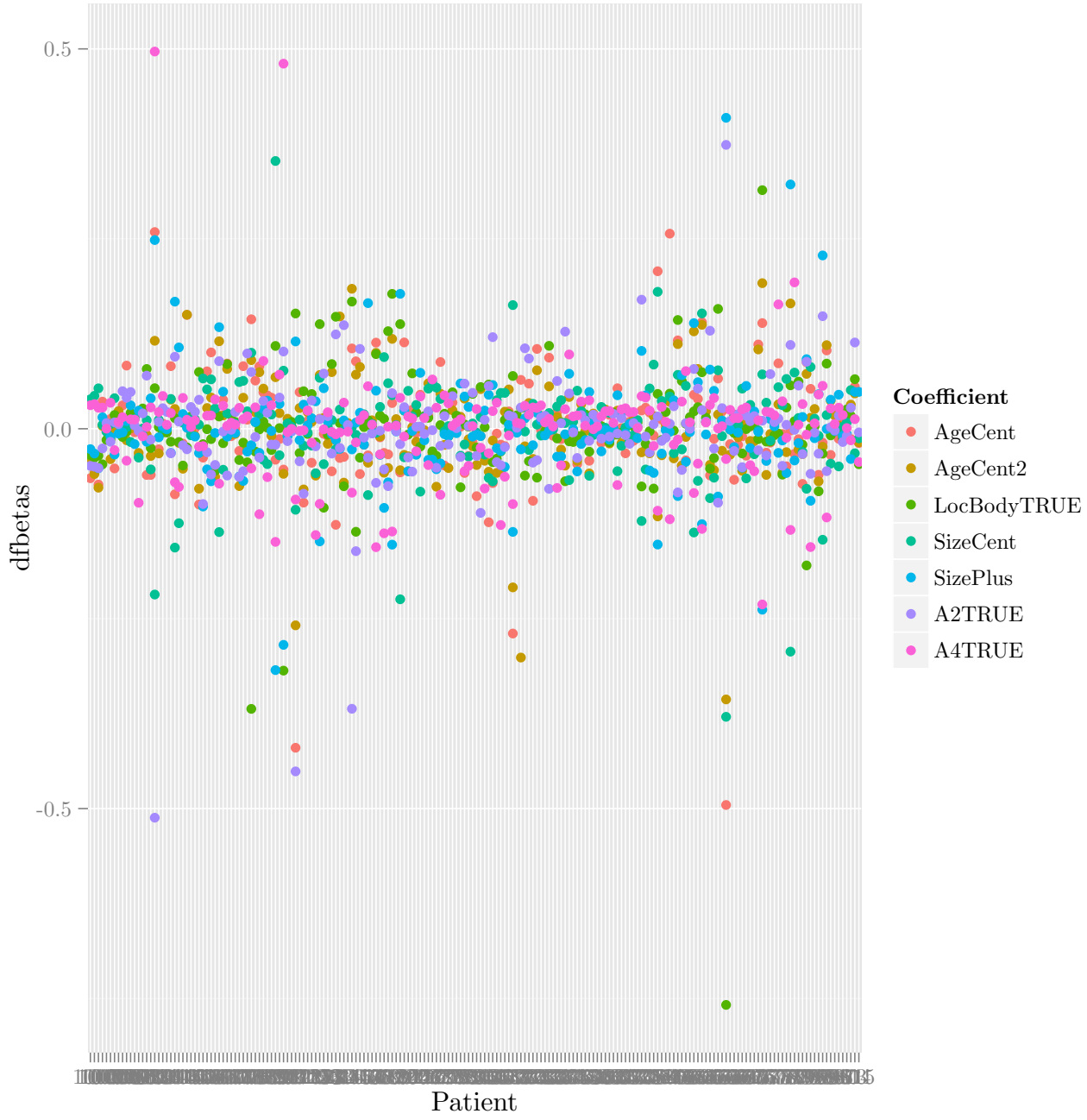



```
boxplot(resid(fit.cph, type = "martingale") ~ data$SexM + data$A2 + data$A4, varwidth = TRUE)
abline(h = 0)
```



Use DFBETAS to examine influence.

```
temp = resid(fit.cph, type = "dfbetas")
colnames(temp) = names(fit.cph$coefficients)
temp = melt(temp)
colnames(temp) = c("Patient", "Coefficient", "dfbetas")
temp$Patient = gsub("NSWPCN_", "", temp$Patient)
ggplot(temp, aes(y = dfbetas, x = Patient, col = Coefficient)) + geom_point()
```



There is quite a number of rather influential observations. These could do with some checking, but first collapse down the model – there's little point doing dfbeta fucking about based on coefficients that will never get fit in the end anyway.

4.4 EDA: Variable selection

```
nobs.coxph <<- function(obj, ...) sum(obj$y[,2])
# Note: Exhaustive search at level 2 is only feasible for at most 5 variables
#fit.cph.as = glmulti(Surv(Time, DSD) ~ strata(SexM) + AgeCent + AgeCent2 + LocBody + SizeCent + SizePlu
set.seed(20150110)
fit.cph.as = glmulti(Surv(Time, DSD) ~ strata(SexM) + AgeCent + AgeCent2 + LocBody + SizeCent + SizePlus

## Initialization...
```

```
## TASK: Genetic algorithm in the candidate set.
## Initialization...
## Algorithm started...
##
## After 10 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+AgeCent2+LocBody+SizeCent+SizePlus+A2+A4+SizePlus:SizeCent+
## Crit= 1354.28574554096
## Mean crit= 1389.08061331627
## Change in best IC: -8645.71425445904 / Change in mean IC: -8610.91938668373
##
## After 20 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+AgeCent2+LocBody+SizeCent+SizePlus+A2+A4+SizePlus:AgeCent2+
## Crit= 1347.5197391119
## Mean crit= 1380.49806590263
## Change in best IC: -6.76600642905873 / Change in mean IC: -8.5825474136393
##
## After 30 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+AgeCent2+SizeCent+SizePlus+A2+A4+A2:AgeCent2+A2:SizeCent+A2
## Crit= 1335.47630295753
## Mean crit= 1377.01558685262
## Change in best IC: -12.0434361543705 / Change in mean IC: -3.48247905001313
##
## After 40 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+AgeCent2+SizeCent+SizePlus+A2+A4+A2:AgeCent2+A2:SizeCent+A2
## Crit= 1335.47630295753
## Mean crit= 1373.6984486489
## Change in best IC: 0 / Change in mean IC: -3.3171382037242
##
## After 50 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+AgeCent2+SizeCent+SizePlus+A2+A4+A2:SizeCent+A2:SizePlus
## Crit= 1327.30049854276
## Mean crit= 1370.31952603325
## Change in best IC: -8.1758044147673 / Change in mean IC: -3.37892261564252
##
## After 60 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+AgeCent2+SizeCent+SizePlus+A2+A4+A2:SizeCent+A2:SizePlus+A4
## Crit= 1327.05884451455
## Mean crit= 1368.52203696429
## Change in best IC: -0.241654028217681 / Change in mean IC: -1.79748906896225
##
## After 70 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+SizePlus+A2+A4+A2:SizeCent+A2:SizePlus+A4:A2
## Crit= 1322.2188775423
## Mean crit= 1367.33736017854
## Change in best IC: -4.83996697225052 / Change in mean IC: -1.18467678575053
##
## After 80 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+SizePlus+A2+A4+A2:SizeCent+A2:SizePlus+A4:A2
## Crit= 1322.2188775423
## Mean crit= 1364.87343806893
## Change in best IC: 0 / Change in mean IC: -2.46392210960857
##
## After 90 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+SizePlus+A2+A4+A2:SizeCent+A2:SizePlus
```

```
## Crit= 1322.1189070341
## Mean crit= 1363.4646098969
## Change in best IC: -0.0999705081956108 / Change in mean IC: -1.40882817202873
##
## After 100 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+SizePlus+A2+A4+A2:SizeCent+A2:SizePlus
## Crit= 1322.1189070341
## Mean crit= 1362.68636612614
## Change in best IC: 0 / Change in mean IC: -0.77824377076422
##
## After 110 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+SizePlus+A2+A4+A2:SizeCent+A2:SizePlus
## Crit= 1322.1189070341
## Mean crit= 1361.22836551388
## Change in best IC: 0 / Change in mean IC: -1.45800061225532
##
## After 120 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+SizePlus+A2+A4+A2:SizeCent+A2:SizePlus
## Crit= 1322.1189070341
## Mean crit= 1359.50645469942
## Change in best IC: 0 / Change in mean IC: -1.7219108144634
##
## After 130 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+SizePlus+A2+A4+A2:SizeCent+A2:SizePlus
## Crit= 1322.1189070341
## Mean crit= 1358.59551250947
## Change in best IC: 0 / Change in mean IC: -0.910942189947946
##
## After 140 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+SizePlus+A2+A4+A2:SizeCent+A2:SizePlus
## Crit= 1322.1189070341
## Mean crit= 1358.01538857016
## Change in best IC: 0 / Change in mean IC: -0.580123939309942
##
## After 150 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+SizePlus+A2+A4+A2:SizeCent+A2:SizePlus
## Crit= 1322.1189070341
## Mean crit= 1357.9376161506
## Change in best IC: 0 / Change in mean IC: -0.0777724195659175
##
## After 160 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+SizePlus+A2+A4+A2:SizeCent+A2:SizePlus
## Crit= 1322.1189070341
## Mean crit= 1356.46885834002
## Change in best IC: 0 / Change in mean IC: -1.46875781057724
##
## After 170 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+SizePlus+A2+A4+A2:SizeCent+A2:SizePlus
## Crit= 1322.1189070341
## Mean crit= 1355.4352368695
## Change in best IC: 0 / Change in mean IC: -1.03362147052326
##
## After 180 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+SizePlus+A2+A4+A2:SizeCent+A2:SizePlus
```

```
## Crit= 1322.1189070341
## Mean crit= 1355.4352368695
## Change in best IC: 0 / Change in mean IC: 0

## Warning in fitter(X, Y, strats, offset, init, control, weights = weights, :  Loglik converged
before variable  3 ; beta may be infinite.

##
## After 190 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+A2+A4+A2:SizeCent
## Crit= 1319.04026884741
## Mean crit= 1354.42684856463
## Change in best IC: -3.0786381866892 / Change in mean IC: -1.00838830486259
##
## After 200 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+A2+A4+A2:SizeCent
## Crit= 1319.04026884741
## Mean crit= 1354.2616269749
## Change in best IC: 0 / Change in mean IC: -0.165221589737939
##
## After 210 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+A2+A4
## Crit= 1313.86182415827
## Mean crit= 1352.48919986557
## Change in best IC: -5.17844468913768 / Change in mean IC: -1.7724271093266
##
## After 220 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+A2+A4
## Crit= 1313.86182415827
## Mean crit= 1351.81721667487
## Change in best IC: 0 / Change in mean IC: -0.671983190697119

## Warning in fitter(X, Y, strats, offset, init, control, weights = weights, :  Loglik converged
before variable  3 ; beta may be infinite.

##
## After 230 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+A2+A4
## Crit= 1313.86182415827
## Mean crit= 1350.98166979759
## Change in best IC: 0 / Change in mean IC: -0.835546877286561
##
## After 240 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+A2+A4
## Crit= 1313.86182415827
## Mean crit= 1350.72264968577
## Change in best IC: 0 / Change in mean IC: -0.259020111812561
##
## After 250 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+A2+A4
## Crit= 1313.86182415827
## Mean crit= 1350.72264968577
## Change in best IC: 0 / Change in mean IC: 0
##
## After 260 generations:
```

```
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+A2+A4
## Crit= 1313.86182415827
## Mean crit= 1349.09919154119
## Change in best IC: 0 / Change in mean IC: -1.62345814458763
##
## After 270 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+A2+A4
## Crit= 1313.86182415827
## Mean crit= 1348.97499717855
## Change in best IC: 0 / Change in mean IC: -0.124194362634853
##
## After 280 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+A2+A4
## Crit= 1313.86182415827
## Mean crit= 1348.20047884048
## Change in best IC: 0 / Change in mean IC: -0.774518338069356
##
## After 290 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+A2+A4
## Crit= 1313.86182415827
## Mean crit= 1347.63434266772
## Change in best IC: 0 / Change in mean IC: -0.566136172765709
##
## After 300 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+A2+A4
## Crit= 1313.86182415827
## Mean crit= 1347.63434266772
## Change in best IC: 0 / Change in mean IC: 0
##
## After 310 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+A2+A4
## Crit= 1313.86182415827
## Mean crit= 1347.63434266772
## Change in best IC: 0 / Change in mean IC: 0
##
## After 320 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+A2+A4
## Crit= 1313.86182415827
## Mean crit= 1347.50385351425
## Change in best IC: 0 / Change in mean IC: -0.130489153465305
##
## After 330 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+A2+A4
## Crit= 1313.86182415827
## Mean crit= 1347.50385351425
## Change in best IC: 0 / Change in mean IC: 0
##
## After 340 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+A2+A4
## Crit= 1313.86182415827
## Mean crit= 1347.46832064224
## Change in best IC: 0 / Change in mean IC: -0.0355328720097532
##
```

```
## After 350 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+A2+A4
## Crit= 1313.86182415827
## Mean crit= 1346.2647364989
## Change in best IC: 0 / Change in mean IC: -1.20358414334032
##
## After 360 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+A2+A4
## Crit= 1313.86182415827
## Mean crit= 1346.23872029283
## Change in best IC: 0 / Change in mean IC: -0.0260162060701532
##
## After 370 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+A2+A4
## Crit= 1313.86182415827
## Mean crit= 1346.10925658884
## Change in best IC: 0 / Change in mean IC: -0.129463703985721
##
## After 380 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+A2+A4
## Crit= 1313.86182415827
## Mean crit= 1345.53002602703
## Change in best IC: 0 / Change in mean IC: -0.579230561817212
##
## After 390 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+A2+A4
## Crit= 1313.86182415827
## Mean crit= 1345.53002602703
## Change in best IC: 0 / Change in mean IC: 0
##
## After 400 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+A2+A4
## Crit= 1313.86182415827
## Mean crit= 1345.5077951485
## Change in best IC: 0 / Change in mean IC: -0.0222308785255336
##
## After 410 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+A2+A4
## Crit= 1313.86182415827
## Mean crit= 1345.50206758174
## Change in best IC: 0 / Change in mean IC: -0.00572756675614983
##
## After 420 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+A2+A4
## Crit= 1313.86182415827
## Mean crit= 1345.20503158788
## Change in best IC: 0 / Change in mean IC: -0.297035993865393
##
## After 430 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+A2+A4
## Crit= 1313.86182415827
## Mean crit= 1345.06006511155
## Change in best IC: 0 / Change in mean IC: -0.144966476329046
##
```

```
## After 440 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+A2+A4
## Crit= 1313.86182415827
## Mean crit= 1344.91463821575
## Change in best IC: 0 / Change in mean IC: -0.145426895802984
##
## After 450 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+A2+A4
## Crit= 1313.86182415827
## Mean crit= 1344.27812042665
## Change in best IC: 0 / Change in mean IC: -0.636517789095478
##
## After 460 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+A2+A4
## Crit= 1313.86182415827
## Mean crit= 1344.2388364852
## Change in best IC: 0 / Change in mean IC: -0.0392839414539594
##
## After 470 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+A2+A4
## Crit= 1313.86182415827
## Mean crit= 1344.2388364852
## Change in best IC: 0 / Change in mean IC: 0
##
## After 480 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+A2+A4
## Crit= 1313.86182415827
## Mean crit= 1344.21229867826
## Change in best IC: 0 / Change in mean IC: -0.0265378069345843
##
## After 490 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+A2+A4
## Crit= 1313.86182415827
## Mean crit= 1344.19890365158
## Change in best IC: 0 / Change in mean IC: -0.013395026684293
##
## After 500 generations:
## Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+A2+A4
## Crit= 1313.86182415827
## Mean crit= 1344.19042753282
## Improvements in best and average IC have bebingo en below the specified goals.
## Algorithm is declared to have converged.
## Completed.
```

```
# fit.cph.as
# After 830 generations:
# Best model: Surv(Time,DSD)~1+strata(SexM)+SizeCent+A2+A4
# Crit= 1367.16344569113
# Mean crit= 1401.37248769175
# Improvements in best and average IC have bebingo en below the specified goals.
# Algorithm is declared to have converged.
# Completed.
fit.cph.as
```

```
## An object of class "glmulti"
```

```
## Slot "name":
## [1] "glmulti.analysis"
##
## Slot "params":
## $name
## [1] "glmulti.analysis"
##
## $intercept
## [1] TRUE
##
## $marginality
## [1] TRUE
##
## $bnch
## [1] 30
##
## $chunk
## [1] 1
##
## $chunks
## [1] 1
##
## $level
## [1] 2
##
## $minsize
## [1] 0
##
## $maxsize
## [1] -1
##
## $minK
## [1] 0
##
## $maxK
## [1] -1
##
## $method
## [1] "g"
##
## $crit
## [1] "bic"
##
## $confsetsize
## [1] 100
##
## $fitfunction
## [1] "coxph"
##
## $popsize
## [1] 100
##
## $mutrate
## [1] 0.001
```

```
##
## $sexrate
## [1] 0.1
##
## $imm
## [1] 0.3
##
## $plotty
## [1] FALSE
##
## $deltaM
## [1] 0.05
##
## $deltaB
## [1] 0.05
##
## $conseq
## [1] 5
##
## $resumefile
## [1] "id"
##
## $generations
## [1] 500
##
## $elapsed
## [1] 4.159
##
## $dynat
##  [1]  6.001 10.904 15.749 20.504 25.417 30.367 34.698 39.977 44.896 50.288
## [11] 54.940  1.007  1.092  1.175  1.258  1.330  1.408  1.496  1.576  1.657
## [21]  1.740  1.823  1.900  1.978  2.058  2.139  2.234  2.309  2.385  2.459
## [31]  2.538  2.620  2.698  2.801  2.884  2.968  3.050  3.143  3.227  3.306
## [41]  3.384  3.463  3.540  3.614  3.707  3.787  3.882  3.978  4.059  4.139
##
## $dynab
##  [1] 1354 1348 1335 1335 1327 1327 1322 1322 1322 1322 1322 1322 1322 1322
## [15] 1322 1322 1322 1322 1319 1319 1314 1314 1314 1314 1314 1314 1314 1314
## [29] 1314 1314 1314 1314 1314 1314 1314 1314 1314 1314 1314 1314 1314 1314
## [43] 1314 1314 1314 1314 1314 1314 1314 1314
##
## $dynam
##  [1] 1389 1380 1377 1374 1370 1369 1367 1365 1363 1363 1361 1360 1359 1358
## [15] 1358 1356 1355 1355 1354 1354 1352 1352 1351 1351 1351 1349 1349 1348
## [29] 1348 1348 1348 1348 1348 1347 1346 1346 1346 1346 1346 1346 1346 1345
## [43] 1345 1345 1344 1344 1344 1344 1344 1344
##
##
## Slot "nbmods":
## [1] 100
##
## Slot "crits":
##   [1] 1314 1315 1316 1316 1316 1317 1318 1318 1318 1318 1318 1319 1319 1319
##  [15] 1322 1322 1323 1323 1323 1323 1323 1325 1325 1325 1326 1326 1327 1327
```

```
##  [29] 1327 1327 1327 1327 1327 1327 1328 1329 1335 1338 1339 1341 1341 1341
##  [43] 1348 1348 1349 1350 1351 1351 1353 1353 1353 1354 1354 1354 1354 1354
##  [57] 1355 1355 1355 1356 1357 1357 1357 1357 1357 1358 1358 1358 1359 1359
##  [71] 1359 1359 1359 1360 1360 1360 1361 1361 1361 1361 1362 1362 1362 1362
##  [85] 1362 1363 1363 1363 1363 1363 1363 1363 1363 1363 1363 1364 1364 1364
##  [99] 1364 1364
##
## Slot "K":
##   [1]  4  3  3  5  3  5  5  5  5  5  5  5  5  5  7  8  6  6  6  6  6  8  8
##  [24]  7  8  9  8  8  9  9  8  8  9  7  7  9 10 11 11 11 11 11 13 14 12 11
##  [47] 14 15 12 14 13 14 15 14 14 13 13 14 14 14 13 15 15 14 14 14 16 15 17
##  [70] 15 15 16 15 16 15 17 16 15 15 17 15 15 15 15 16 16 15 16 16 15 16 16
##  [93] 15 17 16 17 15 15 17 15
##
## Slot "formulas":
## [[1]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + SizeCent + A2 + A4
## <environment: 0x5313260>
##
## [[2]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + A2 + A4
## <environment: 0x5313260>
##
## [[3]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + SizeCent + A2
## <environment: 0x5313260>
##
## [[4]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + SizeCent + A2 + A4 + A4:A2
## <environment: 0x5313260>
##
## [[5]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + SizeCent + A4
## <environment: 0x5313260>
##
## [[6]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + SizeCent + A2 + A4 + strata(SexM):SizeCent
## <environment: 0x5313260>
##
## [[7]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + SizeCent + A2 + A4 + A4:SizeCent
## <environment: 0x5313260>
##
## [[8]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + LocBody + SizeCent + A2 +
##     A4
## <environment: 0x5313260>
##
## [[9]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + SizeCent + SizePlus + A2 +
##     A4
## <environment: 0x5313260>
##
```

```
## [[10]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + SizeCent + A2 + A4 + strata(SexM):A2
## <environment: 0x5313260>
##
## [[11]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + SizeCent + A2 +
##     A4
## <environment: 0x5313260>
##
## [[12]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent2 + SizeCent + A2 +
##     A4
## <environment: 0x5313260>
##
## [[13]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + SizeCent + A2 + A4 + strata(SexM):A4
## <environment: 0x5313260>
##
## [[14]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + SizeCent + A2 + A4 + A2:SizeCent
## <environment: 0x5313260>
##
## [[15]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + SizeCent + SizePlus + A2 +
##     A4 + A2:SizeCent + A2:SizePlus
## <environment: 0x5313260>
##
## [[16]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + SizeCent + SizePlus + A2 +
##     A4 + A2:SizeCent + A2:SizePlus + A4:A2
## <environment: 0x5313260>
##
## [[17]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + SizeCent + SizePlus + A2 +
##     A4 + A2:SizePlus
## <environment: 0x5313260>
##
## [[18]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + LocBody + SizeCent +
##     A2 + A4
## <environment: 0x5313260>
##
## [[19]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + SizeCent + SizePlus + A2 +
##     A2:SizeCent + A2:SizePlus
## <environment: 0x5313260>
##
## [[20]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + LocBody + SizeCent + A2 +
##     A4 + A2:SizeCent
## <environment: 0x5313260>
##
## [[21]]
```

```
## Surv(Time, DSD) ~ 1 + strata(SexM) + SizeCent + SizePlus + A2 +
##     A4 + A2:SizeCent
## <environment: 0x5313260>
##
## [[22]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + SizeCent + SizePlus + A2 +
##     A4 + A2:SizeCent + A2:SizePlus + strata(SexM):SizePlus
## <environment: 0x5313260>
##
## [[23]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + SizeCent + SizePlus + A2 +
##     A4 + A2:SizeCent + A2:SizePlus + strata(SexM):SizeCent
## <environment: 0x5313260>
##
## [[24]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + SizeCent + SizePlus + A2 +
##     A4 + A2:SizeCent + A4:A2
## <environment: 0x5313260>
##
## [[25]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + LocBody + SizeCent + SizePlus +
##     A2 + A4 + A2:SizeCent + A2:SizePlus
## <environment: 0x5313260>
##
## [[26]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + SizeCent + SizePlus + A2 +
##     A4 + A2:SizeCent + A2:SizePlus + A4:SizeCent + A4:A2
## <environment: 0x5313260>
##
## [[27]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + SizeCent + SizePlus + A2 +
##     A4 + A2:SizeCent + A2:SizePlus + A4:SizeCent
## <environment: 0x5313260>
##
## [[28]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + SizeCent + SizePlus + A2 +
##     A4 + A2:SizeCent + A2:SizePlus + A4:SizePlus
## <environment: 0x5313260>
##
## [[29]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent2 + SizeCent + SizePlus +
##     A2 + A4 + A2:SizeCent + A2:SizePlus + A4:A2
## <environment: 0x5313260>
##
## [[30]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + SizeCent + SizePlus + A2 +
##     A4 + SizePlus:SizeCent + A2:SizeCent + A2:SizePlus + A4:A2
## <environment: 0x5313260>
##
## [[31]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + SizeCent + SizePlus + A2 +
##     A4 + A2:SizeCent + A2:SizePlus + strata(SexM):A4
## <environment: 0x5313260>
```

```
##
## [[32]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent2 + SizeCent + SizePlus +
##     A2 + A4 + A2:SizeCent + A2:SizePlus
## <environment: 0x5313260>
##
## [[33]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + SizeCent + SizePlus + A2 +
##     A4 + A2:SizeCent + A2:SizePlus + A4:A2 + strata(SexM):A2
## <environment: 0x5313260>
##
## [[34]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent2 + SizeCent + SizePlus +
##     A2 + A4 + A2:SizePlus
## <environment: 0x5313260>
##
## [[35]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent2 + SizeCent + SizePlus +
##     A2 + A4 + A2:SizeCent
## <environment: 0x5313260>
##
## [[36]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent2 + SizeCent + SizePlus +
##     A2 + A4 + SizeCent:AgeCent2 + A2:SizeCent + A2:SizePlus
## <environment: 0x5313260>
##
## [[37]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent2 + SizeCent + SizePlus +
##     A2 + A4 + A2:AgeCent2 + A2:SizeCent + A2:SizePlus + A4:SizeCent
## <environment: 0x5313260>
##
## [[38]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent2 + SizeCent + SizePlus +
##     A2 + A4 + SizeCent:AgeCent2 + A2:AgeCent2 + A2:SizeCent +
##     A2:SizePlus + A4:SizeCent
## <environment: 0x5313260>
##
## [[39]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent2 + LocBody + SizeCent +
##     SizePlus + A2 + A4 + A2:AgeCent2 + A2:SizeCent + A2:SizePlus +
##     A4:SizeCent
## <environment: 0x5313260>
##
## [[40]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent2 + SizeCent + SizePlus +
##     A2 + A4 + A2:AgeCent2 + A2:SizeCent + A2:SizePlus + A4:SizeCent +
##     strata(SexM):AgeCent2
## <environment: 0x5313260>
##
## [[41]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent2 + SizeCent + SizePlus +
##     A2 + A4 + A2:AgeCent2 + A2:SizeCent + A2:SizePlus + A4:SizeCent +
##     strata(SexM):A4
## <environment: 0x5313260>
```

```
##
## [[42]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent2 + SizeCent + SizePlus +
##     A2 + A4 + A2:AgeCent2 + A2:SizeCent + A2:SizePlus + A4:SizeCent +
##     A4:SizePlus
## <environment: 0x5313260>
##
## [[43]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent2 + LocBody + SizeCent +
##     SizePlus + A2 + A4 + SizePlus:AgeCent2 + A2:AgeCent2 + A2:LocBody +
##     A2:SizeCent + A2:SizePlus + A4:SizeCent
## <environment: 0x5313260>
##
## [[44]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent2 + LocBody + SizeCent +
##     SizePlus + A2 + A4 + SizeCent:AgeCent2 + SizeCent:LocBody +
##     A2:LocBody + A2:SizeCent + A2:SizePlus + A4:SizeCent + A4:A2
## <environment: 0x5313260>
##
## [[45]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + LocBody + SizeCent + SizePlus +
##     A2 + A4 + A2:LocBody + A4:LocBody + A4:SizeCent + A4:SizePlus +
##     strata(SexM):LocBody + strata(SexM):SizeCent
## <environment: 0x5313260>
##
## [[46]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + AgeCent2 + SizeCent +
##     SizePlus + A4 + SizePlus:AgeCent2 + SizePlus:SizeCent + A4:AgeCent +
##     A4:SizeCent + strata(SexM):SizeCent
## <environment: 0x5313260>
##
## [[47]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + AgeCent2 + LocBody +
##     SizeCent + SizePlus + A2 + A4 + AgeCent2:AgeCent + SizeCent:AgeCent2 +
##     A4:AgeCent2 + A4:SizePlus + A4:A2 + strata(SexM):A2
## <environment: 0x5313260>
##
## [[48]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + LocBody + SizeCent +
##     SizePlus + A2 + A4 + SizePlus:AgeCent + A2:LocBody + A2:SizeCent +
##     A2:SizePlus + A4:SizePlus + A4:A2 + strata(SexM):SizePlus +
##     strata(SexM):A4
## <environment: 0x5313260>
##
## [[49]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + AgeCent2 + LocBody +
##     SizeCent + SizePlus + A4 + SizePlus:SizeCent + A4:AgeCent2 +
##     A4:SizePlus + strata(SexM):AgeCent + strata(SexM):LocBody
## <environment: 0x5313260>
##
## [[50]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent2 + LocBody + SizeCent +
##     SizePlus + A2 + A4 + SizePlus:AgeCent2 + A2:AgeCent2 + A2:LocBody +
##     A2:SizeCent + A2:SizePlus + A4:SizeCent + strata(SexM):LocBody
```

```
## <environment: 0x5313260>
##
## [[51]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + AgeCent2 + LocBody +
##     SizeCent + SizePlus + A2 + A4 + LocBody:AgeCent2 + SizeCent:AgeCent +
##     SizePlus:AgeCent + A2:SizeCent + A4:AgeCent
## <environment: 0x5313260>
##
## [[52]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent2 + LocBody + SizeCent +
##     SizePlus + A2 + A4 + SizePlus:AgeCent2 + A2:AgeCent2 + A2:LocBody +
##     A2:SizeCent + A4:AgeCent2 + A4:LocBody + A4:A2
## <environment: 0x5313260>
##
## [[53]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + AgeCent2 + LocBody +
##     SizeCent + SizePlus + A2 + A4 + SizePlus:AgeCent2 + A2:AgeCent +
##     A2:SizeCent + A2:SizePlus + A4:A2 + strata(SexM):AgeCent2 +
##     strata(SexM):LocBody
## <environment: 0x5313260>
##
## [[54]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent2 + LocBody + SizeCent +
##     SizePlus + A2 + A4 + SizePlus:SizeCent + A2:AgeCent2 + A2:LocBody +
##     A2:SizeCent + A4:AgeCent2 + A4:LocBody + A4:A2
## <environment: 0x5313260>
##
## [[55]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + AgeCent2 + LocBody +
##     SizeCent + A2 + A4 + AgeCent2:AgeCent + LocBody:AgeCent2 +
##     A4:SizeCent + A4:A2 + strata(SexM):AgeCent2 + strata(SexM):SizeCent +
##     strata(SexM):A2
## <environment: 0x5313260>
##
## [[56]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + AgeCent2 + LocBody +
##     SizeCent + SizePlus + A2 + A4 + SizeCent:AgeCent2 + SizePlus:AgeCent2 +
##     A2:AgeCent2 + A2:SizePlus + strata(SexM):AgeCent
## <environment: 0x5313260>
##
## [[57]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + LocBody + SizeCent +
##     SizePlus + A2 + A4 + SizeCent:AgeCent + SizeCent:LocBody +
##     SizePlus:SizeCent + A2:SizePlus + strata(SexM):LocBody +
##     strata(SexM):A2
## <environment: 0x5313260>
##
## [[58]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + LocBody + SizeCent +
##     SizePlus + A2 + A4 + SizeCent:LocBody + A4:LocBody + A4:SizePlus +
##     strata(SexM):AgeCent + strata(SexM):SizePlus + strata(SexM):A2 +
##     strata(SexM):A4
## <environment: 0x5313260>
##
```

```
## [[59]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + AgeCent2 + LocBody +
##     SizeCent + SizePlus + A2 + A4 + AgeCent2:AgeCent + SizeCent:AgeCent +
##     SizePlus:LocBody + A4:LocBody + A4:SizeCent + strata(SexM):A2
## <environment: 0x5313260>
##
## [[60]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent2 + LocBody + SizeCent +
##     A2 + A4 + LocBody:AgeCent2 + SizeCent:AgeCent2 + SizeCent:LocBody +
##     A2:AgeCent2 + A2:SizeCent + A4:A2 + strata(SexM):LocBody +
##     strata(SexM):A2
## <environment: 0x5313260>
##
## [[61]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + AgeCent2 + LocBody +
##     SizeCent + A2 + A4 + AgeCent2:AgeCent + LocBody:AgeCent +
##     A2:AgeCent + strata(SexM):AgeCent2 + strata(SexM):LocBody +
##     strata(SexM):A4
## <environment: 0x5313260>
##
## [[62]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent2 + LocBody + SizeCent +
##     SizePlus + A2 + A4 + SizeCent:AgeCent2 + SizePlus:LocBody +
##     SizePlus:SizeCent + A2:AgeCent2 + A2:LocBody + A2:SizeCent +
##     A4:SizeCent + strata(SexM):SizeCent
## <environment: 0x5313260>
##
## [[63]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + AgeCent2 + LocBody +
##     SizeCent + SizePlus + A2 + AgeCent2:AgeCent + LocBody:AgeCent2 +
##     SizeCent:AgeCent + SizeCent:AgeCent2 + A2:SizeCent + A2:SizePlus +
##     strata(SexM):AgeCent + strata(SexM):A2
## <environment: 0x5313260>
##
## [[64]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + AgeCent2 + LocBody +
##     SizeCent + SizePlus + A2 + A4 + AgeCent2:AgeCent + SizeCent:AgeCent2 +
##     A2:LocBody + A2:SizeCent + A4:LocBody + strata(SexM):AgeCent
## <environment: 0x5313260>
##
## [[65]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + LocBody + SizeCent +
##     SizePlus + A2 + LocBody:AgeCent + SizeCent:AgeCent + SizeCent:LocBody +
##     SizePlus:AgeCent + A2:LocBody + A2:SizeCent + A2:SizePlus +
##     strata(SexM):A2
## <environment: 0x5313260>
##
## [[66]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + AgeCent2 + LocBody +
##     SizeCent + SizePlus + A2 + A4 + LocBody:AgeCent2 + SizePlus:AgeCent2 +
##     SizePlus:LocBody + A2:AgeCent2 + A2:LocBody + strata(SexM):A4
## <environment: 0x5313260>
##
```

```
## [[67]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + LocBody + SizeCent +
##     SizePlus + A2 + A4 + SizeCent:LocBody + SizePlus:AgeCent +
##     SizePlus:LocBody + A2:SizeCent + A2:SizePlus + A4:LocBody +
##     A4:SizePlus + strata(SexM):LocBody + strata(SexM):SizePlus
## <environment: 0x5313260>
##
## [[68]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + AgeCent2 + LocBody +
##     SizeCent + SizePlus + A2 + A4 + AgeCent2:AgeCent + LocBody:AgeCent +
##     SizePlus:AgeCent + SizePlus:SizeCent + A4:A2 + strata(SexM):LocBody +
##     strata(SexM):SizePlus
## <environment: 0x5313260>
##
## [[69]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent2 + LocBody + SizeCent +
##     SizePlus + A2 + A4 + SizeCent:AgeCent2 + SizePlus:AgeCent2 +
##     SizePlus:LocBody + A2:LocBody + A2:SizeCent + A2:SizePlus +
##     A4:A2 + strata(SexM):SizePlus + strata(SexM):A2 + strata(SexM):A4
## <environment: 0x5313260>
##
## [[70]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent2 + LocBody + SizeCent +
##     SizePlus + A2 + A4 + LocBody:AgeCent2 + SizePlus:SizeCent +
##     A2:LocBody + A4:A2 + strata(SexM):LocBody + strata(SexM):SizeCent +
##     strata(SexM):A2 + strata(SexM):A4
## <environment: 0x5313260>
##
## [[71]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent2 + LocBody + SizeCent +
##     SizePlus + A2 + A4 + SizePlus:SizeCent + A2:AgeCent2 + A2:LocBody +
##     A2:SizeCent + A4:AgeCent2 + A4:LocBody + A4:SizeCent + A4:A2
## <environment: 0x5313260>
##
## [[72]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent2 + LocBody + SizeCent +
##     SizePlus + A2 + A4 + SizeCent:LocBody + SizePlus:AgeCent2 +
##     SizePlus:LocBody + A2:AgeCent2 + A2:SizeCent + A2:SizePlus +
##     A4:LocBody + A4:SizeCent + strata(SexM):A4
## <environment: 0x5313260>
##
## [[73]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + AgeCent2 + LocBody +
##     SizeCent + SizePlus + A2 + A4 + SizeCent:AgeCent2 + SizeCent:LocBody +
##     A2:AgeCent + A2:LocBody + A4:SizeCent + strata(SexM):LocBody +
##     strata(SexM):SizeCent
## <environment: 0x5313260>
##
## [[74]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + AgeCent2 + LocBody +
##     SizeCent + SizePlus + A2 + A4 + AgeCent2:AgeCent + SizeCent:AgeCent2 +
##     SizePlus:AgeCent + A4:AgeCent2 + A4:A2 + strata(SexM):AgeCent2 +
##     strata(SexM):SizePlus + strata(SexM):A2
```

```
## <environment: 0x5313260>
##
## [[75]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + AgeCent2 + LocBody +
##     SizeCent + A2 + A4 + SizeCent:AgeCent2 + SizeCent:LocBody +
##     A2:AgeCent + A4:AgeCent + A4:AgeCent2 + A4:SizeCent + strata(SexM):AgeCent2 +
##     strata(SexM):SizeCent
## <environment: 0x5313260>
##
## [[76]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent2 + LocBody + SizeCent +
##     SizePlus + A2 + A4 + SizeCent:LocBody + SizePlus:LocBody +
##     SizePlus:SizeCent + A2:AgeCent2 + A2:SizeCent + A2:SizePlus +
##     A4:SizeCent + A4:SizePlus + A4:A2 + strata(SexM):A4
## <environment: 0x5313260>
##
## [[77]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + AgeCent2 + LocBody +
##     SizeCent + SizePlus + A2 + A4 + SizeCent:AgeCent + SizeCent:AgeCent2 +
##     SizePlus:LocBody + A4:LocBody + strata(SexM):AgeCent + strata(SexM):LocBody +
##     strata(SexM):SizeCent + strata(SexM):A2
## <environment: 0x5313260>
##
## [[78]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + AgeCent2 + LocBody +
##     SizeCent + SizePlus + A2 + A4 + LocBody:AgeCent + SizePlus:AgeCent2 +
##     SizePlus:LocBody + A2:AgeCent + A4:AgeCent + A4:SizeCent +
##     strata(SexM):AgeCent2
## <environment: 0x5313260>
##
## [[79]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + AgeCent2 + LocBody +
##     SizeCent + SizePlus + A2 + A4 + LocBody:AgeCent2 + SizeCent:AgeCent +
##     SizePlus:LocBody + A2:LocBody + A2:SizePlus + A4:AgeCent2 +
##     A4:SizeCent
## <environment: 0x5313260>
##
## [[80]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + AgeCent2 + LocBody +
##     SizeCent + SizePlus + A2 + A4 + SizeCent:LocBody + SizePlus:AgeCent +
##     SizePlus:LocBody + SizePlus:SizeCent + A2:SizePlus + A4:A2 +
##     strata(SexM):SizePlus + strata(SexM):A2 + strata(SexM):A4
## <environment: 0x5313260>
##
## [[81]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + AgeCent2 + LocBody +
##     SizeCent + SizePlus + A2 + A4 + AgeCent2:AgeCent + LocBody:AgeCent +
##     LocBody:AgeCent2 + SizePlus:AgeCent + A4:SizeCent + strata(SexM):A2 +
##     strata(SexM):A4
## <environment: 0x5313260>
##
## [[82]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + AgeCent2 + LocBody +
##     SizeCent + A2 + A4 + AgeCent2:AgeCent + LocBody:AgeCent +
```

```
##     A2:SizeCent + A4:AgeCent + A4:AgeCent2 + A4:LocBody + A4:SizeCent +
##     strata(SexM):A2
## <environment: 0x5313260>
##
## [[83]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + AgeCent2 + SizeCent +
##     SizePlus + A2 + A4 + SizePlus:SizeCent + A2:AgeCent2 + A2:SizePlus +
##     A4:AgeCent + A4:SizePlus + A4:A2 + strata(SexM):AgeCent2 +
##     strata(SexM):A4
## <environment: 0x5313260>
##
## [[84]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + AgeCent2 + SizeCent +
##     SizePlus + A2 + A4 + SizeCent:AgeCent + SizePlus:AgeCent +
##     A2:AgeCent + A2:SizeCent + A4:AgeCent + A4:AgeCent2 + strata(SexM):AgeCent2 +
##     strata(SexM):SizePlus
## <environment: 0x5313260>
##
## [[85]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + AgeCent2 + LocBody +
##     SizeCent + SizePlus + A2 + A4 + LocBody:AgeCent + LocBody:AgeCent2 +
##     SizePlus:LocBody + A2:AgeCent + A4:AgeCent2 + strata(SexM):SizeCent +
##     strata(SexM):SizePlus + strata(SexM):A2
## <environment: 0x5313260>
##
## [[86]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + LocBody + SizeCent +
##     SizePlus + A2 + A4 + LocBody:AgeCent + SizeCent:AgeCent +
##     SizeCent:LocBody + A4:AgeCent + A4:SizeCent + A4:A2 + strata(SexM):AgeCent +
##     strata(SexM):SizePlus + strata(SexM):A4
## <environment: 0x5313260>
##
## [[87]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + AgeCent2 + LocBody +
##     SizeCent + SizePlus + A2 + A4 + LocBody:AgeCent2 + SizePlus:AgeCent +
##     SizePlus:AgeCent2 + SizePlus:SizeCent + A2:AgeCent + A2:LocBody +
##     A2:SizePlus
## <environment: 0x5313260>
##
## [[88]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + AgeCent2 + LocBody +
##     SizeCent + SizePlus + A2 + A4 + LocBody:AgeCent + SizeCent:LocBody +
##     A2:AgeCent + A2:SizeCent + A4:AgeCent + A4:LocBody + A4:SizePlus +
##     strata(SexM):SizePlus
## <environment: 0x5313260>
##
## [[89]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + AgeCent2 + LocBody +
##     SizeCent + SizePlus + A2 + A4 + LocBody:AgeCent2 + SizeCent:AgeCent +
##     A2:SizeCent + A4:AgeCent + A4:LocBody + A4:SizeCent + strata(SexM):AgeCent2 +
##     strata(SexM):SizePlus
## <environment: 0x5313260>
##
## [[90]]
```

```
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + AgeCent2 + LocBody +
##     SizePlus + A2 + A4 + LocBody:AgeCent + SizePlus:LocBody +
##     A2:LocBody + A2:SizePlus + A4:AgeCent + strata(SexM):AgeCent2 +
##     strata(SexM):SizePlus + strata(SexM):A4
## <environment: 0x5313260>
##
## [[91]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + AgeCent2 + LocBody +
##     SizeCent + SizePlus + A2 + A4 + AgeCent2:AgeCent + LocBody:AgeCent +
##     SizePlus:LocBody + A4:LocBody + A4:A2 + strata(SexM):AgeCent +
##     strata(SexM):LocBody + strata(SexM):A2
## <environment: 0x5313260>
##
## [[92]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + AgeCent2 + LocBody +
##     SizeCent + SizePlus + A2 + A4 + AgeCent2:AgeCent + SizeCent:LocBody +
##     SizePlus:AgeCent2 + A2:AgeCent2 + A4:AgeCent2 + A4:A2 + strata(SexM):LocBody +
##     strata(SexM):A4
## <environment: 0x5313260>
##
## [[93]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + AgeCent2 + SizeCent +
##     SizePlus + A2 + A4 + SizePlus:AgeCent + SizePlus:SizeCent +
##     A2:SizeCent + strata(SexM):AgeCent + strata(SexM):AgeCent2 +
##     strata(SexM):SizeCent + strata(SexM):A2 + strata(SexM):A4
## <environment: 0x5313260>
##
## [[94]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent2 + LocBody + SizeCent +
##     SizePlus + A2 + A4 + SizeCent:AgeCent2 + SizePlus:LocBody +
##     SizePlus:SizeCent + A4:AgeCent2 + A4:A2 + strata(SexM):AgeCent2 +
##     strata(SexM):LocBody + strata(SexM):SizeCent + strata(SexM):SizePlus +
##     strata(SexM):A4
## <environment: 0x5313260>
##
## [[95]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + AgeCent2 + LocBody +
##     SizeCent + SizePlus + A2 + A4 + SizePlus:AgeCent + SizePlus:AgeCent2 +
##     SizePlus:SizeCent + A2:LocBody + A4:AgeCent + A4:SizePlus +
##     strata(SexM):LocBody + strata(SexM):SizePlus
## <environment: 0x5313260>
##
## [[96]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + AgeCent2 + LocBody +
##     SizeCent + SizePlus + A2 + A4 + AgeCent2:AgeCent + LocBody:AgeCent2 +
##     SizeCent:AgeCent2 + SizePlus:LocBody + A2:AgeCent + A2:SizeCent +
##     A2:SizePlus + strata(SexM):AgeCent + strata(SexM):A2
## <environment: 0x5313260>
##
## [[97]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + AgeCent2 + LocBody +
##     SizePlus + A2 + A4 + AgeCent2:AgeCent + LocBody:AgeCent +
##     LocBody:AgeCent2 + A4:AgeCent + A4:LocBody + strata(SexM):AgeCent +
```

```
##     strata(SexM):AgeCent2 + strata(SexM):A2
## <environment: 0x5313260>
##
## [[98]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + AgeCent2 + LocBody +
##     SizeCent + SizePlus + A2 + A4 + AgeCent2:AgeCent + LocBody:AgeCent +
##     SizeCent:AgeCent + SizePlus:AgeCent + SizePlus:AgeCent2 +
##     A2:SizeCent + A4:AgeCent2
## <environment: 0x5313260>
##
## [[99]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + AgeCent2 + LocBody +
##     SizeCent + SizePlus + A2 + A4 + LocBody:AgeCent + SizeCent:AgeCent2 +
##     SizeCent:LocBody + SizePlus:LocBody + A4:LocBody + A4:SizeCent +
##     A4:A2 + strata(SexM):SizeCent + strata(SexM):A2
## <environment: 0x5313260>
##
## [[100]]
## Surv(Time, DSD) ~ 1 + strata(SexM) + AgeCent + LocBody + SizeCent +
##     SizePlus + A2 + A4 + LocBody:AgeCent + SizePlus:AgeCent +
##     A2:AgeCent + A2:SizeCent + A4:SizeCent + A4:SizePlus + strata(SexM):AgeCent +
##     strata(SexM):A2
## <environment: 0x5313260>
##
##
## Slot "call":
## glmulti(y = "Surv(Time, DSD)", xr = c("strata(SexM)", "AgeCent",
## "AgeCent2", "LocBody", "SizeCent", "SizePlus", "A2", "A4"), data = data,
##     exclude = 1, marginality = TRUE, level = 2, method = "g",
##     crit = "bic", plotty = FALSE, report = TRUE, fitfunction = "coxph")
##
## Slot "adi":
## list()
##
## Slot "objects":
## [[1]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##            coef exp(coef) se(coef)    z      p
## SizeCent 0.0123      1.01  0.00492 2.51 0.0120
## A2TRUE   0.5872      1.80  0.20192 2.91 0.0036
## A4TRUE   0.4747      1.61  0.18705 2.54 0.0110
##
## Likelihood ratio test=22.9  on 3 df, p=4.26e-05  n= 192, number of events= 178
##
## [[2]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##         coef exp(coef) se(coef)    z      p
```

```
## A2TRUE 0.651      1.92    0.200 3.25 0.0012
## A4TRUE 0.479      1.61    0.187 2.56 0.0100
##
## Likelihood ratio test=17  on 2 df, p=0.000205  n= 192, number of events= 178
##
## [[3]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##            coef exp(coef) se(coef)    z      p
## SizeCent 0.0122      1.01  0.00481 2.54 0.0110
## A2TRUE   0.6143      1.85  0.20122 3.05 0.0023
##
## Likelihood ratio test=15.9  on 2 df, p=0.000354  n= 192, number of events= 178
##
## [[4]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                  coef exp(coef) se(coef)      z     p
## SizeCent       0.0115     1.012  0.00493  2.336 0.019
## A2TRUE        -0.4213     0.656  0.73639 -0.572 0.570
## A4TRUE         0.3599     1.433  0.19601  1.836 0.066
## A2TRUE:A4TRUE  1.1489     3.155  0.76972  1.493 0.140
##
## Likelihood ratio test=25.8  on 4 df, p=3.5e-05  n= 192, number of events= 178
##
## [[5]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##            coef exp(coef) se(coef)    z      p
## SizeCent 0.0137      1.01   0.0048 2.85 0.0043
## A4TRUE   0.4960      1.64   0.1866 2.66 0.0079
##
## Likelihood ratio test=15.3  on 2 df, p=0.000468  n= 192, number of events= 178
##
## [[6]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                   coef exp(coef) se(coef)     z      p
## SizeCent                       0.00594      1.01  0.00709 0.838 0.4000
## A2TRUE                         0.61878      1.86  0.20325 3.044 0.0023
## A4TRUE                         0.46504      1.59  0.18704 2.486 0.0130
## strata(SexM)SexM=TRUE:SizeCent 0.01296      1.01  0.00988 1.312 0.1900
##
## Likelihood ratio test=24.6  on 4 df, p=6.01e-05  n= 192, number of events= 178
##
## [[7]]
```

```
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                     coef exp(coef) se(coef)     z      p
## SizeCent        0.00314      1.00  0.00976 0.322 0.7500
## A2TRUE          0.56119      1.75  0.20310 2.763 0.0057
## A4TRUE          0.44075      1.55  0.18867 2.336 0.0190
## SizeCent:A4TRUE 0.01291      1.01  0.01141 1.132 0.2600
##
## Likelihood ratio test=24.2  on 4 df, p=7.2e-05  n= 192, number of events= 178
##
## [[8]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##               coef exp(coef) se(coef)    z      p
## LocBodyTRUE 0.2125      1.24  0.20560 1.03 0.3000
## SizeCent    0.0108      1.01  0.00513 2.11 0.0350
## A2TRUE      0.5560      1.74  0.20501 2.71 0.0067
## A4TRUE      0.4577      1.58  0.18815 2.43 0.0150
##
## Likelihood ratio test=23.9  on 4 df, p=8.28e-05  n= 192, number of events= 178
##
## [[9]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##             coef exp(coef) se(coef)      z      p
## SizeCent  0.0267     1.027   0.0162  1.648 0.0990
## SizePlus -0.0191     0.981   0.0204 -0.936 0.3500
## A2TRUE    0.5472     1.728   0.2057  2.661 0.0078
## A4TRUE    0.4542     1.575   0.1881  2.415 0.0160
##
## Likelihood ratio test=23.8  on 4 df, p=8.85e-05  n= 192, number of events= 178
##
## [[10]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                 coef exp(coef) se(coef)      z      p
## SizeCent                      0.0119     1.012  0.00495  2.401 0.0160
## A2TRUE                        0.7492     2.115  0.28143  2.662 0.0078
## A4TRUE                        0.4574     1.580  0.18843  2.427 0.0150
## strata(SexM)SexM=TRUE:A2TRUE -0.3253     0.722  0.40887 -0.796 0.4300
##
## Likelihood ratio test=23.5  on 4 df, p=9.93e-05  n= 192, number of events= 178
##
## [[11]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
```

```
##
##
##            coef exp(coef) se(coef)     z      p
## AgeCent  0.0070      1.01  0.00894 0.783 0.4300
## SizeCent 0.0123      1.01  0.00491 2.508 0.0120
## A2TRUE   0.5769      1.78  0.20254 2.848 0.0044
## A4TRUE   0.4804      1.62  0.18723 2.566 0.0100
##
## Likelihood ratio test=23.5  on 4 df, p=1e-04  n= 192, number of events= 178
##
## [[12]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##              coef exp(coef) se(coef)     z      p
## AgeCent2 0.000457      1.00 0.000678 0.673 0.5000
## SizeCent 0.012542      1.01 0.004948 2.535 0.0110
## A2TRUE   0.589125      1.80 0.201746 2.920 0.0035
## A4TRUE   0.463574      1.59 0.187824 2.468 0.0140
##
## Likelihood ratio test=23.3  on 4 df, p=0.000109  n= 192, number of events= 178
##
## [[13]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                 coef exp(coef) se(coef)       z     p
## SizeCent                      0.0124     1.012  0.00494  2.5072 0.012
## A2TRUE                        0.5849     1.795  0.20329  2.8773 0.004
## A4TRUE                        0.4930     1.637  0.26823  1.8380 0.066
## strata(SexM)SexM=TRUE:A4TRUE -0.0361     0.965  0.37680 -0.0959 0.920
##
## Likelihood ratio test=22.9  on 4 df, p=0.000133  n= 192, number of events= 178
##
## [[14]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                     coef exp(coef) se(coef)      z     p
## SizeCent        0.012239      1.01  0.00526 2.3259 0.020
## A2TRUE          0.581023      1.79  0.22910 2.5361 0.011
## A4TRUE          0.473298      1.61  0.18855 2.5102 0.012
## SizeCent:A2TRUE 0.000869      1.00  0.01502 0.0579 0.950
##
## Likelihood ratio test=22.9  on 4 df, p=0.000133  n= 192, number of events= 178
##
## [[15]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
```

```
##                     coef exp(coef) se(coef)     z      p
## SizeCent          0.0396     1.040   0.0173  2.29 0.0220
## SizePlus         -0.0374     0.963   0.0224 -1.68 0.0940
## A2TRUE            0.0501     1.051   0.3131  0.16 0.8700
## A4TRUE            0.4479     1.565   0.1921  2.33 0.0200
## SizeCent:A2TRUE -0.1477     0.863   0.0569 -2.59 0.0095
## SizePlus:A2TRUE  0.1765     1.193   0.0658  2.68 0.0073
##
## Likelihood ratio test=30.2  on 6 df, p=3.64e-05  n= 192, number of events= 178
##
## [[16]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                     coef exp(coef) se(coef)     z      p
## SizeCent          0.0425     1.043   0.0174  2.45 0.0140
## SizePlus         -0.0413     0.960   0.0224 -1.84 0.0660
## A2TRUE           -1.4148     0.243   0.8553 -1.65 0.0980
## A4TRUE            0.2995     1.349   0.1988  1.51 0.1300
## SizeCent:A2TRUE -0.1963     0.822   0.0652 -3.01 0.0026
## SizePlus:A2TRUE  0.2227     1.249   0.0744  2.99 0.0028
## A2TRUE:A4TRUE    1.5972     4.939   0.8169  1.96 0.0510
##
## Likelihood ratio test=35.3  on 7 df, p=9.99e-06  n= 192, number of events= 178
##
## [[17]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                     coef exp(coef) se(coef)      z     p
## SizeCent          0.0294     1.030   0.0165  1.784 0.074
## SizePlus         -0.0251     0.975   0.0216 -1.164 0.240
## A2TRUE            0.4106     1.508   0.2618  1.569 0.120
## A4TRUE            0.4278     1.534   0.1906  2.245 0.025
## SizePlus:A2TRUE  0.0150     1.015   0.0167  0.896 0.370
##
## Likelihood ratio test=24.6  on 5 df, p=0.00017  n= 192, number of events= 178
##
## [[18]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                 coef exp(coef) se(coef)     z      p
## AgeCent     0.00625      1.01  0.00900 0.695 0.4900
## LocBodyTRUE 0.19882      1.22  0.20633 0.964 0.3400
## SizeCent    0.01088      1.01  0.00512 2.123 0.0340
## A2TRUE      0.54968      1.73  0.20519 2.679 0.0074
## A4TRUE      0.46440      1.59  0.18836 2.465 0.0140
##
## Likelihood ratio test=24.4  on 5 df, p=0.000181  n= 192, number of events= 178
```

```
##
## [[19]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                     coef exp(coef) se(coef)      z      p
## SizeCent          0.0450     1.046   0.0171  2.631 0.0085
## SizePlus         -0.0456     0.955   0.0220 -2.074 0.0380
## A2TRUE            0.0256     1.026   0.3087  0.083 0.9300
## SizeCent:A2TRUE -0.1372     0.872   0.0552 -2.485 0.0130
## SizePlus:A2TRUE  0.1716     1.187   0.0638  2.690 0.0071
##
## Likelihood ratio test=24.3  on 5 df, p=0.000187  n= 192, number of events= 178
##
## [[20]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                      coef exp(coef) se(coef)      z     p
## LocBodyTRUE       0.22367     1.251  0.21149  1.058 0.290
## SizeCent          0.01113     1.011  0.00534  2.087 0.037
## A2TRUE            0.57840     1.783  0.22935  2.522 0.012
## A4TRUE            0.46217     1.588  0.18931  2.441 0.015
## SizeCent:A2TRUE -0.00327     0.997  0.01547 -0.211 0.830
##
## Likelihood ratio test=24  on 5 df, p=0.00022  n= 192, number of events= 178
##
## [[21]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                      coef exp(coef) se(coef)      z     p
## SizeCent          0.02739     1.028   0.0163  1.675 0.094
## SizePlus         -0.02085     0.979   0.0212 -0.985 0.320
## A2TRUE            0.50868     1.663   0.2411  2.110 0.035
## A4TRUE            0.44481     1.560   0.1905  2.335 0.020
## SizeCent:A2TRUE  0.00503     1.005   0.0159  0.316 0.750
##
## Likelihood ratio test=23.9  on 5 df, p=0.000229  n= 192, number of events= 178
##
## [[22]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                  coef exp(coef) se(coef)      z      p
## SizeCent                       0.0396     1.040   0.0173  2.292 0.0220
## SizePlus                      -0.0491     0.952   0.0238 -2.067 0.0390
## A2TRUE                         0.0461     1.047   0.3153  0.146 0.8800
## A4TRUE                         0.4293     1.536   0.1916  2.240 0.0250
## SizeCent:A2TRUE               -0.1519     0.859   0.0569 -2.670 0.0076
```

```
## SizePlus:A2TRUE                  0.1867     1.205   0.0662  2.821 0.0048
## strata(SexM)SexM=TRUE:SizePlus  0.0219     1.022   0.0134  1.635 0.1000
##
## Likelihood ratio test=32.9  on 7 df, p=2.8e-05  n= 192, number of events= 178
##
## [[23]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                   coef exp(coef) se(coef)      z      p
## SizeCent                         0.0317     1.032   0.0178  1.775 0.0760
## SizePlus                        -0.0384     0.962   0.0224 -1.715 0.0860
## A2TRUE                           0.0367     1.037   0.3150  0.117 0.9100
## A4TRUE                           0.4322     1.541   0.1915  2.257 0.0240
## SizeCent:A2TRUE                 -0.1540     0.857   0.0571 -2.696 0.0070
## SizePlus:A2TRUE                  0.1883     1.207   0.0665  2.833 0.0046
## strata(SexM)SexM=TRUE:SizeCent  0.0165     1.017   0.0105  1.569 0.1200
##
## Likelihood ratio test=32.6  on 7 df, p=3.07e-05  n= 192, number of events= 178
##
## [[24]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                     coef exp(coef) se(coef)       z     p
## SizeCent         0.02937     1.030   0.0165  1.7782 0.075
## SizePlus        -0.02358     0.977   0.0214 -1.1028 0.270
## A2TRUE          -0.54865     0.578   0.7453 -0.7362 0.460
## A4TRUE           0.32262     1.381   0.1988  1.6226 0.100
## SizeCent:A2TRUE -0.00165     0.998   0.0165 -0.0996 0.920
## A2TRUE:A4TRUE    1.25448     3.506   0.7853  1.5974 0.110
##
## Likelihood ratio test=27.2  on 6 df, p=0.000135  n= 192, number of events= 178
##
## [[25]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                     coef exp(coef) se(coef)      z      p
## LocBodyTRUE      0.2846     1.329   0.2207  1.290 0.2000
## SizeCent         0.0421     1.043   0.0174  2.428 0.0150
## SizePlus        -0.0429     0.958   0.0228 -1.883 0.0600
## A2TRUE           0.0255     1.026   0.3152  0.081 0.9400
## A4TRUE           0.4228     1.526   0.1940  2.179 0.0290
## SizeCent:A2TRUE -0.1517     0.859   0.0572 -2.654 0.0080
## SizePlus:A2TRUE  0.1766     1.193   0.0660  2.677 0.0074
##
## Likelihood ratio test=31.8  on 7 df, p=4.49e-05  n= 192, number of events= 178
##
## [[26]]
## Call:
```

```
## fitfunc(formula = as.formula(x), data = data)
##
##
##                     coef exp(coef) se(coef)     z      p
## SizeCent         0.0325     1.033   0.0193  1.69 0.0920
## SizePlus        -0.0404     0.960   0.0226 -1.79 0.0740
## A2TRUE          -1.5080     0.221   0.8704 -1.73 0.0830
## A4TRUE           0.2612     1.299   0.2006  1.30 0.1900
## SizeCent:A2TRUE -0.1974     0.821   0.0657 -3.01 0.0026
## SizePlus:A2TRUE  0.2185     1.244   0.0749  2.92 0.0035
## SizeCent:A4TRUE  0.0141     1.014   0.0123  1.14 0.2500
## A2TRUE:A4TRUE    1.7206     5.588   0.8306  2.07 0.0380
##
## Likelihood ratio test=36.6  on 8 df, p=1.36e-05  n= 192, number of events= 178
##
## [[27]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                      coef exp(coef) se(coef)      z     p
## SizeCent         0.03196     1.032   0.0196  1.632 0.100
## SizePlus        -0.03629     0.964   0.0225 -1.614 0.110
## A2TRUE           0.06790     1.070   0.3137  0.216 0.830
## A4TRUE           0.42752     1.533   0.1932  2.212 0.027
## SizeCent:A2TRUE -0.14243     0.867   0.0569 -2.502 0.012
## SizePlus:A2TRUE  0.16767     1.183   0.0662  2.532 0.011
## SizeCent:A4TRUE  0.00999     1.010   0.0123  0.811 0.420
##
## Likelihood ratio test=30.9  on 7 df, p=6.61e-05  n= 192, number of events= 178
##
## [[28]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                     coef exp(coef) se(coef)      z     p
## SizeCent         0.0393     1.040   0.0173  2.268 0.023
## SizePlus        -0.0453     0.956   0.0250 -1.813 0.070
## A2TRUE           0.0649     1.067   0.3134  0.207 0.840
## A4TRUE           0.3656     1.441   0.2169  1.686 0.092
## SizeCent:A2TRUE -0.1442     0.866   0.0568 -2.539 0.011
## SizePlus:A2TRUE  0.1694     1.185   0.0660  2.567 0.010
## SizePlus:A4TRUE  0.0123     1.012   0.0160  0.769 0.440
##
## Likelihood ratio test=30.8  on 7 df, p=6.79e-05  n= 192, number of events= 178
##
## [[29]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                       coef exp(coef) se(coef)      z      p
```

```
## AgeCent2          0.000426     1.000 0.000715  0.595 0.5500
## SizeCent          0.041701     1.043 0.017433  2.392 0.0170
## SizePlus         -0.040262     0.961 0.022569 -1.784 0.0740
## A2TRUE           -1.503736     0.222 0.881615 -1.706 0.0880
## A4TRUE            0.280045     1.323 0.201992  1.386 0.1700
## SizeCent:A2TRUE -0.192189     0.825 0.065999 -2.912 0.0036
## SizePlus:A2TRUE  0.218294     1.244 0.075165  2.904 0.0037
## A2TRUE:A4TRUE    1.710203     5.530 0.848059  2.017 0.0440
##
## Likelihood ratio test=35.6  on 8 df, p=2.08e-05  n= 192, number of events= 178
##
## [[30]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                         coef exp(coef) se(coef)      z      p
## SizeCent            0.039448     1.040 0.018324  2.153 0.0310
## SizePlus           -0.027901     0.972 0.034621 -0.806 0.4200
## A2TRUE             -1.428638     0.240 0.862191 -1.657 0.0980
## A4TRUE              0.290861     1.338 0.199217  1.460 0.1400
## SizeCent:SizePlus -0.000281     1.000 0.000555 -0.507 0.6100
## SizeCent:A2TRUE   -0.199828     0.819 0.065751 -3.039 0.0024
## SizePlus:A2TRUE    0.227178     1.255 0.075475  3.010 0.0026
## A2TRUE:A4TRUE      1.597565     4.941 0.820724  1.947 0.0520
##
## Likelihood ratio test=35.5  on 8 df, p=2.15e-05  n= 192, number of events= 178
##
## [[31]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                  coef exp(coef) se(coef)      z      p
## SizeCent                       0.0397     1.041   0.0173  2.297 0.0220
## SizePlus                      -0.0376     0.963   0.0224 -1.680 0.0930
## A2TRUE                         0.0512     1.053   0.3133  0.164 0.8700
## A4TRUE                         0.4208     1.523   0.2712  1.552 0.1200
## SizeCent:A2TRUE               -0.1487     0.862   0.0575 -2.586 0.0097
## SizePlus:A2TRUE                0.1777     1.194   0.0663  2.678 0.0074
## strata(SexM)SexM=TRUE:A4TRUE  0.0536     1.055   0.3816  0.141 0.8900
##
## Likelihood ratio test=30.2  on 7 df, p=8.73e-05  n= 192, number of events= 178
##
## [[32]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                        coef exp(coef) se(coef)       z     p
## AgeCent2           9.94e-06     1.000 0.000717  0.0139 0.990
## SizeCent           3.96e-02     1.040 0.017354  2.2831 0.022
## SizePlus          -3.74e-02     0.963 0.022468 -1.6651 0.096
## A2TRUE             5.06e-02     1.052 0.315355  0.1605 0.870
```

```
## A4TRUE           4.48e-01     1.565 0.192669  2.3239 0.020
## SizeCent:A2TRUE -1.47e-01     0.863 0.060342 -2.4430 0.015
## SizePlus:A2TRUE  1.76e-01     1.193 0.068946  2.5562 0.011
##
## Likelihood ratio test=30.2  on 7 df, p=8.81e-05  n= 192, number of events= 178
##
## [[33]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                 coef exp(coef) se(coef)      z      p
## SizeCent                      0.0425     1.043   0.0173  2.452 0.0140
## SizePlus                     -0.0414     0.959   0.0224 -1.848 0.0650
## A2TRUE                       -1.2829     0.277   0.9522 -1.347 0.1800
## A4TRUE                        0.2996     1.349   0.1988  1.507 0.1300
## SizeCent:A2TRUE              -0.1945     0.823   0.0649 -2.996 0.0027
## SizePlus:A2TRUE               0.2196     1.246   0.0746  2.945 0.0032
## A2TRUE:A4TRUE                 1.5414     4.671   0.8356  1.845 0.0650
## strata(SexM)SexM=TRUE:A2TRUE -0.1350     0.874   0.4393 -0.307 0.7600
##
## Likelihood ratio test=35.4  on 8 df, p=2.3e-05  n= 192, number of events= 178
##
## [[34]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                      coef exp(coef) se(coef)      z     p
## AgeCent2         0.000443     1.000 0.000686  0.646 0.520
## SizeCent         0.028918     1.029 0.016530  1.749 0.080
## SizePlus        -0.024305     0.976 0.021651 -1.123 0.260
## A2TRUE           0.410276     1.507 0.261110  1.571 0.120
## A4TRUE           0.414776     1.514 0.192034  2.160 0.031
## SizePlus:A2TRUE  0.015592     1.016 0.016684  0.935 0.350
##
## Likelihood ratio test=24.9  on 6 df, p=0.000349  n= 192, number of events= 178
##
## [[35]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                      coef exp(coef) se(coef)      z     p
## AgeCent2         0.000431      1.00 0.000688  0.627 0.530
## SizeCent         0.026885      1.03 0.016374  1.642 0.100
## SizePlus        -0.020134      0.98 0.021228 -0.948 0.340
## A2TRUE           0.506173      1.66 0.240239  2.107 0.035
## A4TRUE           0.431705      1.54 0.192115  2.247 0.025
## SizeCent:A2TRUE  0.006028      1.01 0.015875  0.380 0.700
##
## Likelihood ratio test=24.2  on 6 df, p=0.000469  n= 192, number of events= 178
##
## [[36]]
```

```
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                        coef exp(coef) se(coef)      z      p
## AgeCent2          -0.000772     0.999 0.000816 -0.946 0.3400
## SizeCent           0.031234     1.032 0.017831  1.752 0.0800
## SizePlus          -0.034366     0.966 0.022688 -1.515 0.1300
## A2TRUE             0.042458     1.043 0.317657  0.134 0.8900
## A4TRUE             0.426855     1.532 0.192054  2.223 0.0260
## AgeCent2:SizeCent  0.000118     1.000 0.000062  1.908 0.0560
## SizeCent:A2TRUE   -0.191126     0.826 0.064220 -2.976 0.0029
## SizePlus:A2TRUE    0.220263     1.246 0.072716  3.029 0.0025
##
## Likelihood ratio test=33.8  on 8 df, p=4.49e-05  n= 192, number of events= 178
##
## [[37]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                       coef exp(coef) se(coef)      z      p
## AgeCent2          0.000331     1.000 0.000744  0.445 0.6600
## SizeCent          0.030812     1.031 0.019545  1.576 0.1100
## SizePlus         -0.036375     0.964 0.022668 -1.605 0.1100
## A2TRUE            0.193647     1.214 0.335491  0.577 0.5600
## A4TRUE            0.371526     1.450 0.197861  1.878 0.0600
## AgeCent2:A2TRUE -0.002670     0.997 0.002194 -1.217 0.2200
## SizeCent:A2TRUE -0.195711     0.822 0.072054 -2.716 0.0066
## SizePlus:A2TRUE  0.221610     1.248 0.080521  2.752 0.0059
## SizeCent:A4TRUE  0.011847     1.012 0.012422  0.954 0.3400
##
## Likelihood ratio test=32.4  on 9 df, p=0.000172  n= 192, number of events= 178
##
## [[38]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                        coef exp(coef) se(coef)      z      p
## AgeCent2          -0.000621     0.999 9.65e-04 -0.643 0.5200
## SizeCent           0.022614     1.023 2.02e-02  1.117 0.2600
## SizePlus          -0.033192     0.967 2.29e-02 -1.450 0.1500
## A2TRUE             0.116991     1.124 3.40e-01  0.344 0.7300
## A4TRUE             0.385310     1.470 1.97e-01  1.958 0.0500
## AgeCent2:SizeCent  0.000108     1.000 6.84e-05  1.584 0.1100
## AgeCent2:A2TRUE   -0.001135     0.999 2.37e-03 -0.479 0.6300
## SizeCent:A2TRUE   -0.203968     0.815 6.98e-02 -2.921 0.0035
## SizePlus:A2TRUE    0.229243     1.258 7.84e-02  2.925 0.0034
## SizeCent:A4TRUE    0.012208     1.012 1.26e-02  0.972 0.3300
##
## Likelihood ratio test=34.9  on 10 df, p=0.00013  n= 192, number of events= 178
##
## [[39]]
```

```
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                      coef exp(coef) se(coef)     z      p
## AgeCent2          0.00039     1.000  0.00075  0.52 0.6000
## LocBodyTRUE       0.33038     1.391  0.22246  1.49 0.1400
## SizeCent          0.03130     1.032  0.01958  1.60 0.1100
## SizePlus         -0.04163     0.959  0.02301 -1.81 0.0700
## A2TRUE            0.17894     1.196  0.33734  0.53 0.6000
## A4TRUE            0.33222     1.394  0.20057  1.66 0.0980
## AgeCent2:A2TRUE -0.00282     0.997  0.00222 -1.27 0.2100
## SizeCent:A2TRUE -0.20196     0.817  0.07325 -2.76 0.0058
## SizePlus:A2TRUE  0.22211     1.249  0.08166  2.72 0.0065
## SizeCent:A4TRUE  0.01447     1.015  0.01250  1.16 0.2500
##
## Likelihood ratio test=34.5  on 10 df, p=0.000155  n= 192, number of events= 178
##
## [[40]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                      coef exp(coef) se(coef)      z      p
## AgeCent2                         0.000498     1.000 0.000862  0.577 0.5600
## SizeCent                         0.031467     1.032 0.019617  1.604 0.1100
## SizePlus                        -0.037299     0.963 0.022801 -1.636 0.1000
## A2TRUE                           0.171899     1.188 0.340963  0.504 0.6100
## A4TRUE                           0.370734     1.449 0.197656  1.876 0.0610
## AgeCent2:A2TRUE                 -0.002378     0.998 0.002351 -1.011 0.3100
## SizeCent:A2TRUE                 -0.196877     0.821 0.072021 -2.734 0.0063
## SizePlus:A2TRUE                  0.223568     1.251 0.080587  2.774 0.0055
## SizeCent:A4TRUE                  0.011551     1.012 0.012471  0.926 0.3500
## strata(SexM)SexM=TRUE:AgeCent2 -0.000538     0.999 0.001522 -0.354 0.7200
##
## Likelihood ratio test=32.5  on 10 df, p=0.000331  n= 192, number of events= 178
##
## [[41]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                     coef exp(coef) se(coef)       z      p
## AgeCent2                        0.000336     1.000 0.000746  0.4500 0.6500
## SizeCent                        0.030799     1.031 0.019551  1.5753 0.1200
## SizePlus                       -0.036415     0.964 0.022669 -1.6064 0.1100
## A2TRUE                          0.194555     1.215 0.335763  0.5794 0.5600
## A4TRUE                          0.353355     1.424 0.276096  1.2798 0.2000
## AgeCent2:A2TRUE                -0.002654     0.997 0.002201 -1.2058 0.2300
## SizeCent:A2TRUE                -0.195737     0.822 0.072032 -2.7174 0.0066
## SizePlus:A2TRUE                 0.221650     1.248 0.080503  2.7533 0.0059
## SizeCent:A4TRUE                 0.011892     1.012 0.012426  0.9570 0.3400
## strata(SexM)SexM=TRUE:A4TRUE  0.035908     1.037 0.382358  0.0939 0.9300
##
```

```
## Likelihood ratio test=32.4  on 10 df, p=0.000347  n= 192, number of events= 178
##
## [[42]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                     coef exp(coef) se(coef)       z      p
## AgeCent2         0.00033     1.000 0.000749  0.4403 0.6600
## SizeCent         0.03025     1.031 0.031155  0.9709 0.3300
## SizePlus        -0.03560     0.965 0.040357 -0.8821 0.3800
## A2TRUE           0.19369     1.214 0.335515  0.5773 0.5600
## A4TRUE           0.37730     1.458 0.317407  1.1887 0.2300
## AgeCent2:A2TRUE -0.00267     0.997 0.002195 -1.2174 0.2200
## SizeCent:A2TRUE -0.19573     0.822 0.072071 -2.7158 0.0066
## SizePlus:A2TRUE  0.22166     1.248 0.080567  2.7512 0.0059
## SizeCent:A4TRUE  0.01265     1.013 0.036497  0.3465 0.7300
## SizePlus:A4TRUE -0.00110     0.999 0.047152 -0.0233 0.9800
##
## Likelihood ratio test=32.4  on 10 df, p=0.000348  n= 192, number of events= 178
##
## [[43]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                         coef exp(coef) se(coef)      z      p
## AgeCent2           -0.000685     0.999 1.22e-03 -0.562 0.5700
## LocBodyTRUE         0.250997     1.285 2.51e-01  1.000 0.3200
## SizeCent            0.029963     1.030 1.97e-02  1.521 0.1300
## SizePlus           -0.043790     0.957 2.33e-02 -1.877 0.0600
## A2TRUE              0.116344     1.123 3.53e-01  0.330 0.7400
## A4TRUE              0.357084     1.429 2.01e-01  1.775 0.0760
## AgeCent2:SizePlus   0.000106     1.000 9.16e-05  1.154 0.2500
## AgeCent2:A2TRUE    -0.001891     0.998 2.36e-03 -0.803 0.4200
## LocBodyTRUE:A2TRUE  0.211583     1.236 5.64e-01  0.375 0.7100
## SizeCent:A2TRUE    -0.203613     0.816 7.28e-02 -2.798 0.0051
## SizePlus:A2TRUE     0.218684     1.244 8.17e-02  2.676 0.0075
## SizeCent:A4TRUE     0.013877     1.014 1.26e-02  1.099 0.2700
##
## Likelihood ratio test=35.9  on 12 df, p=0.00034  n= 192, number of events= 178
##
## [[44]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                            coef exp(coef) se(coef)      z      p
## AgeCent2             -2.65e-04     1.000 9.11e-04 -0.291 0.7700
## LocBodyTRUE           1.64e-01     1.178 2.89e-01  0.569 0.5700
## SizeCent              2.24e-02     1.023 2.06e-02  1.091 0.2800
## SizePlus             -4.28e-02     0.958 2.36e-02 -1.817 0.0690
## A2TRUE               -1.27e+00     0.280 8.92e-01 -1.427 0.1500
## A4TRUE                2.69e-01     1.309 2.12e-01  1.267 0.2100
```

```
## AgeCent2:SizeCent     8.24e-05     1.000 6.81e-05  1.211 0.2300
## LocBodyTRUE:SizeCent  1.28e-02     1.013 1.44e-02  0.885 0.3800
## LocBodyTRUE:A2TRUE    1.58e-01     1.171 5.68e-01  0.278 0.7800
## SizeCent:A2TRUE      -2.05e-01     0.815 6.65e-02 -3.082 0.0021
## SizePlus:A2TRUE       2.09e-01     1.233 7.69e-02  2.721 0.0065
## SizeCent:A4TRUE       1.85e-02     1.019 1.26e-02  1.460 0.1400
## A2TRUE:A4TRUE         1.49e+00     4.456 8.75e-01  1.708 0.0880
##
## Likelihood ratio test=41  on 13 df, p=9.48e-05  n= 192, number of events= 178
##
## [[45]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                      coef exp(coef) se(coef)      z     p
## LocBodyTRUE                       0.11130     1.118   1.1598  0.096 0.920
## SizeCent                          0.00923     1.009   0.0310  0.297 0.770
## SizePlus                         -0.01744     0.983   0.0444 -0.392 0.690
## A2TRUE                            0.44188     1.556   0.2592  1.705 0.088
## A4TRUE                            0.41748     1.518   0.3168  1.318 0.190
## LocBodyTRUE:A2TRUE                0.14744     1.159   0.4504  0.327 0.740
## LocBodyTRUE:A4TRUE                0.17202     1.188   1.1730  0.147 0.880
## SizeCent:A4TRUE                   0.01966     1.020   0.0357  0.550 0.580
## SizePlus:A4TRUE                  -0.01162     0.988   0.0499 -0.233 0.820
## strata(SexM)SexM=TRUE:LocBodyTRUE  0.05889     1.061   0.4095  0.144 0.890
## strata(SexM)SexM=TRUE:SizeCent     0.01306     1.013   0.0115  1.136 0.260
##
## Likelihood ratio test=29.2  on 11 df, p=0.00212  n= 192, number of events= 178
##
## [[46]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                     coef exp(coef) se(coef)       z     p
## AgeCent                         2.32e-02     1.024 2.44e-02  0.9529 0.340
## AgeCent2                       -2.54e-05     1.000 1.18e-03 -0.0216 0.980
## SizeCent                        2.10e-02     1.021 1.91e-02  1.1018 0.270
## SizePlus                       -4.35e-02     0.957 3.57e-02 -1.2182 0.220
## A4TRUE                          4.38e-01     1.549 1.98e-01  2.2131 0.027
## AgeCent2:SizePlus               9.04e-05     1.000 9.21e-05  0.9819 0.330
## SizeCent:SizePlus               2.42e-04     1.000 5.85e-04  0.4144 0.680
## AgeCent:A4TRUE                 -1.27e-02     0.987 2.62e-02 -0.4854 0.630
## SizeCent:A4TRUE                 1.53e-02     1.015 1.22e-02  1.2613 0.210
## strata(SexM)SexM=TRUE:SizeCent  9.84e-03     1.010 1.05e-02  0.9373 0.350
##
## Likelihood ratio test=23.4  on 10 df, p=0.00933  n= 192, number of events= 178
##
## [[47]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
```

```
##                                     coef exp(coef) se(coef)      z     p
## AgeCent                         -0.008413     0.992 1.58e-02 -0.532 0.590
## AgeCent2                         0.005706     1.006 2.56e-03  2.225 0.026
## LocBodyTRUE                      0.242497     1.274 2.20e-01  1.104 0.270
## SizeCent                         0.030662     1.031 1.78e-02  1.724 0.085
## SizePlus                        -0.051008     0.950 2.59e-02 -1.966 0.049
## A2TRUE                          -0.943881     0.389 9.53e-01 -0.991 0.320
## A4TRUE                           0.350434     1.420 2.75e-01  1.273 0.200
## AgeCent:AgeCent2                 0.000082     1.000 6.97e-05  1.177 0.240
## AgeCent2:SizeCent                0.000103     1.000 7.45e-05  1.388 0.170
## AgeCent2:A4TRUE                 -0.005012     0.995 2.74e-03 -1.832 0.067
## SizePlus:A4TRUE                  0.023040     1.023 1.60e-02  1.438 0.150
## A2TRUE:A4TRUE                    1.668559     5.305 9.22e-01  1.811 0.070
## strata(SexM)SexM=TRUE:A2TRUE -0.224239     0.799 4.24e-01 -0.528 0.600
##
## Likelihood ratio test=37.4  on 13 df, p=0.000362  n= 192, number of events= 178
##
## [[48]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                       coef exp(coef) se(coef)       z      p
## AgeCent                           0.000576     1.001  0.01217  0.0473 0.9600
## LocBodyTRUE                       0.341051     1.406  0.25249  1.3508 0.1800
## SizeCent                          0.043630     1.045  0.01747  2.4978 0.0120
## SizePlus                         -0.070347     0.932  0.02688 -2.6172 0.0089
## A2TRUE                           -1.506107     0.222  0.87356 -1.7241 0.0850
## A4TRUE                            0.235623     1.266  0.29279  0.8047 0.4200
## AgeCent:SizePlus                  0.000964     1.001  0.00118  0.8182 0.4100
## LocBodyTRUE:A2TRUE                0.045826     1.047  0.56100  0.0817 0.9300
## SizeCent:A2TRUE                  -0.195737     0.822  0.06801 -2.8780 0.0040
## SizePlus:A2TRUE                   0.208346     1.232  0.08027  2.5954 0.0094
## SizePlus:A4TRUE                   0.019847     1.020  0.01735  1.1439 0.2500
## A2TRUE:A4TRUE                     1.748358     5.745  0.86521  2.0207 0.0430
## strata(SexM)SexM=TRUE:SizePlus  0.022810     1.023  0.01458  1.5642 0.1200
## strata(SexM)SexM=TRUE:A4TRUE   -0.239634     0.787  0.38675 -0.6196 0.5400
##
## Likelihood ratio test=42.4  on 14 df, p=0.000106  n= 192, number of events= 178
##
## [[49]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                      coef exp(coef) se(coef)       z
## AgeCent                          0.011224     1.011 0.013134  0.8545
## AgeCent2                         0.002489     1.002 0.001875  1.3272
## LocBodyTRUE                      0.351300     1.421 0.287830  1.2205
## SizeCent                         0.041103     1.042 0.017198  2.3900
## SizePlus                        -0.061968     0.940 0.037599 -1.6481
## A4TRUE                           0.338380     1.403 0.260513  1.2989
## SizeCent:SizePlus                0.000176     1.000 0.000542  0.3244
```

```
## AgeCent2:A4TRUE                    -0.001792     0.998 0.002028 -0.8835
## SizePlus:A4TRUE                     0.022977     1.023 0.015902  1.4449
## strata(SexM)SexM=TRUE:AgeCent       0.000980     1.001 0.017791  0.0551
## strata(SexM)SexM=TRUE:LocBodyTRUE   0.095691     1.100 0.405418  0.2360
##                                        p
## AgeCent                             0.390
## AgeCent2                            0.180
## LocBodyTRUE                         0.220
## SizeCent                            0.017
## SizePlus                            0.099
## A4TRUE                              0.190
## SizeCent:SizePlus                   0.750
## AgeCent2:A4TRUE                     0.380
## SizePlus:A4TRUE                     0.150
## strata(SexM)SexM=TRUE:AgeCent       0.960
## strata(SexM)SexM=TRUE:LocBodyTRUE   0.810
##
## Likelihood ratio test=25.7  on 11 df, p=0.00721  n= 192, number of events= 178
##
## [[50]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                       coef exp(coef) se(coef)      z
## AgeCent2                           -0.000672     0.999 0.001221 -0.550
## LocBodyTRUE                         0.187650     1.206 0.321991  0.583
## SizeCent                            0.030037     1.030 0.019689  1.526
## SizePlus                           -0.042982     0.958 0.023428 -1.835
## A2TRUE                              0.116532     1.124 0.353154  0.330
## A4TRUE                              0.352946     1.423 0.201602  1.751
## AgeCent2:SizePlus                   0.000104     1.000 0.000092  1.125
## AgeCent2:A2TRUE                    -0.001856     0.998 0.002361 -0.786
## LocBodyTRUE:A2TRUE                  0.200538     1.222 0.564185  0.355
## SizeCent:A2TRUE                    -0.202256     0.817 0.072781 -2.779
## SizePlus:A2TRUE                     0.218054     1.244 0.081737  2.668
## SizeCent:A4TRUE                     0.013328     1.013 0.012757  1.045
## strata(SexM)SexM=TRUE:LocBodyTRUE   0.128680     1.137 0.402958  0.319
##                                        p
## AgeCent2                            0.5800
## LocBodyTRUE                         0.5600
## SizeCent                            0.1300
## SizePlus                            0.0670
## A2TRUE                              0.7400
## A4TRUE                              0.0800
## AgeCent2:SizePlus                   0.2600
## AgeCent2:A2TRUE                     0.4300
## LocBodyTRUE:A2TRUE                  0.7200
## SizeCent:A2TRUE                     0.0055
## SizePlus:A2TRUE                     0.0076
## SizeCent:A4TRUE                     0.3000
## strata(SexM)SexM=TRUE:LocBodyTRUE   0.7500
##
## Likelihood ratio test=36  on 13 df, p=6e-04  n= 192, number of events= 178
```

```
##
## [[51]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                           coef exp(coef) se(coef)       z     p
## AgeCent                0.025596     1.026 0.029599  0.8648 0.390
## AgeCent2               0.000411     1.000 0.000877  0.4685 0.640
## LocBodyTRUE            0.011411     1.011 0.286080  0.0399 0.970
## SizeCent               0.027061     1.027 0.016834  1.6076 0.110
## SizePlus              -0.023684     0.977 0.022130 -1.0702 0.280
## A2TRUE                 0.591135     1.806 0.255246  2.3159 0.021
## A4TRUE                 0.452513     1.572 0.201535  2.2453 0.025
## AgeCent2:LocBodyTRUE   0.003683     1.004 0.002444  1.5071 0.130
## AgeCent:SizeCent      -0.000133     1.000 0.002039 -0.0652 0.950
## AgeCent:SizePlus       0.000809     1.001 0.002811  0.2879 0.770
## SizeCent:A2TRUE       -0.001228     0.999 0.016832 -0.0730 0.940
## AgeCent:A4TRUE        -0.025392     0.975 0.026507 -0.9579 0.340
##
## Likelihood ratio test=30.5  on 12 df, p=0.00236  n= 192, number of events= 178
##
## [[52]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                           coef exp(coef) se(coef)      z     p
## AgeCent2              3.51e-03     1.004 2.94e-03  1.192 0.230
## LocBodyTRUE          -6.69e-01     0.512 8.07e-01 -0.830 0.410
## SizeCent              3.36e-02     1.034 1.71e-02  1.963 0.050
## SizePlus             -3.11e-02     0.969 2.32e-02 -1.339 0.180
## A2TRUE               -1.43e+00     0.240 1.09e+00 -1.316 0.190
## A4TRUE                4.13e-01     1.511 2.58e-01  1.599 0.110
## AgeCent2:SizePlus     9.28e-05     1.000 9.35e-05  0.992 0.320
## AgeCent2:A2TRUE       9.36e-04     1.001 2.58e-03  0.363 0.720
## LocBodyTRUE:A2TRUE    1.84e-01     1.202 5.25e-01  0.350 0.730
## SizeCent:A2TRUE      -1.24e-02     0.988 1.97e-02 -0.627 0.530
## AgeCent2:A4TRUE      -4.08e-03     0.996 2.92e-03 -1.395 0.160
## LocBodyTRUE:A4TRUE    9.58e-01     2.606 8.38e-01  1.143 0.250
## A2TRUE:A4TRUE         2.04e+00     7.719 1.05e+00  1.943 0.052
##
## Likelihood ratio test=35  on 13 df, p=0.000847  n= 192, number of events= 178
##
## [[53]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                      coef exp(coef) se(coef)       z
## AgeCent                          1.21e-02     1.012  0.01067  1.1298
## AgeCent2                         1.10e-04     1.000  0.00156  0.0704
## LocBodyTRUE                      1.83e-01     1.200  0.30953  0.5897
## SizeCent                         4.28e-02     1.044  0.01768  2.4223
```

```
## SizePlus                            -4.75e-02     0.954  0.02351 -2.0219
## A2TRUE                              -1.42e+00     0.242  0.93674 -1.5153
## A4TRUE                               2.80e-01     1.324  0.20616  1.3605
## AgeCent2:SizePlus                    8.15e-05     1.000  0.00010  0.8147
## AgeCent:A2TRUE                      -9.28e-03     0.991  0.02751 -0.3372
## SizeCent:A2TRUE                     -2.00e-01     0.819  0.07205 -2.7714
## SizePlus:A2TRUE                      2.23e-01     1.250  0.08116  2.7461
## A2TRUE:A4TRUE                        1.60e+00     4.953  0.93979  1.7025
## strata(SexM)SexM=TRUE:AgeCent2       4.60e-05     1.000  0.00166  0.0277
## strata(SexM)SexM=TRUE:LocBodyTRUE    9.68e-02     1.102  0.40943  0.2365
##                                          p
## AgeCent                             0.2600
## AgeCent2                            0.9400
## LocBodyTRUE                         0.5600
## SizeCent                            0.0150
## SizePlus                            0.0430
## A2TRUE                              0.1300
## A4TRUE                              0.1700
## AgeCent2:SizePlus                   0.4200
## AgeCent:A2TRUE                      0.7400
## SizeCent:A2TRUE                     0.0056
## SizePlus:A2TRUE                     0.0060
## A2TRUE:A4TRUE                       0.0890
## strata(SexM)SexM=TRUE:AgeCent2      0.9800
## strata(SexM)SexM=TRUE:LocBodyTRUE 0.8100
##
## Likelihood ratio test=39.6  on 14 df, p=0.00029  n= 192, number of events= 178
##
## [[54]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                          coef exp(coef) se(coef)      z     p
## AgeCent2             0.004288     1.004 0.002909  1.474 0.140
## LocBodyTRUE         -0.853257     0.426 0.852108 -1.001 0.320
## SizeCent             0.037865     1.039 0.018141  2.087 0.037
## SizePlus            -0.041826     0.959 0.034865 -1.200 0.230
## A2TRUE              -1.454492     0.234 1.092851 -1.331 0.180
## A4TRUE               0.362818     1.437 0.256005  1.417 0.160
## SizeCent:SizePlus    0.000306     1.000 0.000569  0.538 0.590
## AgeCent2:A2TRUE      0.000334     1.000 0.002617  0.127 0.900
## LocBodyTRUE:A2TRUE   0.114646     1.121 0.523658  0.219 0.830
## SizeCent:A2TRUE     -0.011837     0.988 0.019382 -0.611 0.540
## AgeCent2:A4TRUE     -0.003829     0.996 0.002932 -1.306 0.190
## LocBodyTRUE:A4TRUE   1.217505     3.379 0.892631  1.364 0.170
## A2TRUE:A4TRUE        2.110132     8.249 1.056519  1.997 0.046
##
## Likelihood ratio test=34.3  on 13 df, p=0.00109  n= 192, number of events= 178
##
## [[55]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
```

```
##
##                                     coef exp(coef) se(coef)        z    p
## AgeCent                         2.04e-03     1.002 0.016511  0.12378 0.90
## AgeCent2                        1.16e-03     1.001 0.001454  0.80113 0.42
## LocBodyTRUE                     8.15e-02     1.085 0.275284  0.29596 0.77
## SizeCent                       -5.19e-03     0.995 0.010816 -0.47963 0.63
## A2TRUE                         -1.79e-01     0.836 0.832418 -0.21468 0.83
## A4TRUE                          2.72e-01     1.313 0.202679  1.34267 0.18
## AgeCent:AgeCent2                2.62e-05     1.000 0.000077  0.34014 0.73
## AgeCent2:LocBodyTRUE            2.94e-03     1.003 0.002409  1.22071 0.22
## SizeCent:A4TRUE                 1.04e-02     1.010 0.011456  0.90553 0.37
## A2TRUE:A4TRUE                   1.04e+00     2.838 0.803783  1.29792 0.19
## strata(SexM)SexM=TRUE:AgeCent2 -7.61e-07     1.000 0.001619 -0.00047 1.00
## strata(SexM)SexM=TRUE:SizeCent  1.47e-02     1.015 0.010467  1.40007 0.16
## strata(SexM)SexM=TRUE:A2TRUE   -3.00e-01     0.741 0.428367 -0.70047 0.48
##
## Likelihood ratio test=34.2  on 13 df, p=0.0011  n= 192, number of events= 178
##
## [[56]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                     coef exp(coef) se(coef)       z     p
## AgeCent                         1.26e-02     1.013 0.013834  0.9077 0.360
## AgeCent2                        3.54e-04     1.000 0.001542  0.2299 0.820
## LocBodyTRUE                     2.27e-01     1.255 0.223136  1.0190 0.310
## SizeCent                        2.47e-02     1.025 0.021535  1.1489 0.250
## SizePlus                       -2.58e-02     0.975 0.027612 -0.9332 0.350
## A2TRUE                          3.10e-01     1.364 0.337338  0.9200 0.360
## A4TRUE                          4.00e-01     1.492 0.197247  2.0283 0.043
## AgeCent2:SizeCent               9.24e-05     1.000 0.000210  0.4411 0.660
## AgeCent2:SizePlus              -2.73e-05     1.000 0.000275 -0.0992 0.920
## AgeCent2:A2TRUE                 1.20e-03     1.001 0.002281  0.5282 0.600
## SizePlus:A2TRUE                 1.25e-02     1.013 0.017163  0.7297 0.470
## strata(SexM)SexM=TRUE:AgeCent -4.35e-03     0.996 0.018804 -0.2316 0.820
##
## Likelihood ratio test=28.9  on 12 df, p=0.00408  n= 192, number of events= 178
##
## [[57]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                      coef exp(coef) se(coef)       z
## AgeCent                          0.004865     1.005 0.009255  0.5257
## LocBodyTRUE                     -0.049732     0.951 0.348460 -0.1427
## SizeCent                         0.025460     1.026 0.018213  1.3979
## SizePlus                        -0.014192     0.986 0.035881 -0.3955
## A2TRUE                           0.686990     1.988 0.362822  1.8935
## A4TRUE                           0.410536     1.508 0.199912  2.0536
## AgeCent:SizeCent                 0.000151     1.000 0.000745  0.2029
## LocBodyTRUE:SizeCent             0.015156     1.015 0.015067  1.0059
## SizeCent:SizePlus               -0.000368     1.000 0.000599 -0.6140
```

```
## SizePlus:A2TRUE                    -0.000735     0.999 0.019415 -0.0379
## strata(SexM)SexM=TRUE:LocBodyTRUE  0.375222     1.455 0.424749  0.8834
## strata(SexM)SexM=TRUE:A2TRUE       -0.447295     0.639 0.433658 -1.0314
##                                        p
## AgeCent                            0.600
## LocBodyTRUE                        0.890
## SizeCent                           0.160
## SizePlus                           0.690
## A2TRUE                             0.058
## A4TRUE                             0.040
## AgeCent:SizeCent                   0.840
## LocBodyTRUE:SizeCent               0.310
## SizeCent:SizePlus                  0.540
## SizePlus:A2TRUE                    0.970
## strata(SexM)SexM=TRUE:LocBodyTRUE 0.380
## strata(SexM)SexM=TRUE:A2TRUE       0.300
##
## Likelihood ratio test=28.9  on 12 df, p=0.0041  n= 192, number of events= 178
##
## [[58]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                      coef exp(coef) se(coef)      z     p
## AgeCent                           0.00376     1.004   0.0131  0.286 0.770
## LocBodyTRUE                      -0.29065     0.748   1.3533 -0.215 0.830
## SizeCent                          0.02974     1.030   0.0163  1.822 0.068
## SizePlus                         -0.05479     0.947   0.0323 -1.695 0.090
## A2TRUE                            0.65335     1.922   0.3001  2.177 0.029
## A4TRUE                            0.36702     1.443   0.2931  1.252 0.210
## LocBodyTRUE:SizeCent              0.02271     1.023   0.0137  1.657 0.098
## LocBodyTRUE:A4TRUE                0.47578     1.609   1.3218  0.360 0.720
## SizePlus:A4TRUE                   0.00932     1.009   0.0224  0.416 0.680
## strata(SexM)SexM=TRUE:AgeCent     0.00369     1.004   0.0182  0.203 0.840
## strata(SexM)SexM=TRUE:SizePlus    0.02519     1.026   0.0150  1.675 0.094
## strata(SexM)SexM=TRUE:A2TRUE     -0.43162     0.649   0.4204 -1.027 0.300
## strata(SexM)SexM=TRUE:A4TRUE     -0.08510     0.918   0.4023 -0.212 0.830
##
## Likelihood ratio test=33.4  on 13 df, p=0.0015  n= 192, number of events= 178
##
## [[59]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                      coef exp(coef) se(coef)      z     p
## AgeCent                          3.50e-03     1.004 1.56e-02  0.224 0.820
## AgeCent2                         1.37e-03     1.001 1.09e-03  1.251 0.210
## LocBodyTRUE                     -1.28e+00     0.279 1.21e+00 -1.057 0.290
## SizeCent                         3.02e-02     1.031 1.94e-02  1.562 0.120
## SizePlus                        -3.54e-02     0.965 2.32e-02 -1.530 0.130
## A2TRUE                           5.52e-01     1.736 3.00e-01  1.841 0.066
## A4TRUE                           3.11e-01     1.364 2.03e-01  1.533 0.130
```

```
## AgeCent:AgeCent2               4.24e-05     1.000 7.32e-05  0.579 0.560
## AgeCent:SizeCent               1.03e-04     1.000 7.27e-04  0.142 0.890
## LocBodyTRUE:SizePlus           2.54e-02     1.026 1.71e-02  1.485 0.140
## LocBodyTRUE:A4TRUE             1.34e+00     3.823 1.13e+00  1.183 0.240
## SizeCent:A4TRUE                4.03e-03     1.004 1.59e-02  0.254 0.800
## strata(SexM)SexM=TRUE:A2TRUE -3.57e-01     0.700 4.20e-01 -0.851 0.390
##
## Likelihood ratio test=33.2  on 13 df, p=0.00158  n= 192, number of events= 178
##
## [[60]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                      coef exp(coef) se(coef)      z
## AgeCent2                         -2.30e-04     1.000 9.78e-04 -0.236
## LocBodyTRUE                      -1.68e-01     0.845 3.55e-01 -0.473
## SizeCent                          5.19e-03     1.005 7.77e-03  0.668
## A2TRUE                           -3.21e-01     0.725 9.07e-01 -0.354
## A4TRUE                            3.58e-01     1.431 2.10e-01  1.708
## AgeCent2:LocBodyTRUE              2.47e-03     1.002 2.51e-03  0.987
## AgeCent2:SizeCent                 6.57e-05     1.000 7.19e-05  0.914
## LocBodyTRUE:SizeCent              9.16e-03     1.009 1.33e-02  0.688
## AgeCent2:A2TRUE                   2.26e-03     1.002 2.39e-03  0.945
## SizeCent:A2TRUE                  -1.25e-02     0.988 1.72e-02 -0.723
## A2TRUE:A4TRUE                     1.18e+00     3.262 8.37e-01  1.412
## strata(SexM)SexM=TRUE:LocBodyTRUE 3.07e-01     1.359 4.24e-01  0.724
## strata(SexM)SexM=TRUE:A2TRUE     -4.41e-01     0.644 4.45e-01 -0.990
##                                      p
## AgeCent2                         0.810
## LocBodyTRUE                      0.640
## SizeCent                         0.500
## A2TRUE                           0.720
## A4TRUE                           0.088
## AgeCent2:LocBodyTRUE             0.320
## AgeCent2:SizeCent                0.360
## LocBodyTRUE:SizeCent             0.490
## AgeCent2:A2TRUE                  0.340
## SizeCent:A2TRUE                  0.470
## A2TRUE:A4TRUE                    0.160
## strata(SexM)SexM=TRUE:LocBodyTRUE 0.470
## strata(SexM)SexM=TRUE:A2TRUE     0.320
##
## Likelihood ratio test=32.6  on 13 df, p=0.00193  n= 192, number of events= 178
##
## [[61]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                      coef exp(coef) se(coef)       z
## AgeCent                          2.70e-03     1.003 1.73e-02  0.1559
## AgeCent2                         1.59e-03     1.002 1.39e-03  1.1388
## LocBodyTRUE                      1.06e-01     1.112 2.89e-01  0.3677
```

```
## SizeCent                               1.20e-02     1.012 5.33e-03  2.2456
## A2TRUE                                 5.50e-01     1.733 2.11e-01  2.6055
## A4TRUE                                 4.62e-01     1.587 2.75e-01  1.6801
## AgeCent:AgeCent2                       4.94e-05     1.000 7.28e-05  0.6779
## AgeCent:LocBodyTRUE                   -1.91e-03     0.998 2.66e-02 -0.0718
## AgeCent:A2TRUE                        -7.65e-03     0.992 2.39e-02 -0.3205
## strata(SexM)SexM=TRUE:AgeCent2        -3.64e-04     1.000 1.61e-03 -0.2258
## strata(SexM)SexM=TRUE:LocBodyTRUE      2.58e-01     1.294 4.06e-01  0.6349
## strata(SexM)SexM=TRUE:A4TRUE          -6.63e-02     0.936 3.97e-01 -0.1673
##                                            p
## AgeCent                               0.8800
## AgeCent2                              0.2500
## LocBodyTRUE                           0.7100
## SizeCent                              0.0250
## A2TRUE                                0.0092
## A4TRUE                                0.0930
## AgeCent:AgeCent2                      0.5000
## AgeCent:LocBodyTRUE                   0.9400
## AgeCent:A2TRUE                        0.7500
## strata(SexM)SexM=TRUE:AgeCent2        0.8200
## strata(SexM)SexM=TRUE:LocBodyTRUE     0.5300
## strata(SexM)SexM=TRUE:A4TRUE          0.8700
##
## Likelihood ratio test=26.9  on 12 df, p=0.00807  n= 192, number of events= 178
##
## [[62]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                        coef exp(coef) se(coef)      z     p
## AgeCent2                           -5.22e-04     0.999 9.87e-04 -0.529 0.600
## LocBodyTRUE                        -3.55e-01     0.701 3.89e-01 -0.912 0.360
## SizeCent                           -6.03e-03     0.994 2.07e-02 -0.291 0.770
## SizePlus                           -6.55e-03     0.993 3.56e-02 -0.184 0.850
## A2TRUE                              3.97e-01     1.487 3.50e-01  1.132 0.260
## A4TRUE                              4.69e-01     1.599 2.01e-01  2.331 0.020
## AgeCent2:SizeCent                   9.51e-05     1.000 7.13e-05  1.334 0.180
## LocBodyTRUE:SizePlus                4.86e-02     1.050 2.14e-02  2.265 0.024
## SizeCent:SizePlus                  -6.37e-04     0.999 6.51e-04 -0.978 0.330
## AgeCent2:A2TRUE                     1.35e-03     1.001 2.32e-03  0.584 0.560
## LocBodyTRUE:A2TRUE                  6.01e-01     1.823 5.87e-01  1.023 0.310
## SizeCent:A2TRUE                    -3.11e-02     0.969 2.37e-02 -1.314 0.190
## SizeCent:A4TRUE                     1.61e-02     1.016 1.28e-02  1.255 0.210
## strata(SexM)SexM=TRUE:SizeCent      2.27e-02     1.023 1.15e-02  1.977 0.048
##
## Likelihood ratio test=36.9  on 14 df, p=0.000773  n= 192, number of events= 178
##
## [[63]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                      coef exp(coef) se(coef)      z      p
```

```
## AgeCent                          -0.003680     0.996 1.89e-02 -0.195 0.8500
## AgeCent2                          0.001125     1.001 1.15e-03  0.977 0.3300
## LocBodyTRUE                       0.243297     1.275 2.96e-01  0.821 0.4100
## SizeCent                          0.041641     1.043 1.86e-02  2.236 0.0250
## SizePlus                         -0.052193     0.949 2.35e-02 -2.217 0.0270
## A2TRUE                            0.183965     1.202 4.24e-01  0.434 0.6600
## AgeCent:AgeCent2                  0.000114     1.000 7.11e-05  1.599 0.1100
## AgeCent2:LocBodyTRUE              0.000959     1.001 2.67e-03  0.359 0.7200
## AgeCent:SizeCent                 -0.000476     1.000 7.45e-04 -0.640 0.5200
## AgeCent2:SizeCent                 0.000123     1.000 7.54e-05  1.637 0.1000
## SizeCent:A2TRUE                  -0.222600     0.800 6.91e-02 -3.222 0.0013
## SizePlus:A2TRUE                   0.254059     1.289 7.95e-02  3.197 0.0014
## strata(SexM)SexM=TRUE:AgeCent -0.002592     0.997 1.88e-02 -0.138 0.8900
## strata(SexM)SexM=TRUE:A2TRUE  -0.462110     0.630 4.42e-01 -1.046 0.3000
##
## Likelihood ratio test=36.8  on 14 df, p=8e-04  n= 192, number of events= 178
##
## [[64]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                    coef exp(coef) se(coef)      z     p
## AgeCent                         2.31e-03     1.002 1.95e-02  0.118 0.910
## AgeCent2                        1.08e-03     1.001 1.12e-03  0.959 0.340
## LocBodyTRUE                    -6.87e-01     0.503 8.13e-01 -0.845 0.400
## SizeCent                        2.09e-02     1.021 1.79e-02  1.167 0.240
## SizePlus                       -1.50e-02     0.985 2.28e-02 -0.656 0.510
## A2TRUE                          4.61e-01     1.586 2.69e-01  1.717 0.086
## A4TRUE                          3.34e-01     1.397 2.01e-01  1.662 0.096
## AgeCent:AgeCent2                6.48e-05     1.000 6.99e-05  0.926 0.350
## AgeCent2:SizeCent               8.49e-05     1.000 7.39e-05  1.148 0.250
## LocBodyTRUE:A2TRUE              4.41e-01     1.555 5.30e-01  0.833 0.400
## SizeCent:A2TRUE                -1.40e-02     0.986 1.97e-02 -0.709 0.480
## LocBodyTRUE:A4TRUE              9.12e-01     2.490 8.44e-01  1.082 0.280
## strata(SexM)SexM=TRUE:AgeCent -4.17e-03     0.996 1.86e-02 -0.223 0.820
##
## Likelihood ratio test=31.4  on 13 df, p=0.00292  n= 192, number of events= 178
##
## [[65]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                     coef exp(coef) se(coef)       z      p
## AgeCent                         0.005480     1.005  0.01580  0.3469 0.7300
## LocBodyTRUE                     0.355737     1.427  0.27573  1.2902 0.2000
## SizeCent                        0.055779     1.057  0.01831  3.0472 0.0023
## SizePlus                       -0.060816     0.941  0.02384 -2.5513 0.0110
## A2TRUE                          0.212057     1.236  0.40953  0.5178 0.6000
## AgeCent:LocBodyTRUE            -0.023474     0.977  0.03055 -0.7684 0.4400
## AgeCent:SizeCent               -0.001700     0.998  0.00212 -0.8003 0.4200
## LocBodyTRUE:SizeCent           -0.000489     1.000  0.01353 -0.0362 0.9700
## AgeCent:SizePlus                0.002197     1.002  0.00298  0.7377 0.4600
```

```
## LocBodyTRUE:A2TRUE             0.288453     1.334  0.57756  0.4994 0.6200
## SizeCent:A2TRUE               -0.200484     0.818  0.06570 -3.0513 0.0023
## SizePlus:A2TRUE                0.219265     1.245  0.07584  2.8911 0.0038
## strata(SexM)SexM=TRUE:A2TRUE -0.590393     0.554  0.44219 -1.3351 0.1800
##
## Likelihood ratio test=31.2  on 13 df, p=0.0031  n= 192, number of events= 178
##
## [[66]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                    coef exp(coef) se(coef)       z     p
## AgeCent                         0.009149     1.009 9.56e-03  0.9567 0.340
## AgeCent2                       -0.000106     1.000 1.28e-03 -0.0827 0.930
## LocBodyTRUE                    -0.179828     0.835 3.60e-01 -0.4998 0.620
## SizeCent                        0.028958     1.029 1.67e-02  1.7357 0.083
## SizePlus                       -0.033397     0.967 2.34e-02 -1.4261 0.150
## A2TRUE                          0.295304     1.344 3.39e-01  0.8703 0.380
## A4TRUE                          0.500888     1.650 2.84e-01  1.7659 0.077
## AgeCent2:LocBodyTRUE            0.002907     1.003 2.58e-03  1.1255 0.260
## AgeCent2:SizePlus               0.000061     1.000 9.87e-05  0.6175 0.540
## LocBodyTRUE:SizePlus            0.012773     1.013 1.58e-02  0.8106 0.420
## AgeCent2:A2TRUE                 0.000995     1.001 2.25e-03  0.4420 0.660
## LocBodyTRUE:A2TRUE              0.412018     1.510 4.62e-01  0.8920 0.370
## strata(SexM)SexM=TRUE:A4TRUE -0.110073     0.896 3.88e-01 -0.2837 0.780
##
## Likelihood ratio test=31  on 13 df, p=0.00335  n= 192, number of events= 178
##
## [[67]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                        coef exp(coef) se(coef)      z
## AgeCent                             0.009382     1.009   0.0120  0.783
## LocBodyTRUE                        -1.371396     0.254   1.5474 -0.886
## SizeCent                            0.048372     1.050   0.0192  2.519
## SizePlus                           -0.072641     0.930   0.0359 -2.021
## A2TRUE                              0.136600     1.146   0.3329  0.410
## A4TRUE                              0.375562     1.456   0.2238  1.678
## LocBodyTRUE:SizeCent               -0.043116     0.958   0.0436 -0.990
## AgeCent:SizePlus                    0.000409     1.000   0.0012  0.341
## LocBodyTRUE:SizePlus                0.084761     1.088   0.0556  1.525
## SizeCent:A2TRUE                    -0.157369     0.854   0.0632 -2.489
## SizePlus:A2TRUE                     0.161640     1.175   0.0759  2.130
## LocBodyTRUE:A4TRUE                  1.214960     3.370   1.4246  0.853
## SizePlus:A4TRUE                     0.004011     1.004   0.0226  0.178
## strata(SexM)SexM=TRUE:LocBodyTRUE -0.089209     0.915   0.4403 -0.203
## strata(SexM)SexM=TRUE:SizePlus      0.026035     1.026   0.0164  1.584
##                                       p
## AgeCent                           0.430
## LocBodyTRUE                       0.380
## SizeCent                          0.012
```

```
## SizePlus                              0.043
## A2TRUE                                0.680
## A4TRUE                                0.093
## LocBodyTRUE:SizeCent                  0.320
## AgeCent:SizePlus                      0.730
## LocBodyTRUE:SizePlus                  0.130
## SizeCent:A2TRUE                       0.013
## SizePlus:A2TRUE                       0.033
## LocBodyTRUE:A4TRUE                    0.390
## SizePlus:A4TRUE                       0.860
## strata(SexM)SexM=TRUE:LocBodyTRUE 0.840
## strata(SexM)SexM=TRUE:SizePlus    0.110
##
## Likelihood ratio test=41  on 15 df, p=0.000319  n= 192, number of events= 178
##
## [[68]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                       coef exp(coef) se(coef)       z
## AgeCent                            -1.10e-03     0.999 1.67e-02 -0.0661
## AgeCent2                            1.32e-03     1.001 1.10e-03  1.1979
## LocBodyTRUE                         3.52e-01     1.423 3.12e-01  1.1303
## SizeCent                            2.87e-02     1.029 1.79e-02  1.6052
## SizePlus                           -3.75e-02     0.963 3.54e-02 -1.0572
## A2TRUE                             -5.84e-01     0.558 7.54e-01 -0.7744
## A4TRUE                              2.34e-01     1.264 2.05e-01  1.1414
## AgeCent:AgeCent2                    6.21e-06     1.000 7.51e-05  0.0828
## AgeCent:LocBodyTRUE                -1.64e-02     0.984 3.03e-02 -0.5397
## AgeCent:SizePlus                    1.67e-03     1.002 1.19e-03  1.4015
## SizeCent:SizePlus                  -1.31e-04     1.000 5.63e-04 -0.2318
## A2TRUE:A4TRUE                       1.28e+00     3.586 7.91e-01  1.6137
## strata(SexM)SexM=TRUE:LocBodyTRUE -3.25e-02     0.968 4.30e-01 -0.0757
## strata(SexM)SexM=TRUE:SizePlus      3.13e-02     1.032 1.56e-02  2.0031
##                                       p
## AgeCent                            0.950
## AgeCent2                           0.230
## LocBodyTRUE                        0.260
## SizeCent                           0.110
## SizePlus                           0.290
## A2TRUE                             0.440
## A4TRUE                             0.250
## AgeCent:AgeCent2                   0.930
## AgeCent:LocBodyTRUE                0.590
## AgeCent:SizePlus                   0.160
## SizeCent:SizePlus                  0.820
## A2TRUE:A4TRUE                      0.110
## strata(SexM)SexM=TRUE:LocBodyTRUE 0.940
## strata(SexM)SexM=TRUE:SizePlus    0.045
##
## Likelihood ratio test=35.5  on 14 df, p=0.00124  n= 192, number of events= 178
##
## [[69]]
```

```
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                     coef exp(coef) se(coef)       z      p
## AgeCent2                         1.34e-04     1.000 0.001364  0.0982 0.9200
## LocBodyTRUE                     -4.14e-02     0.959 0.337323 -0.1227 0.9000
## SizeCent                         3.43e-02     1.035 0.021625  1.5839 0.1100
## SizePlus                        -6.75e-02     0.935 0.030367 -2.2232 0.0260
## A2TRUE                          -7.86e-01     0.456 0.968380 -0.8112 0.4200
## A4TRUE                           4.03e-01     1.496 0.290655  1.3856 0.1700
## AgeCent2:SizeCent                1.29e-04     1.000 0.000215  0.6014 0.5500
## AgeCent2:SizePlus               -4.74e-05     1.000 0.000279 -0.1699 0.8700
## LocBodyTRUE:SizePlus             3.24e-02     1.033 0.017721  1.8306 0.0670
## LocBodyTRUE:A2TRUE               2.43e-01     1.275 0.591288  0.4106 0.6800
## SizeCent:A2TRUE                 -1.93e-01     0.825 0.065481 -2.9452 0.0032
## SizePlus:A2TRUE                  1.99e-01     1.221 0.076141  2.6175 0.0089
## A2TRUE:A4TRUE                    1.20e+00     3.333 0.898804  1.3393 0.1800
## strata(SexM)SexM=TRUE:SizePlus   3.43e-02     1.035 0.014447  2.3767 0.0170
## strata(SexM)SexM=TRUE:A2TRUE    -3.57e-01     0.700 0.448580 -0.7951 0.4300
## strata(SexM)SexM=TRUE:A4TRUE    -2.09e-01     0.812 0.402020 -0.5194 0.6000
##
## Likelihood ratio test=45.4  on 16 df, p=0.000121  n= 192, number of events= 178
##
## [[70]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                        coef exp(coef) se(coef)       z
## AgeCent2                           0.000588     1.001 0.000773  0.7610
## LocBodyTRUE                        0.056056     1.058 0.374309  0.1498
## SizeCent                           0.021106     1.021 0.018611  1.1340
## SizePlus                          -0.032288     0.968 0.034784 -0.9282
## A2TRUE                            -0.365271     0.694 0.852803 -0.4283
## A4TRUE                             0.344208     1.411 0.281130  1.2244
## AgeCent2:LocBodyTRUE               0.003444     1.003 0.002451  1.4050
## SizeCent:SizePlus                  0.000126     1.000 0.000570  0.2215
## LocBodyTRUE:A2TRUE                 0.176436     1.193 0.453160  0.3893
## A2TRUE:A4TRUE                      1.177265     3.245 0.828352  1.4212
## strata(SexM)SexM=TRUE:LocBodyTRUE  0.028089     1.028 0.441173  0.0637
## strata(SexM)SexM=TRUE:SizeCent     0.016186     1.016 0.011193  1.4460
## strata(SexM)SexM=TRUE:A2TRUE      -0.317464     0.728 0.439714 -0.7220
## strata(SexM)SexM=TRUE:A4TRUE      -0.191637     0.826 0.396787 -0.4830
##                                       p
## AgeCent2                           0.45
## LocBodyTRUE                        0.88
## SizeCent                           0.26
## SizePlus                           0.35
## A2TRUE                             0.67
## A4TRUE                             0.22
## AgeCent2:LocBodyTRUE               0.16
## SizeCent:SizePlus                  0.82
## LocBodyTRUE:A2TRUE                 0.70
```

```
## A2TRUE:A4TRUE                       0.16
## strata(SexM)SexM=TRUE:LocBodyTRUE 0.95
## strata(SexM)SexM=TRUE:SizeCent    0.15
## strata(SexM)SexM=TRUE:A2TRUE      0.47
## strata(SexM)SexM=TRUE:A4TRUE      0.63
##
## Likelihood ratio test=34.7  on 14 df, p=0.00162  n= 192, number of events= 178
##
## [[71]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                          coef exp(coef) se(coef)      z     p
## AgeCent2             0.004121     1.004 0.002925  1.409 0.160
## LocBodyTRUE         -0.533704     0.586 1.000518 -0.533 0.590
## SizeCent             0.032099     1.033 0.020286  1.582 0.110
## SizePlus            -0.043562     0.957 0.034862 -1.250 0.210
## A2TRUE              -1.463179     0.231 1.095303 -1.336 0.180
## A4TRUE               0.351937     1.422 0.256529  1.372 0.170
## SizeCent:SizePlus    0.000308     1.000 0.000563  0.546 0.580
## AgeCent2:A2TRUE      0.000311     1.000 0.002618  0.119 0.910
## LocBodyTRUE:A2TRUE   0.117556     1.125 0.523709  0.224 0.820
## SizeCent:A2TRUE     -0.013474     0.987 0.019539 -0.690 0.490
## AgeCent2:A4TRUE     -0.003674     0.996 0.002946 -1.247 0.210
## LocBodyTRUE:A4TRUE   0.893385     2.443 1.037852  0.861 0.390
## SizeCent:A4TRUE      0.009098     1.009 0.014406  0.632 0.530
## A2TRUE:A4TRUE        2.120735     8.337 1.059049  2.002 0.045
##
## Likelihood ratio test=34.7  on 14 df, p=0.00163  n= 192, number of events= 178
##
## [[72]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                   coef exp(coef) se(coef)      z      p
## AgeCent2                      -0.000592     0.999 1.21e-03 -0.487 0.6300
## LocBodyTRUE                   -1.821963     0.162 1.35e+00 -1.351 0.1800
## SizeCent                       0.039048     1.040 2.14e-02  1.828 0.0680
## SizePlus                      -0.054235     0.947 2.59e-02 -2.092 0.0360
## A2TRUE                         0.308051     1.361 3.40e-01  0.907 0.3600
## A4TRUE                         0.317314     1.373 2.94e-01  1.078 0.2800
## LocBodyTRUE:SizeCent          -0.046635     0.954 4.44e-02 -1.049 0.2900
## AgeCent2:SizePlus              0.000101     1.000 9.08e-05  1.114 0.2700
## LocBodyTRUE:SizePlus           0.090304     1.095 5.74e-02  1.572 0.1200
## AgeCent2:A2TRUE               -0.002147     0.998 2.36e-03 -0.909 0.3600
## SizeCent:A2TRUE               -0.192067     0.825 7.15e-02 -2.687 0.0072
## SizePlus:A2TRUE                0.187654     1.206 8.06e-02  2.327 0.0200
## LocBodyTRUE:A4TRUE             1.556911     4.744 1.23e+00  1.264 0.2100
## SizeCent:A4TRUE                0.008361     1.008 1.68e-02  0.499 0.6200
## strata(SexM)SexM=TRUE:A4TRUE   0.050483     1.052 3.97e-01  0.127 0.9000
##
## Likelihood ratio test=39.6  on 15 df, p=0.000515  n= 192, number of events= 178
```

```
##
## [[73]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                       coef exp(coef) se(coef)      z
## AgeCent                           1.24e-02     1.013 0.010537  1.180
## AgeCent2                          3.52e-04     1.000 0.000926  0.381
## LocBodyTRUE                       1.55e-01     1.168 0.349891  0.443
## SizeCent                          2.56e-03     1.003 0.020212  0.126
## SizePlus                         -2.94e-02     0.971 0.022409 -1.312
## A2TRUE                            4.58e-01     1.582 0.263347  1.741
## A4TRUE                            4.28e-01     1.534 0.202995  2.107
## AgeCent2:SizeCent                 8.48e-05     1.000 0.000067  1.266
## LocBodyTRUE:SizeCent              1.87e-02     1.019 0.013784  1.353
## AgeCent:A2TRUE                   -1.49e-02     0.985 0.024130 -0.616
## LocBodyTRUE:A2TRUE                1.26e-01     1.134 0.460803  0.273
## SizeCent:A4TRUE                   1.27e-02     1.013 0.012282  1.033
## strata(SexM)SexM=TRUE:LocBodyTRUE -1.18e-01     0.889 0.437902 -0.269
## strata(SexM)SexM=TRUE:SizeCent     2.06e-02     1.021 0.012047  1.710
##                                      p
## AgeCent                          0.240
## AgeCent2                         0.700
## LocBodyTRUE                      0.660
## SizeCent                         0.900
## SizePlus                         0.190
## A2TRUE                           0.082
## A4TRUE                           0.035
## AgeCent2:SizeCent                0.210
## LocBodyTRUE:SizeCent             0.180
## AgeCent:A2TRUE                   0.540
## LocBodyTRUE:A2TRUE               0.780
## SizeCent:A4TRUE                  0.300
## strata(SexM)SexM=TRUE:LocBodyTRUE 0.790
## strata(SexM)SexM=TRUE:SizeCent    0.087
##
## Likelihood ratio test=34.3  on 14 df, p=0.00187  n= 192, number of events= 178
##
## [[74]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                      coef exp(coef) se(coef)      z     p
## AgeCent                          -1.17e-02     0.988 1.69e-02 -0.692 0.490
## AgeCent2                          5.02e-03     1.005 2.96e-03  1.699 0.089
## LocBodyTRUE                       2.67e-01     1.307 2.23e-01  1.197 0.230
## SizeCent                          2.63e-02     1.027 1.81e-02  1.450 0.150
## SizePlus                         -4.58e-02     0.955 2.34e-02 -1.958 0.050
## A2TRUE                           -6.20e-01     0.538 9.38e-01 -0.661 0.510
## A4TRUE                            4.69e-01     1.598 2.56e-01  1.832 0.067
## AgeCent:AgeCent2                  4.87e-05     1.000 7.51e-05  0.648 0.520
## AgeCent2:SizeCent                 1.03e-04     1.000 7.51e-05  1.375 0.170
```

```
## AgeCent:SizePlus                1.34e-03     1.001 1.05e-03  1.272 0.200
## AgeCent2:A4TRUE                -4.22e-03     0.996 2.75e-03 -1.532 0.130
## A2TRUE:A4TRUE                   1.49e+00     4.447 9.09e-01  1.641 0.100
## strata(SexM)SexM=TRUE:AgeCent2 -5.39e-04     0.999 1.74e-03 -0.311 0.760
## strata(SexM)SexM=TRUE:SizePlus  3.00e-02     1.030 1.52e-02  1.969 0.049
## strata(SexM)SexM=TRUE:A2TRUE   -3.13e-01     0.731 4.25e-01 -0.737 0.460
##
## Likelihood ratio test=39.3  on 15 df, p=0.000575  n= 192, number of events= 178
##
## [[75]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                    coef exp(coef) se(coef)      z      p
## AgeCent                         0.029676     1.030 2.40e-02  1.236 0.2200
## AgeCent2                        0.001600     1.002 2.50e-03  0.641 0.5200
## LocBodyTRUE                     0.067095     1.069 2.56e-01  0.262 0.7900
## SizeCent                       -0.016306     0.984 1.30e-02 -1.256 0.2100
## A2TRUE                          0.588304     1.801 2.23e-01  2.643 0.0082
## A4TRUE                          0.614194     1.848 2.65e-01  2.314 0.0210
## AgeCent2:SizeCent               0.000121     1.000 7.36e-05  1.646 0.1000
## LocBodyTRUE:SizeCent            0.014141     1.014 1.26e-02  1.126 0.2600
## AgeCent:A2TRUE                 -0.009524     0.991 2.58e-02 -0.369 0.7100
## AgeCent:A4TRUE                 -0.022791     0.977 2.53e-02 -0.901 0.3700
## AgeCent2:A4TRUE                -0.002103     0.998 2.69e-03 -0.783 0.4300
## SizeCent:A4TRUE                 0.011042     1.011 1.14e-02  0.968 0.3300
## strata(SexM)SexM=TRUE:AgeCent2  0.000768     1.001 1.57e-03  0.488 0.6300
## strata(SexM)SexM=TRUE:SizeCent  0.019038     1.019 1.06e-02  1.798 0.0720
##
## Likelihood ratio test=34  on 14 df, p=0.00208  n= 192, number of events= 178
##
## [[76]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                      coef exp(coef) se(coef)      z      p
## AgeCent2                         3.77e-04     1.000 0.000771  0.489 0.6200
## LocBodyTRUE                     -4.48e-01     0.639 0.486940 -0.920 0.3600
## SizeCent                         5.16e-02     1.053 0.031797  1.623 0.1000
## SizePlus                        -6.86e-02     0.934 0.050639 -1.354 0.1800
## A2TRUE                          -1.74e+00     0.176 1.081307 -1.608 0.1100
## A4TRUE                           1.50e-01     1.162 0.383223  0.392 0.6900
## LocBodyTRUE:SizeCent            -6.88e-02     0.934 0.049251 -1.396 0.1600
## LocBodyTRUE:SizePlus             1.20e-01     1.128 0.068041  1.766 0.0770
## SizeCent:SizePlus               -6.43e-04     0.999 0.000674 -0.955 0.3400
## AgeCent2:A2TRUE                  6.33e-05     1.000 0.002533  0.025 0.9800
## SizeCent:A2TRUE                 -1.90e-01     0.827 0.069474 -2.728 0.0064
## SizePlus:A2TRUE                  1.80e-01     1.197 0.079683  2.258 0.0240
## SizeCent:A4TRUE                 -4.51e-03     0.996 0.038652 -0.117 0.9100
## SizePlus:A4TRUE                  4.21e-02     1.043 0.050557  0.832 0.4100
## A2TRUE:A4TRUE                    2.13e+00     8.431 0.990481  2.152 0.0310
## strata(SexM)SexM=TRUE:A4TRUE -2.77e-01     0.758 0.395076 -0.702 0.4800
```

```
##
## Likelihood ratio test=43.9  on 16 df, p=0.000207  n= 192, number of events= 178
##
## [[77]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                       coef exp(coef) se(coef)       z
## AgeCent                           9.05e-03     1.009 1.37e-02  0.6620
## AgeCent2                          5.06e-04     1.001 9.37e-04  0.5397
## LocBodyTRUE                      -1.12e+00     0.327 9.65e-01 -1.1575
## SizeCent                          1.07e-02     1.011 1.91e-02  0.5594
## SizePlus                         -3.31e-02     0.967 2.34e-02 -1.4145
## A2TRUE                            7.26e-01     2.066 3.12e-01  2.3239
## A4TRUE                            3.40e-01     1.405 2.02e-01  1.6803
## AgeCent:SizeCent                  6.81e-04     1.001 7.38e-04  0.9222
## AgeCent2:SizeCent                 8.96e-05     1.000 7.35e-05  1.2191
## LocBodyTRUE:SizePlus              3.25e-02     1.033 1.68e-02  1.9342
## LocBodyTRUE:A4TRUE                1.07e+00     2.922 8.96e-01  1.1973
## strata(SexM)SexM=TRUE:AgeCent    -2.33e-03     0.998 1.86e-02 -0.1251
## strata(SexM)SexM=TRUE:LocBodyTRUE 1.05e-02     1.011 4.42e-01  0.0237
## strata(SexM)SexM=TRUE:SizeCent    2.42e-02     1.025 1.29e-02  1.8724
## strata(SexM)SexM=TRUE:A2TRUE     -5.13e-01     0.599 4.34e-01 -1.1837
##                                      p
## AgeCent                          0.510
## AgeCent2                         0.590
## LocBodyTRUE                      0.250
## SizeCent                         0.580
## SizePlus                         0.160
## A2TRUE                           0.020
## A4TRUE                           0.093
## AgeCent:SizeCent                 0.360
## AgeCent2:SizeCent                0.220
## LocBodyTRUE:SizePlus             0.053
## LocBodyTRUE:A4TRUE               0.230
## strata(SexM)SexM=TRUE:AgeCent    0.900
## strata(SexM)SexM=TRUE:LocBodyTRUE 0.980
## strata(SexM)SexM=TRUE:SizeCent   0.061
## strata(SexM)SexM=TRUE:A2TRUE     0.240
##
## Likelihood ratio test=37.8  on 15 df, p=0.000983  n= 192, number of events= 178
##
## [[78]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                      coef exp(coef) se(coef)       z     p
## AgeCent                          0.033130     1.034 2.55e-02  1.3003 0.190
## AgeCent2                        -0.000200     1.000 1.55e-03 -0.1286 0.900
## LocBodyTRUE                      0.019395     1.020 3.07e-01  0.0632 0.950
## SizeCent                         0.020164     1.020 1.82e-02  1.1054 0.270
## SizePlus                        -0.040182     0.961 2.33e-02 -1.7212 0.085
```

```
## A2TRUE                             0.490746     1.634 2.27e-01  2.1632 0.031
## A4TRUE                             0.479074     1.615 2.09e-01  2.2884 0.022
## AgeCent:LocBodyTRUE                0.002315     1.002 2.59e-02  0.0895 0.930
## AgeCent2:SizePlus                  0.000088     1.000 9.87e-05  0.8917 0.370
## LocBodyTRUE:SizePlus               0.019036     1.019 1.63e-02  1.1695 0.240
## AgeCent:A2TRUE                    -0.017957     0.982 2.47e-02 -0.7262 0.470
## AgeCent:A4TRUE                    -0.024608     0.976 2.66e-02 -0.9259 0.350
## SizeCent:A4TRUE                    0.017092     1.017 1.20e-02  1.4209 0.160
## strata(SexM)SexM=TRUE:AgeCent2     0.000295     1.000 1.62e-03  0.1820 0.860
##
## Likelihood ratio test=32.4  on 14 df, p=0.00353  n= 192, number of events= 178
##
## [[79]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                             coef exp(coef) se(coef)      z    p
## AgeCent                 0.008649     1.009 0.009727  0.889 0.37
## AgeCent2                0.001230     1.001 0.002011  0.612 0.54
## LocBodyTRUE            -0.232588     0.792 0.399844 -0.582 0.56
## SizeCent                0.018229     1.018 0.020130  0.906 0.37
## SizePlus               -0.032142     0.968 0.024107 -1.333 0.18
## A2TRUE                  0.386826     1.472 0.285753  1.354 0.18
## A4TRUE                  0.478043     1.613 0.244192  1.958 0.05
## AgeCent2:LocBodyTRUE    0.003161     1.003 0.002536  1.246 0.21
## AgeCent:SizeCent        0.000279     1.000 0.000764  0.365 0.72
## LocBodyTRUE:SizePlus    0.019327     1.020 0.018882  1.024 0.31
## LocBodyTRUE:A2TRUE      0.481646     1.619 0.588104  0.819 0.41
## SizePlus:A2TRUE        -0.013322     0.987 0.025250 -0.528 0.60
## AgeCent2:A4TRUE        -0.000864     0.999 0.002165 -0.399 0.69
## SizeCent:A4TRUE         0.015997     1.016 0.013612  1.175 0.24
##
## Likelihood ratio test=32.3  on 14 df, p=0.00358  n= 192, number of events= 178
##
## [[80]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                   coef exp(coef) se(coef)       z      p
## AgeCent                       -0.000933     0.999 0.012044 -0.0774 0.9400
## AgeCent2                       0.000957     1.001 0.000831  1.1511 0.2500
## LocBodyTRUE                   -0.682622     0.505 0.488277 -1.3980 0.1600
## SizeCent                       0.029111     1.030 0.018936  1.5374 0.1200
## SizePlus                      -0.025759     0.975 0.036697 -0.7020 0.4800
## A2TRUE                        -0.204346     0.815 0.854535 -0.2391 0.8100
## A4TRUE                         0.410956     1.508 0.291444  1.4101 0.1600
## LocBodyTRUE:SizeCent          -0.076983     0.926 0.046534 -1.6543 0.0980
## AgeCent:SizePlus               0.001116     1.001 0.001052  1.0613 0.2900
## LocBodyTRUE:SizePlus           0.147913     1.159 0.067018  2.2071 0.0270
## SizeCent:SizePlus             -0.001311     0.999 0.000724 -1.8121 0.0700
## SizePlus:A2TRUE               -0.020336     0.980 0.020554 -0.9894 0.3200
## A2TRUE:A4TRUE                  1.229329     3.419 0.837401  1.4680 0.1400
```

```
## strata(SexM)SexM=TRUE:SizePlus  0.050811     1.052 0.016294  3.1183 0.0018
## strata(SexM)SexM=TRUE:A2TRUE   -0.430321     0.650 0.433640 -0.9923 0.3200
## strata(SexM)SexM=TRUE:A4TRUE   -0.233367     0.792 0.399340 -0.5844 0.5600
##
## Likelihood ratio test=42.6  on 16 df, p=0.000318  n= 192, number of events= 178
##
## [[81]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                   coef exp(coef) se(coef)       z    p
## AgeCent                       1.50e-03     1.002 0.016664  0.0900 0.93
## AgeCent2                      9.45e-04     1.001 0.001181  0.7995 0.42
## LocBodyTRUE                   1.22e-01     1.130 0.295847  0.4123 0.68
## SizeCent                      1.97e-02     1.020 0.018243  1.0781 0.28
## SizePlus                     -2.69e-02     0.973 0.021636 -1.2455 0.21
## A2TRUE                        6.85e-01     1.984 0.293997  2.3297 0.02
## A4TRUE                        3.63e-01     1.438 0.279673  1.2985 0.19
## AgeCent:AgeCent2              2.62e-05     1.000 0.000077  0.3398 0.73
## AgeCent:LocBodyTRUE          -1.13e-02     0.989 0.029014 -0.3888 0.70
## AgeCent2:LocBodyTRUE          2.98e-03     1.003 0.002540  1.1737 0.24
## AgeCent:SizePlus              8.08e-04     1.001 0.001161  0.6965 0.49
## SizeCent:A4TRUE               1.34e-02     1.013 0.012171  1.0992 0.27
## strata(SexM)SexM=TRUE:A2TRUE -4.21e-01     0.656 0.418498 -1.0065 0.31
## strata(SexM)SexM=TRUE:A4TRUE -2.80e-02     0.972 0.382570 -0.0732 0.94
##
## Likelihood ratio test=32.1  on 14 df, p=0.00383  n= 192, number of events= 178
##
## [[82]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                   coef exp(coef) se(coef)      z     p
## AgeCent                       2.94e-02     1.030 2.62e-02  1.121 0.260
## AgeCent2                      2.71e-03     1.003 2.38e-03  1.137 0.260
## LocBodyTRUE                  -9.38e-01     0.391 9.86e-01 -0.951 0.340
## SizeCent                      1.38e-02     1.014 1.31e-02  1.053 0.290
## A2TRUE                        8.17e-01     2.264 3.30e-01  2.474 0.013
## A4TRUE                        4.29e-01     1.536 2.62e-01  1.639 0.100
## AgeCent:AgeCent2              5.91e-05     1.000 7.18e-05  0.824 0.410
## AgeCent:LocBodyTRUE           6.90e-03     1.007 2.67e-02  0.258 0.800
## SizeCent:A2TRUE              -1.46e-02     0.985 1.67e-02 -0.874 0.380
## AgeCent:A4TRUE               -3.55e-02     0.965 2.69e-02 -1.319 0.190
## AgeCent2:A4TRUE              -1.33e-03     0.999 2.38e-03 -0.562 0.570
## LocBodyTRUE:A4TRUE            1.28e+00     3.608 1.01e+00  1.277 0.200
## SizeCent:A4TRUE               3.05e-03     1.003 1.45e-02  0.210 0.830
## strata(SexM)SexM=TRUE:A2TRUE -3.42e-01     0.710 4.36e-01 -0.784 0.430
##
## Likelihood ratio test=31.8  on 14 df, p=0.00428  n= 192, number of events= 178
##
## [[83]]
```

```
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                     coef exp(coef) se(coef)       z     p
## AgeCent                         2.28e-02     1.023 0.026564  0.8596 0.390
## AgeCent2                        6.26e-04     1.001 0.000982  0.6378 0.520
## SizeCent                        3.33e-02     1.034 0.017849  1.8671 0.062
## SizePlus                       -4.63e-02     0.955 0.038764 -1.1946 0.230
## A2TRUE                         -8.50e-01     0.428 0.897595 -0.9466 0.340
## A4TRUE                          2.85e-01     1.330 0.313083  0.9112 0.360
## SizeCent:SizePlus               9.19e-05     1.000 0.000568  0.1617 0.870
## AgeCent2:A2TRUE                 1.78e-03     1.002 0.002503  0.7093 0.480
## SizePlus:A2TRUE                 4.67e-03     1.005 0.018174  0.2572 0.800
## AgeCent:A4TRUE                 -1.76e-02     0.983 0.029006 -0.6055 0.540
## SizePlus:A4TRUE                 2.03e-02     1.021 0.016890  1.2018 0.230
## A2TRUE:A4TRUE                   1.35e+00     3.850 0.889697  1.5152 0.130
## strata(SexM)SexM=TRUE:AgeCent2  7.36e-05     1.000 0.001558  0.0472 0.960
## strata(SexM)SexM=TRUE:A4TRUE   -2.01e-01     0.818 0.393912 -0.5114 0.610
##
## Likelihood ratio test=31.6  on 14 df, p=0.00455  n= 192, number of events= 178
##
## [[84]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                     coef exp(coef) se(coef)       z     p
## AgeCent                         0.035569     1.036  0.03108  1.1444 0.250
## AgeCent2                        0.002031     1.002  0.00258  0.7856 0.430
## SizeCent                        0.029351     1.030  0.01714  1.7125 0.087
## SizePlus                       -0.037370     0.963  0.02316 -1.6136 0.110
## A2TRUE                          0.608070     1.837  0.26516  2.2932 0.022
## A4TRUE                          0.533131     1.704  0.25540  2.0875 0.037
## AgeCent:SizeCent                0.000154     1.000  0.00212  0.0726 0.940
## AgeCent:SizePlus                0.001027     1.001  0.00293  0.3504 0.730
## AgeCent:A2TRUE                 -0.016627     0.984  0.02664 -0.6243 0.530
## SizeCent:A2TRUE                 0.006449     1.006  0.01740  0.3706 0.710
## AgeCent:A4TRUE                 -0.033334     0.967  0.02625 -1.2698 0.200
## AgeCent2:A4TRUE                -0.000993     0.999  0.00266 -0.3734 0.710
## strata(SexM)SexM=TRUE:AgeCent2 -0.000500     0.999  0.00164 -0.3053 0.760
## strata(SexM)SexM=TRUE:SizePlus  0.026402     1.027  0.01437  1.8379 0.066
##
## Likelihood ratio test=31.6  on 14 df, p=0.00456  n= 192, number of events= 178
##
## [[85]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                     coef exp(coef) se(coef)       z      p
## AgeCent                         0.011759     1.012  0.01160  1.0135 0.3100
## AgeCent2                        0.001378     1.001  0.00219  0.6301 0.5300
## LocBodyTRUE                    -0.159678     0.852  0.35745 -0.4467 0.6600
```

```
## SizeCent                           0.034229     1.035  0.02305  1.4852 0.1400
## SizePlus                          -0.060272     0.942  0.03178 -1.8968 0.0580
## A2TRUE                             0.825968     2.284  0.30800  2.6817 0.0073
## A4TRUE                             0.459342     1.583  0.24132  1.9035 0.0570
## AgeCent:LocBodyTRUE                0.001636     1.002  0.02489  0.0657 0.9500
## AgeCent2:LocBodyTRUE               0.002761     1.003  0.00257  1.0750 0.2800
## LocBodyTRUE:SizePlus               0.029207     1.030  0.01630  1.7918 0.0730
## AgeCent:A2TRUE                    -0.017557     0.983  0.02708 -0.6484 0.5200
## AgeCent2:A4TRUE                   -0.000626     0.999  0.00240 -0.2604 0.7900
## strata(SexM)SexM=TRUE:SizeCent    -0.005449     0.995  0.03262 -0.1671 0.8700
## strata(SexM)SexM=TRUE:SizePlus     0.039928     1.041  0.04194  0.9521 0.3400
## strata(SexM)SexM=TRUE:A2TRUE      -0.599297     0.549  0.44427 -1.3489 0.1800
##
## Likelihood ratio test=36.7  on 15 df, p=0.0014  n= 192, number of events= 178
##
## [[86]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                       coef exp(coef) se(coef)       z     p
## AgeCent                           2.14e-02     1.022 0.029304  0.7305 0.470
## LocBodyTRUE                       1.94e-01     1.214 0.254345  0.7625 0.450
## SizeCent                          2.17e-02     1.022 0.018075  1.2023 0.230
## SizePlus                         -5.21e-02     0.949 0.023663 -2.2017 0.028
## A2TRUE                           -5.03e-01     0.605 0.806390 -0.6240 0.530
## A4TRUE                            4.79e-01     1.615 0.291237  1.6449 0.100
## AgeCent:LocBodyTRUE              -9.87e-05     1.000 0.029923 -0.0033 1.000
## AgeCent:SizeCent                  7.36e-04     1.001 0.000867  0.8485 0.400
## LocBodyTRUE:SizeCent              1.69e-02     1.017 0.013522  1.2496 0.210
## AgeCent:A4TRUE                   -2.10e-02     0.979 0.028787 -0.7310 0.460
## SizeCent:A4TRUE                   1.40e-02     1.014 0.012078  1.1553 0.250
## A2TRUE:A4TRUE                     1.11e+00     3.021 0.834675  1.3247 0.190
## strata(SexM)SexM=TRUE:AgeCent    -4.56e-03     0.995 0.018774 -0.2430 0.810
## strata(SexM)SexM=TRUE:SizePlus    2.93e-02     1.030 0.014564  2.0104 0.044
## strata(SexM)SexM=TRUE:A4TRUE     -3.51e-01     0.704 0.392960 -0.8944 0.370
##
## Likelihood ratio test=36.3  on 15 df, p=0.0016  n= 192, number of events= 178
##
## [[87]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                            coef exp(coef) se(coef)       z    p
## AgeCent                7.45e-03     1.007  0.01301  0.5722 0.57
## AgeCent2               6.10e-05     1.000  0.00117  0.0523 0.96
## LocBodyTRUE           -1.13e-01     0.893  0.33163 -0.3397 0.73
## SizeCent               2.76e-02     1.028  0.01806  1.5266 0.13
## SizePlus              -3.14e-02     0.969  0.03750 -0.8381 0.40
## A2TRUE                 4.29e-01     1.535  0.27774  1.5438 0.12
## A4TRUE                 4.42e-01     1.556  0.20366  2.1711 0.03
## AgeCent2:LocBodyTRUE   3.50e-03     1.004  0.00263  1.3272 0.18
## AgeCent:SizePlus       6.95e-04     1.001  0.00102  0.6833 0.49
```

```
## AgeCent2:SizePlus     6.64e-05     1.000  0.00010  0.6618 0.51
## SizeCent:SizePlus     1.02e-04     1.000  0.00061  0.1671 0.87
## AgeCent:A2TRUE       -1.37e-02     0.986  0.02424 -0.5663 0.57
## LocBodyTRUE:A2TRUE    4.34e-01     1.544  0.56638  0.7664 0.44
## SizePlus:A2TRUE      -5.67e-04     0.999  0.02236 -0.0254 0.98
##
## Likelihood ratio test=31  on 14 df, p=0.00547  n= 192, number of events= 178
##
## [[88]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                     coef exp(coef) se(coef)       z     p
## AgeCent                         0.042868     1.044  0.02554  1.6782 0.093
## AgeCent2                        0.000768     1.001  0.00082  0.9363 0.350
## LocBodyTRUE                    -1.272093     0.280  1.39844 -0.9096 0.360
## SizeCent                        0.027555     1.028  0.01655  1.6646 0.096
## SizePlus                       -0.037538     0.963  0.03248 -1.1557 0.250
## A2TRUE                          0.632807     1.883  0.25631  2.4689 0.014
## A4TRUE                          0.412319     1.510  0.23731  1.7374 0.082
## AgeCent:LocBodyTRUE             0.009255     1.009  0.02614  0.3540 0.720
## LocBodyTRUE:SizeCent            0.025966     1.026  0.01494  1.7380 0.082
## AgeCent:A2TRUE                 -0.015119     0.985  0.02446 -0.6181 0.540
## SizeCent:A2TRUE                -0.015441     0.985  0.01868 -0.8264 0.410
## AgeCent:A4TRUE                 -0.037072     0.964  0.02703 -1.3714 0.170
## LocBodyTRUE:A4TRUE              1.448850     4.258  1.36010  1.0652 0.290
## SizePlus:A4TRUE                 0.001297     1.001  0.02230  0.0582 0.950
## strata(SexM)SexM=TRUE:SizePlus  0.020082     1.020  0.01532  1.3108 0.190
##
## Likelihood ratio test=36  on 15 df, p=0.00179  n= 192, number of events= 178
##
## [[89]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                     coef exp(coef) se(coef)      z     p
## AgeCent                         0.036224     1.037 0.024064  1.505 0.130
## AgeCent2                        0.000909     1.001 0.001047  0.869 0.380
## LocBodyTRUE                    -0.600353     0.549 1.132310 -0.530 0.600
## SizeCent                        0.019432     1.020 0.019141  1.015 0.310
## SizePlus                       -0.027896     0.972 0.025035 -1.114 0.270
## A2TRUE                          0.652992     1.921 0.255714  2.554 0.011
## A4TRUE                          0.350978     1.420 0.203807  1.722 0.085
## AgeCent2:LocBodyTRUE            0.003281     1.003 0.002508  1.308 0.190
## AgeCent:SizeCent                0.001146     1.001 0.000798  1.437 0.150
## SizeCent:A2TRUE                -0.006591     0.993 0.017810 -0.370 0.710
## AgeCent:A4TRUE                 -0.035861     0.965 0.026522 -1.352 0.180
## LocBodyTRUE:A4TRUE              0.754931     2.127 1.132474  0.667 0.510
## SizeCent:A4TRUE                 0.006270     1.006 0.015443  0.406 0.680
## strata(SexM)SexM=TRUE:AgeCent2 -0.000591     0.999 0.001612 -0.367 0.710
## strata(SexM)SexM=TRUE:SizePlus  0.021995     1.022 0.015503  1.419 0.160
##
```

```
## Likelihood ratio test=35.8  on 15 df, p=0.00189  n= 192, number of events= 178
##
## [[90]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                     coef exp(coef) se(coef)       z     p
## AgeCent                         0.029669     1.030 0.023510  1.2620 0.210
## AgeCent2                        0.000854     1.001 0.000996  0.8575 0.390
## LocBodyTRUE                    -0.014182     0.986 0.324740 -0.0437 0.970
## SizePlus                       -0.014199     0.986 0.013432 -1.0571 0.290
## A2TRUE                          0.613538     1.847 0.274628  2.2341 0.025
## A4TRUE                          0.622048     1.863 0.301239  2.0650 0.039
## AgeCent:LocBodyTRUE             0.007759     1.008 0.027104  0.2863 0.770
## LocBodyTRUE:SizePlus            0.023973     1.024 0.016466  1.4559 0.150
## LocBodyTRUE:A2TRUE              0.207344     1.230 0.574638  0.3608 0.720
## SizePlus:A2TRUE                -0.005271     0.995 0.022559 -0.2336 0.820
## AgeCent:A4TRUE                 -0.024977     0.975 0.025951 -0.9625 0.340
## strata(SexM)SexM=TRUE:AgeCent2  0.000225     1.000 0.001529  0.1469 0.880
## strata(SexM)SexM=TRUE:SizePlus  0.032153     1.033 0.013963  2.3028 0.021
## strata(SexM)SexM=TRUE:A4TRUE   -0.245747     0.782 0.401533 -0.6120 0.540
##
## Likelihood ratio test=30.6  on 14 df, p=0.00628  n= 192, number of events= 178
##
## [[91]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                        coef exp(coef) se(coef)       z
## AgeCent                            6.59e-04     1.001 2.05e-02  0.0322
## AgeCent2                           1.46e-03     1.001 1.11e-03  1.3192
## LocBodyTRUE                       -1.53e+00     0.216 9.62e-01 -1.5912
## SizeCent                           3.42e-02     1.035 1.66e-02  2.0560
## SizePlus                          -3.72e-02     0.964 2.31e-02 -1.6110
## A2TRUE                            -4.27e-01     0.653 8.50e-01 -0.5025
## A4TRUE                             2.04e-01     1.226 2.11e-01  0.9653
## AgeCent:AgeCent2                   4.52e-05     1.000 7.36e-05  0.6145
## AgeCent:LocBodyTRUE               -2.81e-03     0.997 2.54e-02 -0.1103
## LocBodyTRUE:SizePlus               2.78e-02     1.028 1.67e-02  1.6655
## LocBodyTRUE:A4TRUE                 1.46e+00     4.288 8.82e-01  1.6503
## A2TRUE:A4TRUE                      1.07e+00     2.918 8.15e-01  1.3132
## strata(SexM)SexM=TRUE:AgeCent      8.86e-04     1.001 1.82e-02  0.0487
## strata(SexM)SexM=TRUE:LocBodyTRUE  2.13e-01     1.238 4.22e-01  0.5047
## strata(SexM)SexM=TRUE:A2TRUE      -2.51e-01     0.778 4.45e-01 -0.5642
##                                       p
## AgeCent                           0.970
## AgeCent2                          0.190
## LocBodyTRUE                       0.110
## SizeCent                          0.040
## SizePlus                          0.110
## A2TRUE                            0.620
## A4TRUE                            0.330
```

```
## AgeCent:AgeCent2                   0.540
## AgeCent:LocBodyTRUE                0.910
## LocBodyTRUE:SizePlus               0.096
## LocBodyTRUE:A4TRUE                 0.099
## A2TRUE:A4TRUE                      0.190
## strata(SexM)SexM=TRUE:AgeCent      0.960
## strata(SexM)SexM=TRUE:LocBodyTRUE 0.610
## strata(SexM)SexM=TRUE:A2TRUE       0.570
##
## Likelihood ratio test=35.8  on 15 df, p=0.00192  n= 192, number of events= 178
##
## [[92]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                      coef exp(coef) se(coef)       z
## AgeCent                           -9.29e-03     0.991 1.60e-02 -0.5806
## AgeCent2                           3.96e-03     1.004 2.94e-03  1.3474
## LocBodyTRUE                       -1.47e-02     0.985 3.46e-01 -0.0426
## SizeCent                           3.42e-02     1.035 1.69e-02  2.0261
## SizePlus                          -4.27e-02     0.958 2.30e-02 -1.8575
## A2TRUE                            -1.24e+00     0.289 1.01e+00 -1.2349
## A4TRUE                             5.98e-01     1.818 3.07e-01  1.9460
## AgeCent:AgeCent2                   7.25e-05     1.000 7.17e-05  1.0115
## LocBodyTRUE:SizeCent               1.25e-02     1.013 1.33e-02  0.9433
## AgeCent2:SizePlus                  1.29e-04     1.000 9.86e-05  1.3074
## AgeCent2:A2TRUE                    1.03e-03     1.001 2.55e-03  0.4035
## AgeCent2:A4TRUE                   -4.06e-03     0.996 2.85e-03 -1.4252
## A2TRUE:A4TRUE                      1.79e+00     5.980 9.76e-01  1.8331
## strata(SexM)SexM=TRUE:LocBodyTRUE  2.89e-01     1.336 4.13e-01  0.7002
## strata(SexM)SexM=TRUE:A4TRUE      -1.79e-01     0.836 4.03e-01 -0.4439
##                                       p
## AgeCent                           0.560
## AgeCent2                          0.180
## LocBodyTRUE                       0.970
## SizeCent                          0.043
## SizePlus                          0.063
## A2TRUE                            0.220
## A4TRUE                            0.052
## AgeCent:AgeCent2                  0.310
## LocBodyTRUE:SizeCent              0.350
## AgeCent2:SizePlus                 0.190
## AgeCent2:A2TRUE                   0.690
## AgeCent2:A4TRUE                   0.150
## A2TRUE:A4TRUE                     0.067
## strata(SexM)SexM=TRUE:LocBodyTRUE 0.480
## strata(SexM)SexM=TRUE:A4TRUE      0.660
##
## Likelihood ratio test=35.7  on 15 df, p=0.00195  n= 192, number of events= 178
##
## [[93]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
```

```
##
##
##                                      coef exp(coef) se(coef)        z     p
## AgeCent                           5.91e-05     1.000 0.014908  0.00396 1.000
## AgeCent2                          1.13e-03     1.001 0.001030  1.09950 0.270
## SizeCent                          1.36e-02     1.014 0.018603  0.73271 0.460
## SizePlus                         -9.68e-03     0.990 0.035062 -0.27597 0.780
## A2TRUE                            8.33e-01     2.300 0.337685  2.46621 0.014
## A4TRUE                            3.80e-01     1.462 0.280894  1.35305 0.180
## AgeCent:SizePlus                  1.34e-03     1.001 0.001091  1.22713 0.220
## SizeCent:SizePlus                -2.18e-04     1.000 0.000574 -0.37929 0.700
## SizeCent:A2TRUE                   1.18e-03     1.001 0.016851  0.06987 0.940
## strata(SexM)SexM=TRUE:AgeCent     4.55e-03     1.005 0.018795  0.24211 0.810
## strata(SexM)SexM=TRUE:AgeCent2 -3.93e-04     1.000 0.001679 -0.23377 0.820
## strata(SexM)SexM=TRUE:SizeCent    2.02e-02     1.020 0.011220  1.79742 0.072
## strata(SexM)SexM=TRUE:A2TRUE     -4.98e-01     0.608 0.426148 -1.16770 0.240
## strata(SexM)SexM=TRUE:A4TRUE      2.34e-02     1.024 0.384779  0.06089 0.950
##
## Likelihood ratio test=30.5  on 14 df, p=0.00653  n= 192, number of events= 178
##
## [[94]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                         coef exp(coef) se(coef)        z
## AgeCent2                             4.48e-03     1.004 2.79e-03  1.60368
## LocBodyTRUE                         -1.25e-01     0.882 3.89e-01 -0.32134
## SizeCent                             2.83e-02     1.029 2.42e-02  1.17168
## SizePlus                            -4.69e-02     0.954 3.94e-02 -1.19043
## A2TRUE                              -1.05e+00     0.350 9.16e-01 -1.14620
## A4TRUE                               6.06e-01     1.833 3.11e-01  1.94568
## AgeCent2:SizeCent                    8.46e-05     1.000 7.69e-05  1.09942
## LocBodyTRUE:SizePlus                 4.37e-02     1.045 2.06e-02  2.12254
## SizeCent:SizePlus                   -5.74e-04     0.999 6.68e-04 -0.85882
## AgeCent2:A4TRUE                     -4.73e-03     0.995 2.79e-03 -1.69527
## A2TRUE:A4TRUE                        1.69e+00     5.399 9.41e-01  1.79268
## strata(SexM)SexM=TRUE:AgeCent2      -3.89e-06     1.000 1.66e-03 -0.00235
## strata(SexM)SexM=TRUE:LocBodyTRUE   -1.56e-01     0.855 4.74e-01 -0.33001
## strata(SexM)SexM=TRUE:SizeCent      -4.87e-03     0.995 3.29e-02 -0.14821
## strata(SexM)SexM=TRUE:SizePlus       4.54e-02     1.046 4.52e-02  1.00483
## strata(SexM)SexM=TRUE:A4TRUE        -1.11e-01     0.895 4.12e-01 -0.26902
##                                        p
## AgeCent2                           0.110
## LocBodyTRUE                        0.750
## SizeCent                           0.240
## SizePlus                           0.230
## A2TRUE                             0.250
## A4TRUE                             0.052
## AgeCent2:SizeCent                  0.270
## LocBodyTRUE:SizePlus               0.034
## SizeCent:SizePlus                  0.390
## AgeCent2:A4TRUE                    0.090
## A2TRUE:A4TRUE                      0.073
```

```
## strata(SexM)SexM=TRUE:AgeCent2    1.000
## strata(SexM)SexM=TRUE:LocBodyTRUE 0.740
## strata(SexM)SexM=TRUE:SizeCent    0.880
## strata(SexM)SexM=TRUE:SizePlus    0.310
## strata(SexM)SexM=TRUE:A4TRUE      0.790
##
## Likelihood ratio test=40.7  on 16 df, p=0.000618  n= 192, number of events= 178
##
## [[95]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                      coef exp(coef) se(coef)       z
## AgeCent                           2.26e-02     1.023 2.48e-02  0.9095
## AgeCent2                          3.56e-05     1.000 1.19e-03  0.0299
## LocBodyTRUE                       2.93e-01     1.340 3.34e-01  0.8769
## SizeCent                          2.88e-02     1.029 1.77e-02  1.6218
## SizePlus                         -6.18e-02     0.940 4.07e-02 -1.5202
## A2TRUE                            5.49e-01     1.732 2.71e-01  2.0242
## A4TRUE                            3.16e-01     1.371 2.24e-01  1.4062
## AgeCent:SizePlus                  1.48e-03     1.001 1.02e-03  1.4468
## AgeCent2:SizePlus                 1.14e-04     1.000 9.62e-05  1.1837
## SizeCent:SizePlus                 9.61e-05     1.000 5.86e-04  0.1639
## LocBodyTRUE:A2TRUE                1.28e-01     1.136 4.59e-01  0.2788
## AgeCent:A4TRUE                   -2.59e-02     0.974 2.60e-02 -0.9943
## SizePlus:A4TRUE                   1.57e-02     1.016 1.68e-02  0.9336
## strata(SexM)SexM=TRUE:LocBodyTRUE -6.87e-02     0.934 4.29e-01 -0.1602
## strata(SexM)SexM=TRUE:SizePlus     3.04e-02     1.031 1.58e-02  1.9214
##                                      p
## AgeCent                           0.360
## AgeCent2                          0.980
## LocBodyTRUE                       0.380
## SizeCent                          0.100
## SizePlus                          0.130
## A2TRUE                            0.043
## A4TRUE                            0.160
## AgeCent:SizePlus                  0.150
## AgeCent2:SizePlus                 0.240
## SizeCent:SizePlus                 0.870
## LocBodyTRUE:A2TRUE                0.780
## AgeCent:A4TRUE                    0.320
## SizePlus:A4TRUE                   0.350
## strata(SexM)SexM=TRUE:LocBodyTRUE 0.870
## strata(SexM)SexM=TRUE:SizePlus    0.055
##
## Likelihood ratio test=35.5  on 15 df, p=0.00211  n= 192, number of events= 178
##
## [[96]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
```

```
##                                     coef exp(coef) se(coef)       z      p
## AgeCent                         -2.96e-03     0.997 1.93e-02 -0.1532 0.8800
## AgeCent2                         6.45e-04     1.001 1.14e-03  0.5683 0.5700
## LocBodyTRUE                      1.97e-02     1.020 3.44e-01  0.0571 0.9500
## SizeCent                         3.41e-02     1.035 1.83e-02  1.8610 0.0630
## SizePlus                        -4.43e-02     0.957 2.43e-02 -1.8256 0.0680
## A2TRUE                           2.34e-01     1.263 4.37e-01  0.5348 0.5900
## A4TRUE                           3.92e-01     1.481 2.06e-01  1.9084 0.0560
## AgeCent:AgeCent2                 9.05e-05     1.000 7.02e-05  1.2885 0.2000
## AgeCent2:LocBodyTRUE             1.21e-03     1.001 2.67e-03  0.4509 0.6500
## AgeCent2:SizeCent                1.24e-04     1.000 7.60e-05  1.6355 0.1000
## LocBodyTRUE:SizePlus             1.16e-02     1.012 1.73e-02  0.6697 0.5000
## AgeCent:A2TRUE                   3.66e-03     1.004 2.63e-02  0.1393 0.8900
## SizeCent:A2TRUE                 -2.09e-01     0.811 7.21e-02 -2.9042 0.0037
## SizePlus:A2TRUE                  2.29e-01     1.257 8.15e-02  2.8038 0.0051
## strata(SexM)SexM=TRUE:AgeCent -2.01e-03     0.998 1.88e-02 -0.1068 0.9100
## strata(SexM)SexM=TRUE:A2TRUE  -3.96e-01     0.673 4.50e-01 -0.8794 0.3800
##
## Likelihood ratio test=40.5  on 16 df, p=0.000655  n= 192, number of events= 178
##
## [[97]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                     coef exp(coef) se(coef)       z      p
## AgeCent                          2.41e-02     1.024 3.02e-02  0.7989 0.4200
## AgeCent2                         1.12e-03     1.001 1.47e-03  0.7592 0.4500
## LocBodyTRUE                     -1.04e+00     0.355 8.43e-01 -1.2283 0.2200
## SizePlus                         1.32e-02     1.013 7.55e-03  1.7472 0.0810
## A2TRUE                           7.73e-01     2.167 2.93e-01  2.6414 0.0083
## A4TRUE                           3.76e-01     1.456 2.03e-01  1.8489 0.0640
## AgeCent:AgeCent2                 4.27e-05     1.000 7.83e-05  0.5455 0.5900
## AgeCent:LocBodyTRUE              1.24e-02     1.012 2.50e-02  0.4940 0.6200
## AgeCent2:LocBodyTRUE             3.69e-03     1.004 2.46e-03  1.5002 0.1300
## AgeCent:A4TRUE                  -2.84e-02     0.972 2.67e-02 -1.0610 0.2900
## LocBodyTRUE:A4TRUE               1.07e+00     2.925 8.37e-01  1.2828 0.2000
## strata(SexM)SexM=TRUE:AgeCent  -1.08e-03     0.999 1.93e-02 -0.0556 0.9600
## strata(SexM)SexM=TRUE:AgeCent2 -2.78e-04     1.000 1.74e-03 -0.1595 0.8700
## strata(SexM)SexM=TRUE:A2TRUE   -2.51e-01     0.778 4.29e-01 -0.5837 0.5600
##
## Likelihood ratio test=30.1  on 14 df, p=0.00735  n= 192, number of events= 178
##
## [[98]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                            coef exp(coef) se(coef)       z     p
## AgeCent                -9.31e-03     0.991 2.09e-02 -0.4456 0.660
## AgeCent2                2.11e-03     1.002 2.37e-03  0.8903 0.370
## LocBodyTRUE             2.39e-01     1.270 2.27e-01  1.0527 0.290
## SizeCent                3.16e-02     1.032 1.74e-02  1.8102 0.070
```

```
## SizePlus            -3.37e-02     0.967 2.30e-02 -1.4662 0.140
## A2TRUE               4.93e-01     1.637 2.63e-01  1.8724 0.061
## A4TRUE               5.49e-01     1.731 2.49e-01  2.2004 0.028
## AgeCent:AgeCent2     6.43e-05     1.000 7.40e-05  0.8691 0.380
## AgeCent:LocBodyTRUE -5.70e-03     0.994 2.96e-02 -0.1929 0.850
## AgeCent:SizeCent    -9.17e-04     0.999 2.05e-03 -0.4481 0.650
## AgeCent:SizePlus     1.61e-03     1.002 2.86e-03  0.5622 0.570
## AgeCent2:SizePlus    1.30e-04     1.000 9.67e-05  1.3409 0.180
## SizeCent:A2TRUE     -6.67e-04     0.999 1.76e-02 -0.0379 0.970
## AgeCent2:A4TRUE     -2.02e-03     0.998 2.38e-03 -0.8485 0.400
##
## Likelihood ratio test=30.1  on 14 df, p=0.00741  n= 192, number of events= 178
##
## [[99]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                     coef exp(coef) se(coef)      z     p
## AgeCent                         0.008148     1.008 1.06e-02  0.769 0.440
## AgeCent2                        0.000718     1.001 9.88e-04  0.726 0.470
## LocBodyTRUE                    -1.086595     0.337 1.24e+00 -0.878 0.380
## SizeCent                        0.019593     1.020 2.26e-02  0.868 0.390
## SizePlus                       -0.051621     0.950 2.53e-02 -2.036 0.042
## A2TRUE                         -0.298764     0.742 8.42e-01 -0.355 0.720
## A4TRUE                          0.229409     1.258 2.14e-01  1.070 0.280
## AgeCent:LocBodyTRUE             0.003068     1.003 2.58e-02  0.119 0.910
## AgeCent2:SizeCent               0.000058     1.000 7.12e-05  0.814 0.420
## LocBodyTRUE:SizeCent           -0.056188     0.945 4.43e-02 -1.269 0.200
## LocBodyTRUE:SizePlus            0.099282     1.104 5.53e-02  1.795 0.073
## LocBodyTRUE:A4TRUE              0.745148     2.107 1.15e+00  0.646 0.520
## SizeCent:A4TRUE                 0.009604     1.010 1.58e-02  0.607 0.540
## A2TRUE:A4TRUE                   1.082147     2.951 8.09e-01  1.337 0.180
## strata(SexM)SexM=TRUE:SizeCent  0.023156     1.023 1.20e-02  1.929 0.054
## strata(SexM)SexM=TRUE:A2TRUE   -0.384104     0.681 4.40e-01 -0.872 0.380
##
## Likelihood ratio test=40.4  on 16 df, p=0.000681  n= 192, number of events= 178
##
## [[100]]
## Call:
## fitfunc(formula = as.formula(x), data = data)
##
##
##                                    coef exp(coef) se(coef)       z    p
## AgeCent                        -0.000456     1.000  0.01598 -0.0285 0.98
## LocBodyTRUE                     0.334821     1.398  0.22773  1.4703 0.14
## SizeCent                        0.022455     1.023  0.03005  0.7473 0.45
## SizePlus                       -0.032879     0.968  0.03945 -0.8335 0.40
## A2TRUE                          0.791867     2.208  0.34068  2.3243 0.02
## A4TRUE                          0.351549     1.421  0.31830  1.1045 0.27
## AgeCent:LocBodyTRUE            -0.014064     0.986  0.03089 -0.4552 0.65
## AgeCent:SizePlus                0.001133     1.001  0.00124  0.9114 0.36
## AgeCent:A2TRUE                 -0.009138     0.991  0.02545 -0.3590 0.72
## SizeCent:A2TRUE                -0.013483     0.987  0.01819 -0.7413 0.46
```

```
## SizeCent:A4TRUE                0.012983     1.013  0.03539  0.3669 0.71
## SizePlus:A4TRUE                0.006811     1.007  0.04614  0.1476 0.88
## strata(SexM)SexM=TRUE:AgeCent  0.006789     1.007  0.01876  0.3619 0.72
## strata(SexM)SexM=TRUE:A2TRUE  -0.505852     0.603  0.44141 -1.1460 0.25
##
## Likelihood ratio test=29.9  on 14 df, p=0.00783  n= 192, number of events= 178

rm(nobs.coxph)
```

Also run BIC stepwise, because we can.

```
stepAIC(fit.cph, k = log(nrow(data)))

## Start:  AIC=1331
## Surv(Time, DSD) ~ strata(SexM) + AgeCent + AgeCent2 + LocBody +
##     SizeCent + SizePlus + A2 + A4
##
##            Df  AIC
## - AgeCent2  1 1327
## - AgeCent   1 1327
## - SizePlus  1 1327
## - LocBody   1 1327
## - SizeCent  1 1329
## - A4        1 1330
## - A2        1 1330
## <none>        1331
##
## Step:  AIC=1327
## Surv(Time, DSD) ~ strata(SexM) + AgeCent + LocBody + SizeCent +
##     SizePlus + A2 + A4
##
##            Df  AIC
## - AgeCent   1 1322
## - LocBody   1 1323
## - SizePlus  1 1323
## - SizeCent  1 1325
## - A2        1 1326
## <none>        1327
## - A4        1 1327
##
## Step:  AIC=1322
## Surv(Time, DSD) ~ strata(SexM) + LocBody + SizeCent + SizePlus +
##     A2 + A4
##
##            Df  AIC
## - SizePlus  1 1318
## - LocBody   1 1318
## - SizeCent  1 1320
## - A2        1 1322
## - A4        1 1322
## <none>        1322
##
## Step:  AIC=1318
## Surv(Time, DSD) ~ strata(SexM) + LocBody + SizeCent + A2 + A4
```

```
##
##            Df  AIC
## - LocBody   1 1314
## - SizeCent  1 1317
## <none>        1318
## - A4        1 1319
## - A2        1 1320
##
## Step:  AIC=1314
## Surv(Time, DSD) ~ strata(SexM) + SizeCent + A2 + A4
##
##            Df  AIC
## <none>        1314
## - SizeCent  1 1315
## - A4        1 1316
## - A2        1 1316
## Call:
## coxph(formula = Surv(Time, DSD) ~ strata(SexM) + SizeCent + A2 +
##     A4, data = data)
##
##
##            coef exp(coef) se(coef)    z      p
## SizeCent 0.0123      1.01  0.00492 2.51 0.0120
## A2TRUE   0.5872      1.80  0.20192 2.91 0.0036
## A4TRUE   0.4747      1.61  0.18705 2.54 0.0110
##
## Likelihood ratio test=22.9  on 3 df, p=4.26e-05  n= 192, number of events= 178
```

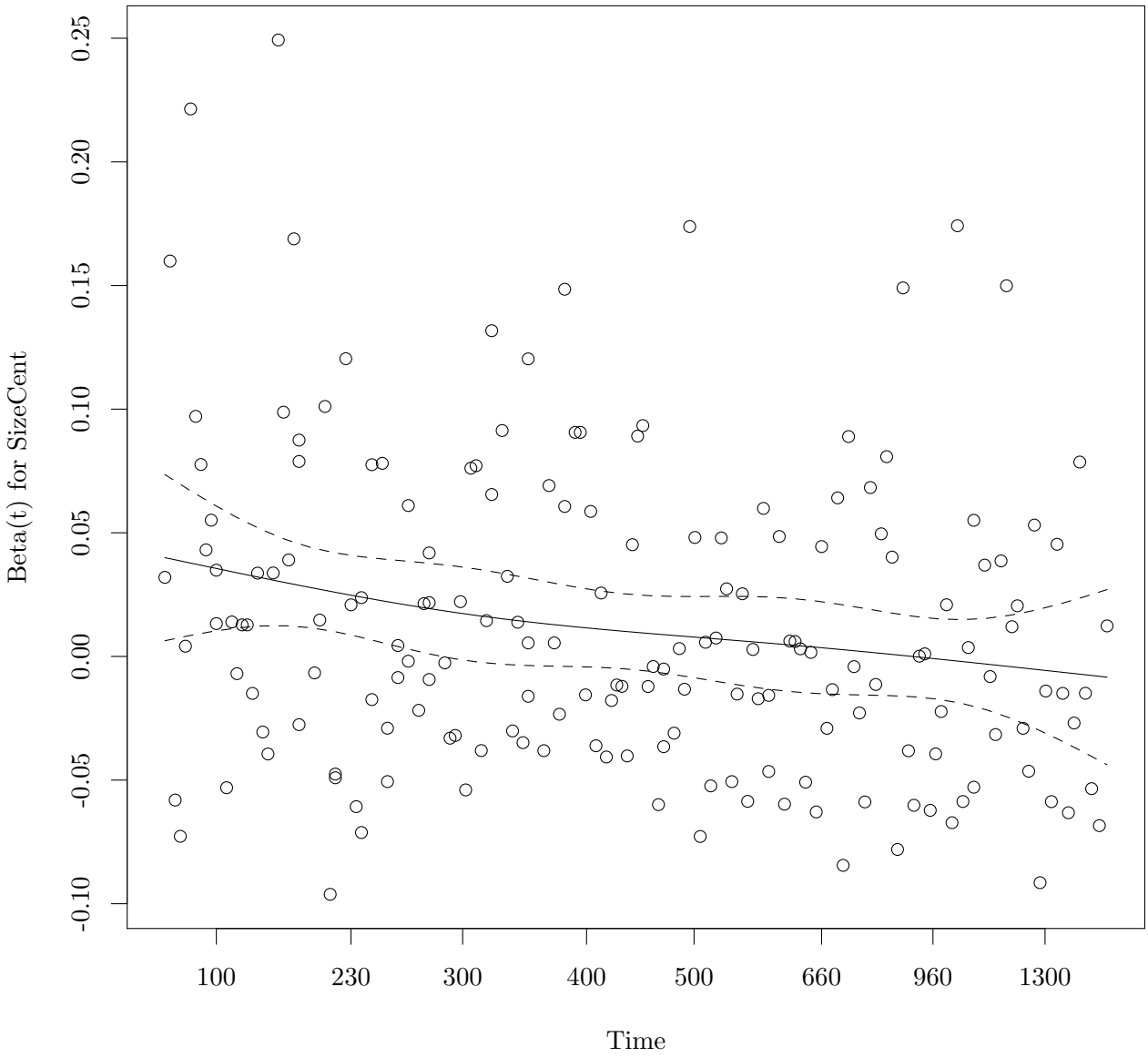
Consensus, excellent.

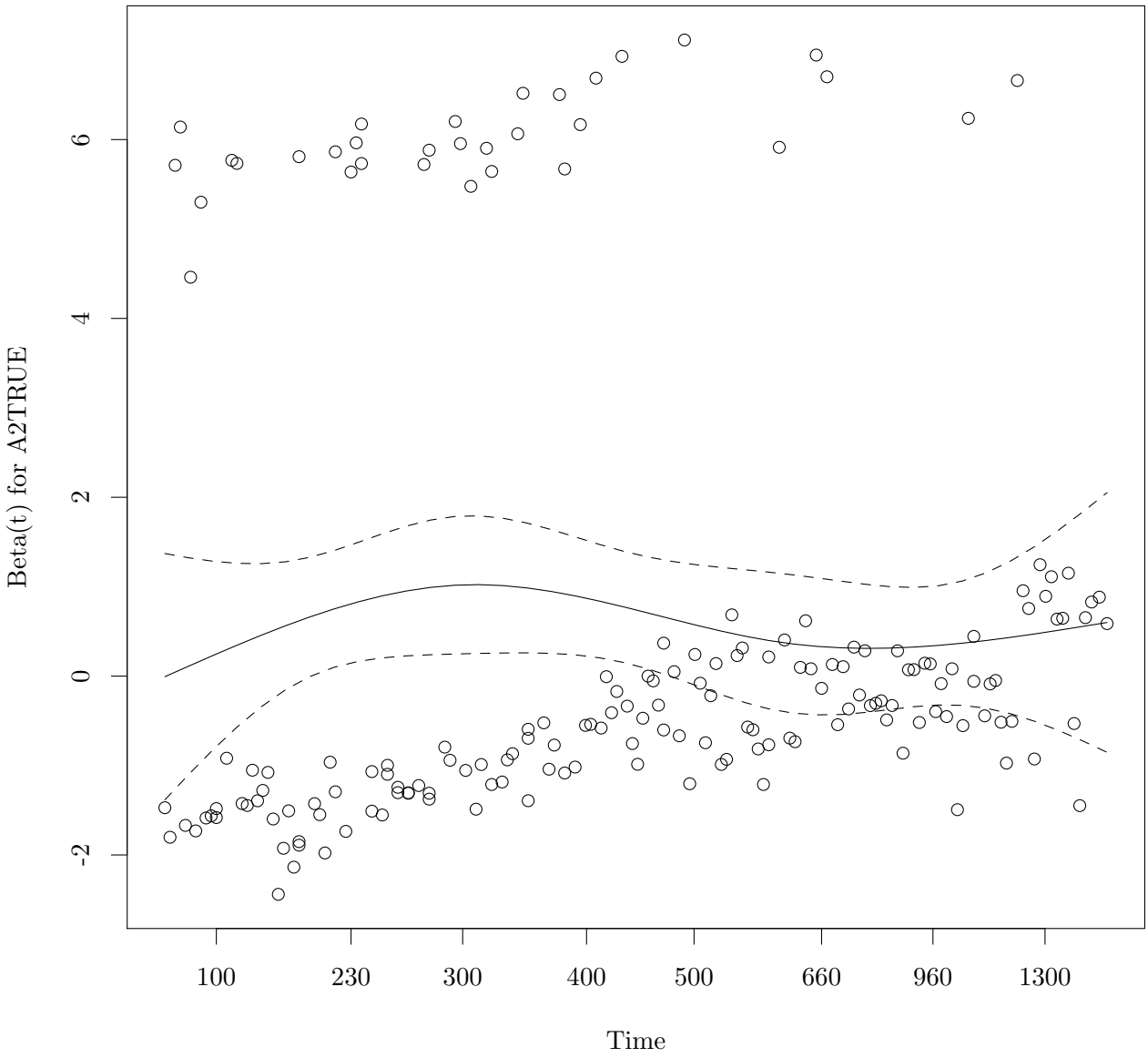
4.5 PH assumption: reduced model

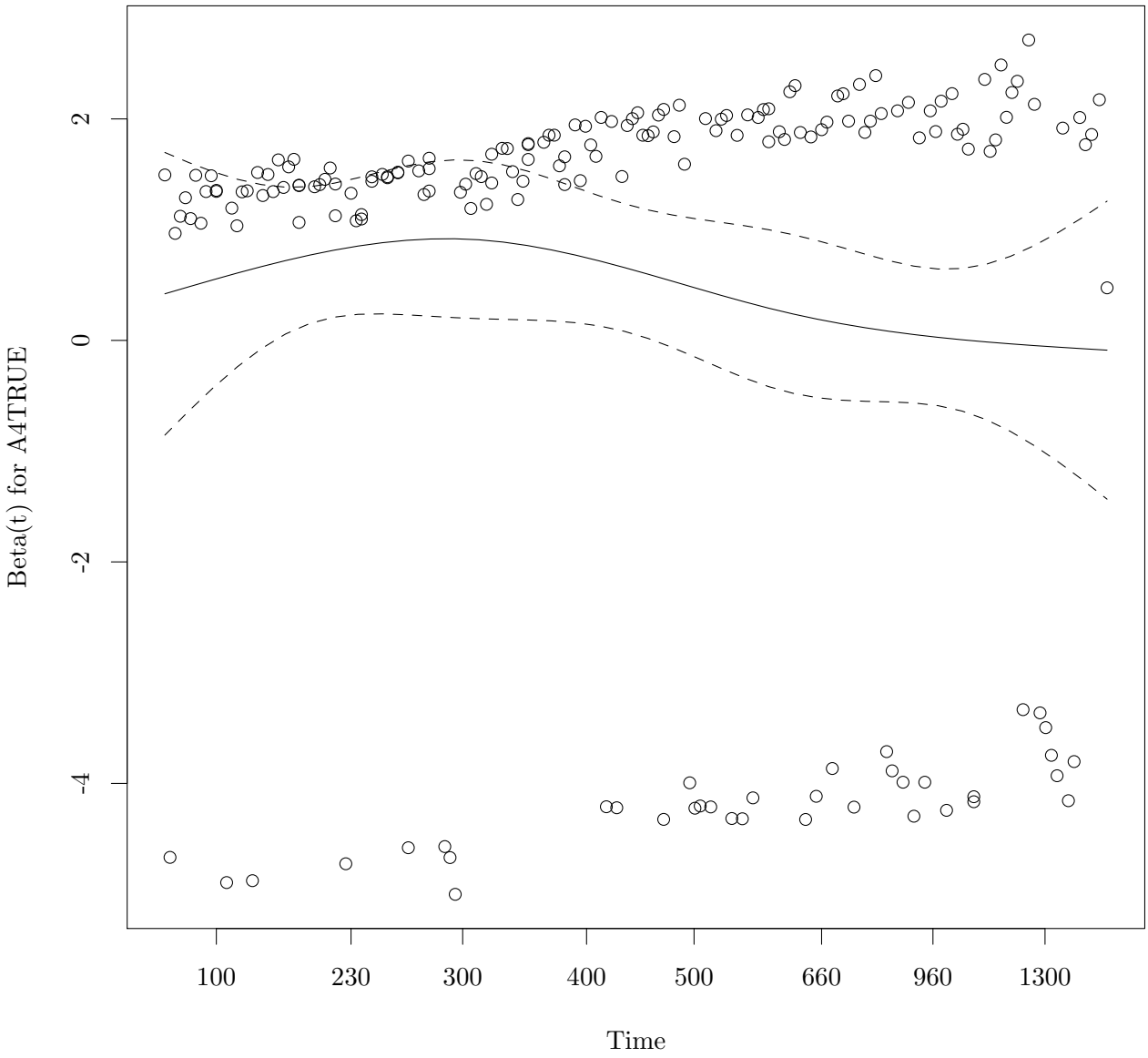
```
fit.cph = coxph(Surv(Time, DSD) ~ strata(SexM) + SizeCent + A2 + A4, data = data)
cox.zph(fit.cph)
```

```
##              rho chisq       p
## SizeCent -0.2058 6.733 0.00946
## A2TRUE   -0.0259 0.116 0.73363
## A4TRUE   -0.1177 2.311 0.12849
## GLOBAL        NA 9.453 0.02383
```

```
plot(cox.zph(fit.cph))
```

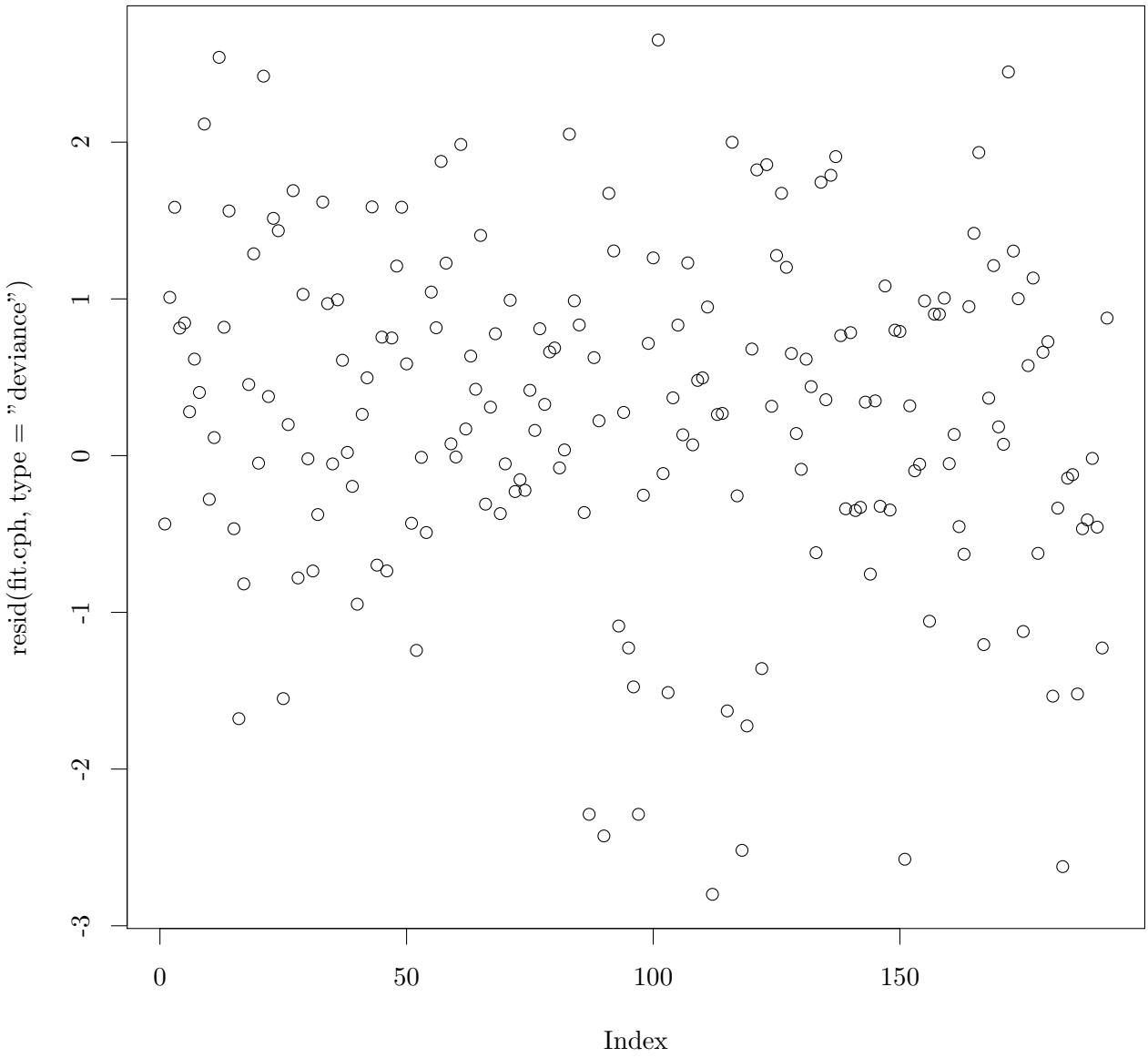

Beta(t) for SizeCent
0.25
0.20
0.15
0.10
0.05
0.00
-0.05
-0.10
100
230
300
400
500
660
960
1300
Time


Beta(t) for A2TRUE
-2
0
2
4
6
100
230
300
400
500
660
960
1300
Time



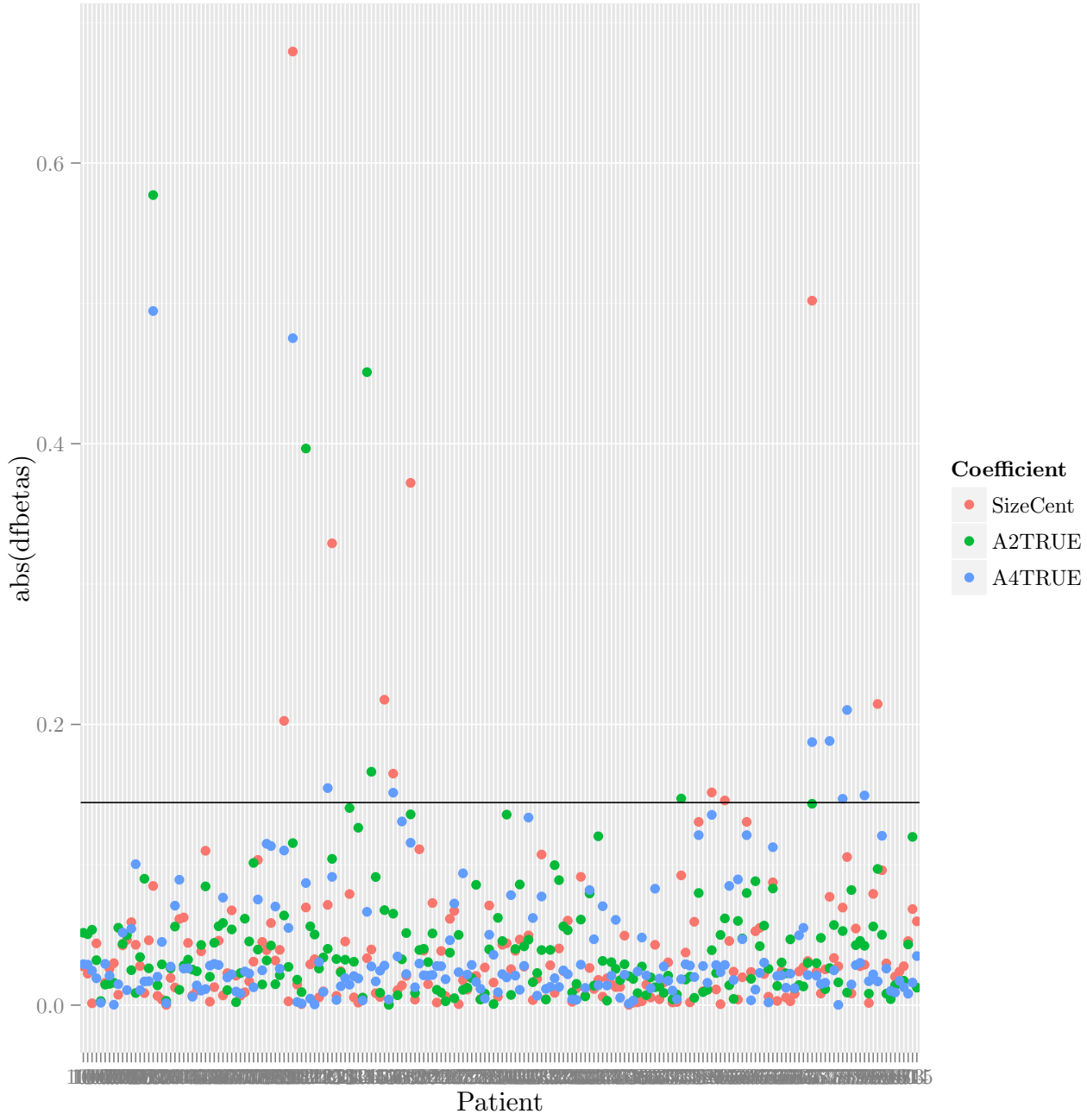
4.6 Outliers: reduced model

```
plot(resid(fit.cph, type = "deviance"))
```



Now generate the restricted fit and examine the DFBETAS on the reduced model.

```
temp = resid(fit.cph, type = "dfbetas")
colnames(temp) = names(fit.cph$coefficients)
temp = melt(temp)
colnames(temp) = c("Patient", "Coefficient", "dfbetas")
temp$Patient = gsub("NSWPCN_", "", temp$Patient)
2/sqrt(nrow(data))              # The classic threshold for concern is 2/sqrt(n).

## [1] 0.1443

ggplot(temp, aes(y = abs(dfbetas), x = Patient, col = Coefficient)) + geom_point() + geom_hline(yinterce
```




```
sort(apply(abs(resid(fit.cph, type = "dfbetas")), 1, max), decreasing = TRUE)

## NSWPCN_1203 NSWPCN_1095  NSWPCN_668  NSWPCN_144 NSWPCN_1212  NSWPCN_183
##    0.679446    0.577186    0.501923    0.451010    0.396606    0.372111
## NSWPCN_1253  NSWPCN_154  NSWPCN_799  NSWPCN_788 NSWPCN_1194  NSWPCN_777
##    0.329044    0.217602    0.214546    0.210311    0.202551    0.188189
##  NSWPCN_145  NSWPCN_159  NSWPCN_125  NSWPCN_389  NSWPCN_795  NSWPCN_374
##    0.166285    0.164951    0.154644    0.151544    0.149390    0.147194
##  NSWPCN_787  NSWPCN_606  NSWPCN_131  NSWPCN_296  NSWPCN_307  NSWPCN_163
##    0.147006    0.145797    0.140483    0.135732    0.133613    0.130845
##  NSWPCN_382  NSWPCN_645  NSWPCN_135  NSWPCN_801  NSWPCN_337  NSWPCN_814
##    0.130554    0.130554    0.126385    0.120654    0.120301    0.119883
## NSWPCN_1187 NSWPCN_1188  NSWPCN_655  NSWPCN_192 NSWPCN_1155  NSWPCN_313
```

```
##    0.114976    0.113346    0.112513    0.111045    0.109989    0.107328
## NSWPCN_1182 NSWPCN_1179 NSWPCN_1072  NSWPCN_321  NSWPCN_269  NSWPCN_333
##    0.103465    0.101334    0.100422    0.099702    0.093907    0.091420
## NSWPCN_1453 NSWPCN_1082  NSWPCN_639 NSWPCN_1145  NSWPCN_322  NSWPCN_647
##    0.091302    0.090016    0.089568    0.089343    0.089050    0.088283
##  NSWPCN_305  NSWPCN_276  NSWPCN_636  NSWPCN_364  NSWPCN_789  NSWPCN_335
##    0.085957    0.085705    0.084915    0.082950    0.082007    0.081983
##  NSWPCN_798  NSWPCN_303 NSWPCN_1168  NSWPCN_200  NSWPCN_267  NSWPCN_281
##    0.079280    0.078363    0.076590    0.072756    0.072372    0.070984
## NSWPCN_1143  NSWPCN_344 NSWPCN_1189 NSWPCN_1172 NSWPCN_1146  NSWPCN_284
##    0.070870    0.070489    0.070241    0.067505    0.062471    0.062183
##  NSWPCN_308 NSWPCN_1177  NSWPCN_257  NSWPCN_348  NSWPCN_326  NSWPCN_815
##    0.062095    0.061588    0.061508    0.060738    0.060211    0.059693
##  NSWPCN_377 NSWPCN_1066  NSWPCN_779  NSWPCN_651 NSWPCN_1165 NSWPCN_1213
##    0.059404    0.059092    0.057056    0.056655    0.056190    0.056140
##  NSWPCN_324 NSWPCN_1028  NSWPCN_665  NSWPCN_648 NSWPCN_1198  NSWPCN_790
##    0.056079    0.055128    0.055077    0.055070    0.054993    0.054567
## NSWPCN_1017 NSWPCN_1029   NSWPCN_10  NSWPCN_182 NSWPCN_1016 NSWPCN_1216
##    0.053716    0.051710    0.051532    0.051363    0.050528    0.050305
##  NSWPCN_445  NSWPCN_268 NSWPCN_1031  NSWPCN_663  NSWPCN_351  NSWPCN_360
##    0.050024    0.050017    0.049762    0.049724    0.049484    0.048131
##  NSWPCN_769  NSWPCN_643  NSWPCN_336  NSWPCN_661 NSWPCN_1089  NSWPCN_794
##    0.047896    0.047505    0.046940    0.046846    0.046190    0.045739
##  NSWPCN_294  NSWPCN_813 NSWPCN_1178   NSWPCN_13 NSWPCN_1183 NSWPCN_1139
##    0.045642    0.045627    0.045374    0.045292    0.045023    0.045012
## NSWPCN_1160 NSWPCN_1147 NSWPCN_1019 NSWPCN_1153  NSWPCN_306  NSWPCN_194
##    0.044393    0.044312    0.043998    0.042885    0.041877    0.040125
##  NSWPCN_304 NSWPCN_1190  NSWPCN_320   NSWPCN_24  NSWPCN_375  NSWPCN_283
##    0.039988    0.039368    0.039342    0.038570    0.037468    0.035857
##  NSWPCN_161 NSWPCN_1075 NSWPCN_1227  NSWPCN_126  NSWPCN_666  NSWPCN_132
##    0.034647    0.034228    0.033968    0.032846    0.031435    0.030890
## NSWPCN_1219   NSWPCN_20  NSWPCN_346  NSWPCN_370  NSWPCN_657 NSWPCN_1026
##    0.030657    0.030628    0.030589    0.030494    0.030390    0.029906
##    NSWPCN_7  NSWPCN_804 NSWPCN_1021  NSWPCN_273    NSWPCN_4  NSWPCN_376
##    0.029887    0.029734    0.029387    0.028622    0.028568    0.028157
## NSWPCN_1158   NSWPCN_21  NSWPCN_384  NSWPCN_811  NSWPCN_781  NSWPCN_369
##    0.028155    0.027893    0.027871    0.027728    0.027662    0.027516
## NSWPCN_1141  NSWPCN_280 NSWPCN_1022  NSWPCN_653  NSWPCN_775 NSWPCN_1150
##    0.027473    0.026816    0.025860    0.025815    0.025492    0.025310
##  NSWPCN_149  NSWPCN_128 NSWPCN_1152   NSWPCN_36  NSWPCN_810  NSWPCN_638
##    0.024536    0.024175    0.024113    0.023930    0.023871    0.023853
##  NSWPCN_646  NSWPCN_309 NSWPCN_1176 NSWPCN_1170  NSWPCN_658  NSWPCN_272
##    0.023604    0.022866    0.022810    0.022793    0.022659    0.021785
##  NSWPCN_362 NSWPCN_1173  NSWPCN_656  NSWPCN_352  NSWPCN_807 NSWPCN_1136
##    0.021164    0.020944    0.020750    0.020673    0.020243    0.020225
##  NSWPCN_363  NSWPCN_345  NSWPCN_366  NSWPCN_358  NSWPCN_256 NSWPCN_1207
##    0.019781    0.019100    0.018888    0.018645    0.018451    0.018120
##  NSWPCN_350  NSWPCN_797  NSWPCN_387  NSWPCN_332  NSWPCN_190  NSWPCN_334
##    0.017800    0.017032    0.015868    0.015129    0.012700    0.012267
##  NSWPCN_662  NSWPCN_277  NSWPCN_319  NSWPCN_372  NSWPCN_806 NSWPCN_1211
##    0.012027    0.011621    0.011569    0.010387    0.010136    0.009291
##  NSWPCN_330  NSWPCN_373  NSWPCN_136  NSWPCN_157 NSWPCN_1140 NSWPCN_1020
##    0.008967    0.007566    0.005306    0.003988    0.003038    0.002854
```

```
sum(apply(abs(resid(fit.cph, type = "dfbetas")), 1, max) > 2/sqrt(nrow(data)))
```

```
## [1] 20
```

4.7 Summary of EDA

1. On the basis of pre-operative assessability and data availability, variables were filtered down to Sex, AgeCent, LocBody, SizeCent, A2, A4.
2. Functional forms for the continuous variates AgeCent and SizeCent indicated a possible slight quadratic effect on AgeCent, and a knee on SizeCent. These were modelled by incorporating additional terms.
3. Analysis of a full model fit (with additional nonlinear terms included) indicated violation of PH for gender. This was dealt with by stratification. A slight PH violation by age was deemed unimportant.
4. Variable selection by BIC (both stepwise and genetic all-subset) settled on a final model of Surv(Time,DSD) $\sim$ 1 + strata(SexM) + SizeCent + A2 + A4. This model was refit by coxph.
5. PH was verified on the final model. Deviance residuals showed no egregious outliers. dfBetaS indicated a number of influential observations, which require checking.

5 Final fits

```
fit.cph = coxph(Surv(Time, DSD) ~ strata(SexM) + SizeCent + A2 + A4, data = data)
```

```
set.seed(20150111)
fit.rsf = rfsrc(Surv(Time, DSD) ~ SexM + AgeCent + LocBody + SizeCent + A2 + A4, data = data, mtry = 1,
```

```
fit.gg = flexsurvreg(Surv(Time, DSD) ~ SexM + SizeCent + A2 + A4,
        anc = list(
                sigma = ~ SexM,
                Q = ~ SexM),
        data = data, dist = "gengamma")

fit.gf = flexsurvreg(Surv(Time, DSD) ~ SexM + SizeCent + A2 + A4,
        anc = list(
                sigma = ~ SexM,
                Q = ~ SexM,
                P = ~ SexM),
        data = data, dist = "genf")

fit.gg$loglik
```

```
## [1] -1321
```

```
fit.gf$loglik
```

```
## [1] -1312
```

```
pchisq(2*(fit.gf$loglik - fit.gg$loglik), 2, lower.tail = FALSE)
```

```
## [1] 0.0001097
```

```
AIC(fit.gg)
```

```
## [1] 2660
```

```
AIC(fit.gf)
```

```
## [1] 2646
```

```
BIC(fit.gg)
```

```
## [1] 2689
```

```
BIC(fit.gf)
```

```
## [1] 2682
```

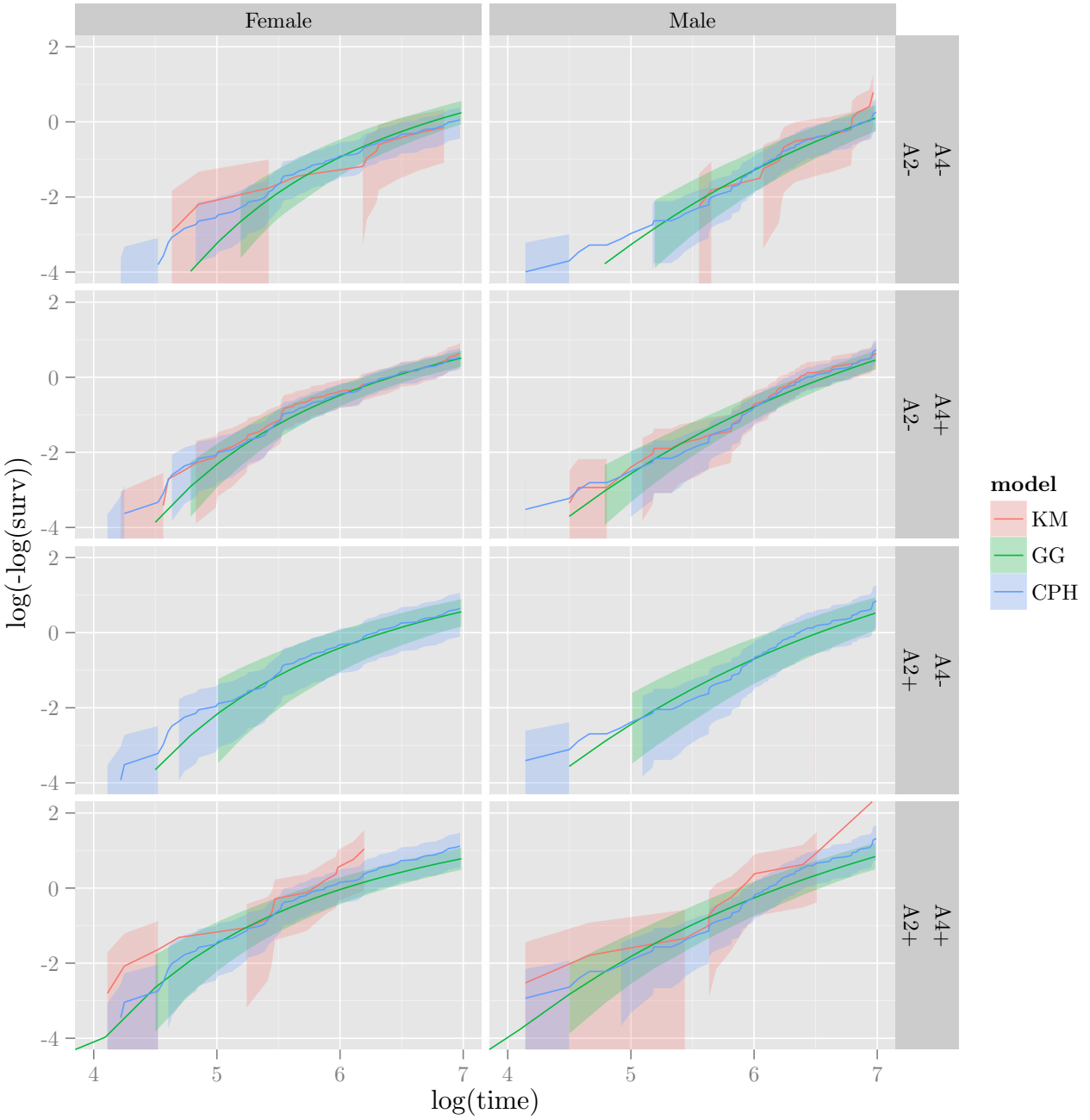
```
fit.gg
```

```
##
## Call:
## flexsurvreg(formula = Surv(Time, DSD) ~ SexM + SizeCent + A2 +     A4, anc = list(sigma = ~SexM, Q =
##
## Estimates:
##                   data mean  est       L95%      U95%      se
## mu                       NA    6.23934   5.84294   6.63575   0.20225
## sigma                    NA    0.89127   0.76429   1.03933   0.06989
## Q                        NA   -0.55202  -1.04978  -0.05427   0.25396
## SexMTRUE           0.48438    0.42793   0.05650   0.79936   0.18951
## SizeCent           3.65104   -0.01605  -0.02472  -0.00739   0.00442
## A2TRUE             0.17188   -0.37690  -0.70956  -0.04425   0.16972
## A4TRUE             0.78125   -0.31796  -0.62892  -0.00699   0.15866
## sigma(SexMTRUE)    0.48438   -0.04243  -0.26147   0.17661   0.11176
## Q(SexMTRUE)        0.48438    0.73193   0.09949   1.36438   0.32268
##                   exp(est)  L95%      U95%
## mu                       NA        NA        NA
## sigma                    NA        NA        NA
## Q                        NA        NA        NA
## SexMTRUE           1.53408   1.05813   2.22412
## SizeCent           0.98407   0.97559   0.99264
## A2TRUE             0.68598   0.49186   0.95671
## A4TRUE             0.72764   0.53317   0.99303
## sigma(SexMTRUE)    0.95846   0.76992   1.19316
## Q(SexMTRUE)        2.07909   1.10461   3.91328
##
## N = 192,  Events: 178,  Censored: 14
## Total time at risk: 133721
## Log-likelihood = -1321, df = 9
## AIC = 2660
```

6 Fit assessment

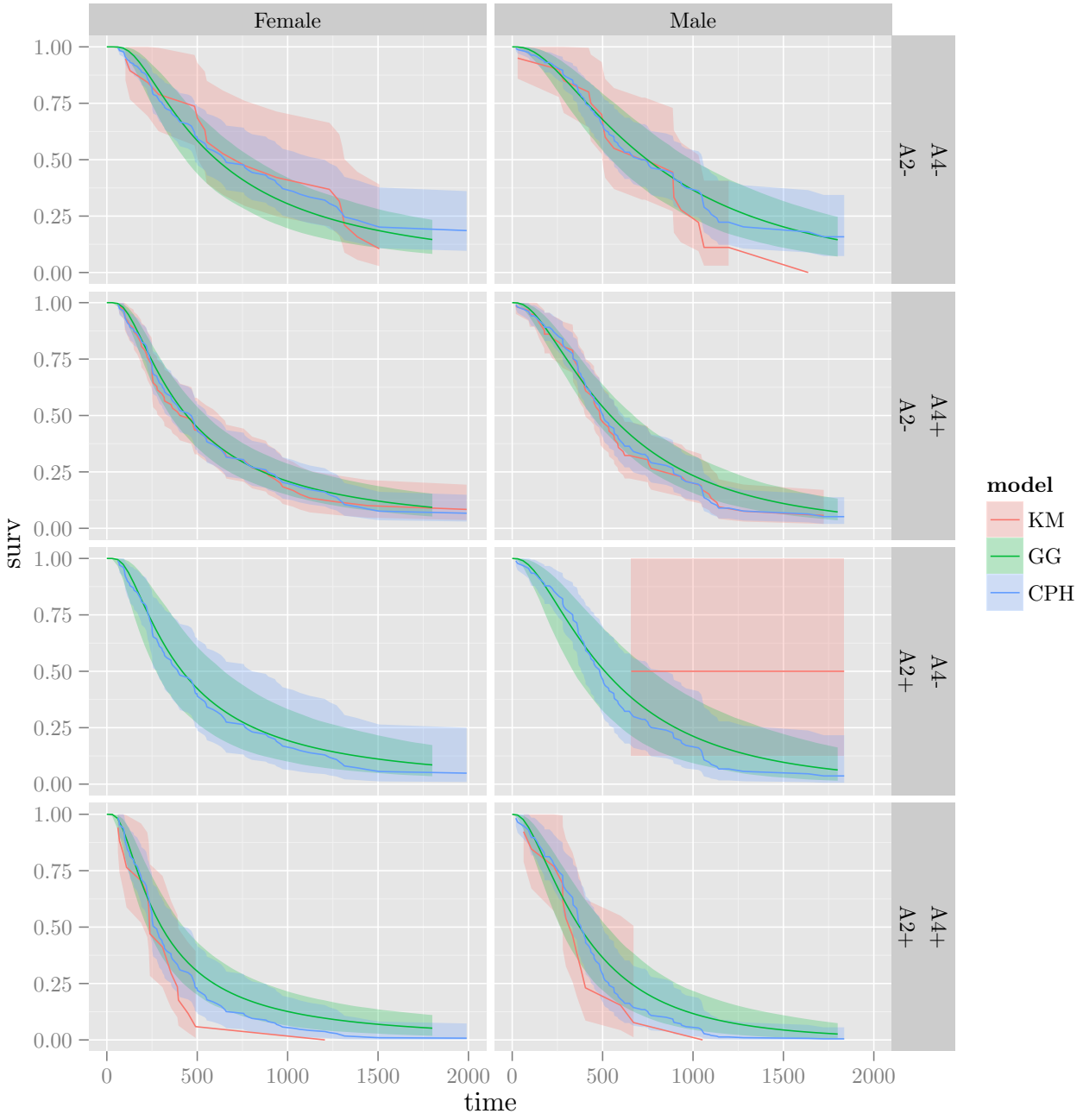
Plot fit stratified by sex, separate curves for A2, A4 status, at median (approx.) Size.

```
temp.grid = expand.grid(A4 = c(FALSE, TRUE), A2 = c(FALSE, TRUE), SexM = c(FALSE, TRUE), SizeCent = 0)
temp.grid$ID = sprintf("SexM=%s, A2=% -5s, A4=% -5s", temp.grid$SexM, temp.grid$A2, temp.grid$A4)
temp.preds = summary(fit.gg, newdata = temp.grid, type = "survival", t = seq(0, 365*5, 30))
temp.preds2 = do.call(rbind, temp.preds)
temp.preds2$group = rep(gsub(".*ID=", "", names(temp.preds)), each = nrow(temp.preds[[1]]))
temp.preds.cox = survfit(fit.cph, newdata = temp.grid)

temp.survfit = survfit(Surv(Time, DSD) ~ SexM + A2 + A4, data)
temp.data = data.frame(time = temp.survfit$time, surv = temp.survfit$surv, upper = temp.survfit$lower, l
temp.data = rbind(temp.data, data.frame(time = temp.preds2$time, surv = temp.preds2$est, upper = temp.pr
temp.data = rbind(temp.data, data.frame(time = temp.preds.cox$time, surv = temp.preds.cox$surv, upper =

temp.data$Sex = c("Male", "Female")[grepl("SexM=FALSE", temp.data$group)+1]
temp.data$A2 = c("A2-", "A2+")[grepl("A2=TRUE", temp.data$group)+1]
temp.data$A4 = c("A4-", "A4+")[grepl("A4=TRUE", temp.data$group)+1]

ggplot(temp.data, aes(x = log(time), y = log(-log(surv)), ymin = log(-log(lower)), ymax = log(-log(upper
        geom_ribbon(alpha = 0.25, colour = NA) +
        geom_line() +
        xlim(4, 7) + ylim(-4, 2) +
        facet_grid(A2 ~ A4 ~ Sex)

## Warning:  Removed 54 rows containing missing values (geom_path).
## Warning:  Removed 41 rows containing missing values (geom_path).
## Warning:  Removed 55 rows containing missing values (geom_path).
## Warning:  Removed 47 rows containing missing values (geom_path).
## Warning:  Removed 44 rows containing missing values (geom_path).
## Warning:  Removed 39 rows containing missing values (geom_path).
## Warning:  Removed 45 rows containing missing values (geom_path).
## Warning:  Removed 38 rows containing missing values (geom_path).
```




```
ggplot(temp.data, aes(x = time, y = surv, ymin = lower, ymax = upper, colour = model, fill = model)) +
        geom_ribbon(alpha = 0.25, colour = NA) +
        geom_line() + xlim(0, 2000) + ylim(0, 1) +
        facet_grid(A2 ~ A4 ~ Sex)
```

```
## Warning:  Removed 9 rows containing missing values (geom_path).
## Warning:  Removed 3 rows containing missing values (geom_path).
## Warning:  Removed 12 rows containing missing values (geom_path).
## Warning:  Removed 6 rows containing missing values (geom_path).
## Warning:  Removed 7 rows containing missing values (geom_path).
## Warning:  Removed 3 rows containing missing values (geom_path).
## Warning:  Removed 7 rows containing missing values (geom_path).
## Warning:  Removed 3 rows containing missing values (geom_path).
```



Some deviation though not significant. Most concerning is the A2- A4- female group, survival of which is underestimated by the flexsurv model. To approach this in a modelling sense would require interaction terms between Sex and A2, A4. Overfitting seems likely considering the very few data available for the A2+/A4- group. Perhaps just add a single "DoubleNegFemale" term.

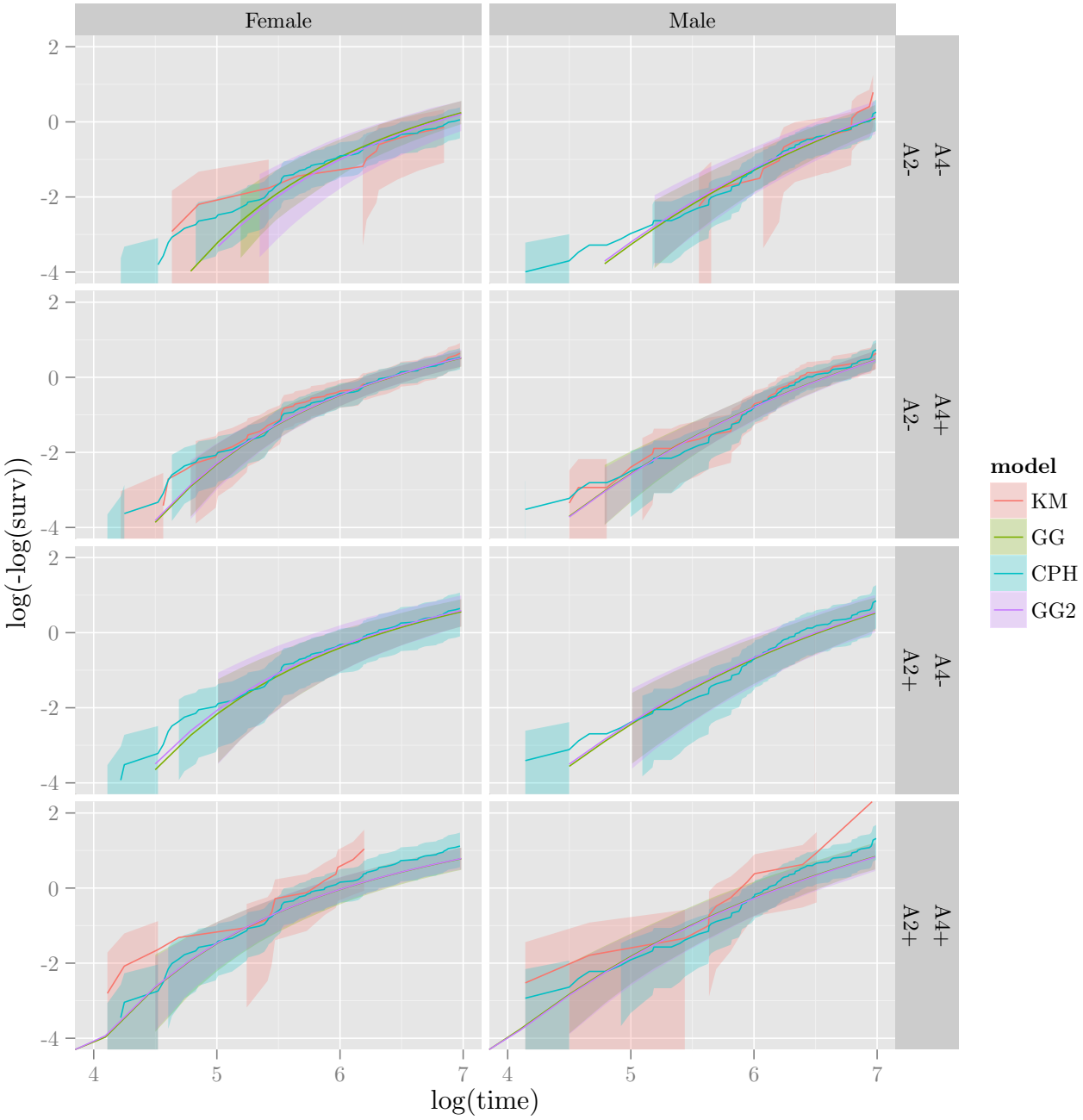
```
fit.gg2 = flexsurvreg(Surv(Time, DSD) ~ SexM + SizeCent + A2 + A4 + I(SexM == FALSE & A2 == FALSE & A4 =
        anc = list(
                sigma = ~ SexM,
                Q = ~ SexM),
        data = data, dist = "gengamma")

fit.gg2

##
```

```
## Call:
## flexsurvreg(formula = Surv(Time, DSD) ~ SexM + SizeCent + A2 +     A4 + I(SexM == FALSE & A2 == FALSE
##
## Estimates:
##                                                    data mean  est
## mu                                                       NA    6.19984
## sigma                                                    NA    0.89245
## Q                                                        NA   -0.53897
## SexMTRUE                                            0.48438    0.44005
## SizeCent                                            3.65104   -0.01596
## A2TRUE                                              0.17188   -0.37310
## A4TRUE                                              0.78125   -0.28237
## I(SexM == FALSE & A2 == FALSE & A4 == FALSE)TRUE    0.09896    0.08326
## sigma(SexMTRUE)                                     0.48438   -0.04436
## Q(SexMTRUE)                                         0.48438    0.72104
##                                                    L95%      U95%
## mu                                                  5.70768   6.69200
## sigma                                               0.76537   1.04063
## Q                                                  -1.04407  -0.03387
## SexMTRUE                                            0.05832   0.82178
## SizeCent                                           -0.02464  -0.00727
## A2TRUE                                             -0.70757  -0.03863
## A4TRUE                                             -0.68949   0.12476
## I(SexM == FALSE & A2 == FALSE & A4 == FALSE)TRUE   -0.53412   0.70064
## sigma(SexMTRUE)                                    -0.26358   0.17487
## Q(SexMTRUE)                                         0.08448   1.35759
##                                                    se        exp(est)
## mu                                                  0.25111        NA
## sigma                                               0.06994        NA
## Q                                                   0.25771        NA
## SexMTRUE                                            0.19476   1.55278
## SizeCent                                            0.00443   0.98417
## A2TRUE                                              0.17065   0.68860
## A4TRUE                                              0.20772   0.75400
## I(SexM == FALSE & A2 == FALSE & A4 == FALSE)TRUE    0.31499   1.08683
## sigma(SexMTRUE)                                     0.11185   0.95661
## Q(SexMTRUE)                                         0.32478   2.05657
##                                                    L95%      U95%
## mu                                                       NA        NA
## sigma                                                    NA        NA
## Q                                                        NA        NA
## SexMTRUE                                            1.06005   2.27454
## SizeCent                                            0.97566   0.99275
## A2TRUE                                              0.49284   0.96211
## A4TRUE                                              0.50183   1.13288
## I(SexM == FALSE & A2 == FALSE & A4 == FALSE)TRUE    0.58619   2.01504
## sigma(SexMTRUE)                                     0.76829   1.19109
## Q(SexMTRUE)                                         1.08815   3.88683
##
## N = 192,  Events: 178,  Censored: 14
## Total time at risk: 133721
## Log-likelihood = -1321, df = 10
## AIC = 2662
```

```
AIC(fit.gg)

## [1] 2660

AIC(fit.gg2)

## [1] 2662

AIC(fit.gg) - AIC(fit.gg2)

## [1] -1.93

# Equivocal on AIC.  BIC would favour gg then.

pchisq(-2*(fit.gg$loglik - fit.gg2$loglik), 1, lower.tail = FALSE)

## [1] 0.7917

# Not good evidence on LRT
```

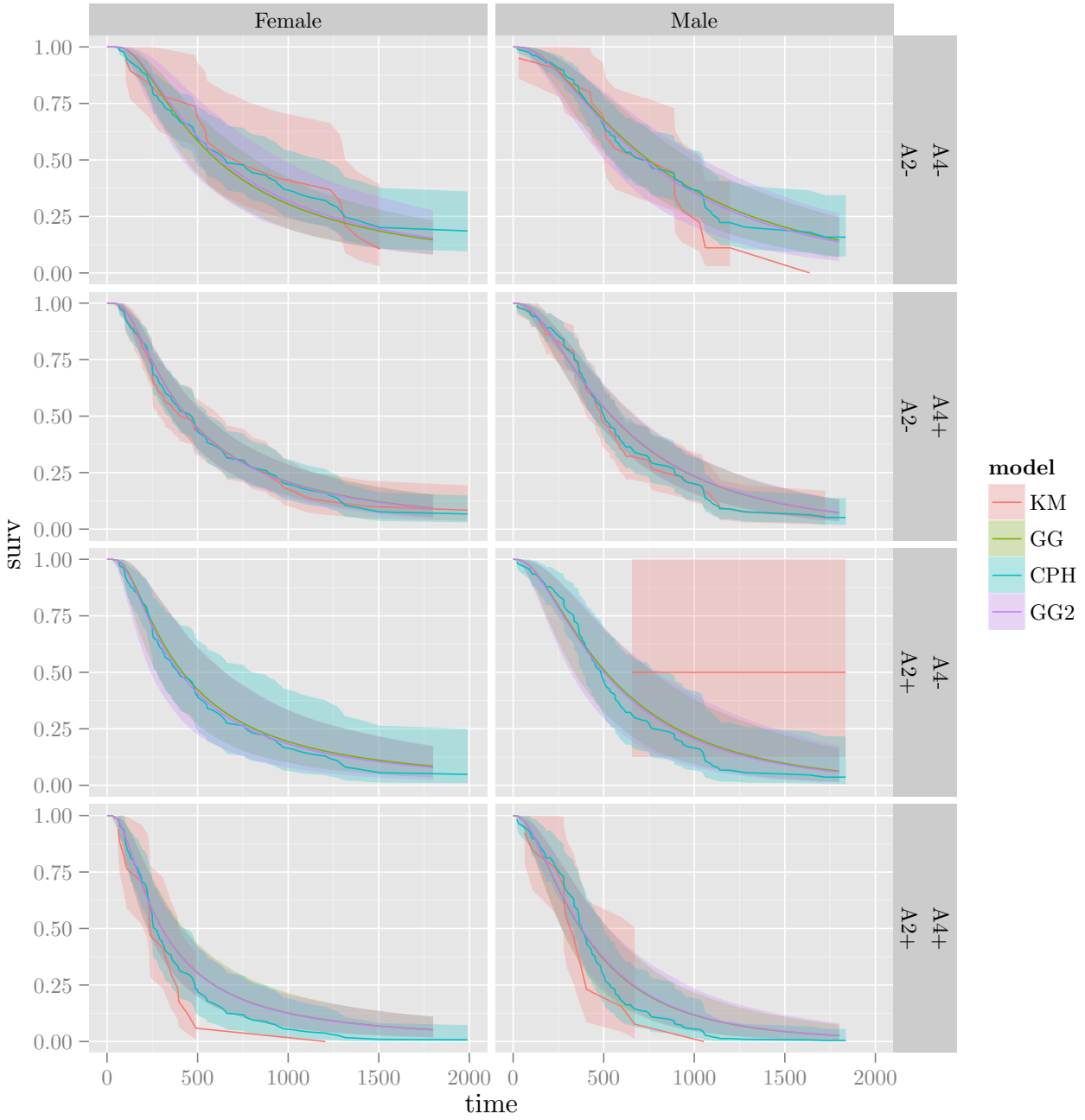
See how it plots relative to the others.

```
temp.preds = summary(fit.gg2, newdata = temp.grid, type = "survival", t = seq(0, 365*5, 30))
temp.preds2 = do.call(rbind, temp.preds)
temp.preds2$group = rep(gsub(".*ID=", "", names(temp.preds)), each = nrow(temp.preds[[1]]))
temp.data = rbind(temp.data, data.frame(time = temp.preds2$time, surv = temp.preds2$est, upper = temp.pr
temp.data$Sex = c("Male", "Female")[grepl("SexM=FALSE", temp.data$group)+1]
temp.data$A2 = c("A2-", "A2+")[grepl("A2=TRUE", temp.data$group)+1]
temp.data$A4 = c("A4-", "A4+")[grepl("A4=TRUE", temp.data$group)+1]

ggplot(temp.data, aes(x = log(time), y = log(-log(surv)), ymin = log(-log(lower)), ymax = log(-log(upper
        geom_ribbon(alpha = 0.25, colour = NA) +
        geom_line() +
        xlim(4, 7) + ylim(-4, 2) +
        facet_grid(A2 ~ A4 ~ Sex)

## Warning:  Removed 79 rows containing missing values (geom_path).
## Warning:  Removed 66 rows containing missing values (geom_path).
## Warning:  Removed 80 rows containing missing values (geom_path).
## Warning:  Removed 72 rows containing missing values (geom_path).
## Warning:  Removed 69 rows containing missing values (geom_path).
## Warning:  Removed 64 rows containing missing values (geom_path).
## Warning:  Removed 70 rows containing missing values (geom_path).
## Warning:  Removed 63 rows containing missing values (geom_path).
```




```
ggplot(temp.data, aes(x = time, y = surv, ymin = lower, ymax = upper, colour = model, fill = model)) +
        geom_ribbon(alpha = 0.25, colour = NA) +
        geom_line() + xlim(0, 2000) + ylim(0, 1) +
        facet_grid(A2 ~ A4 ~ Sex)
```

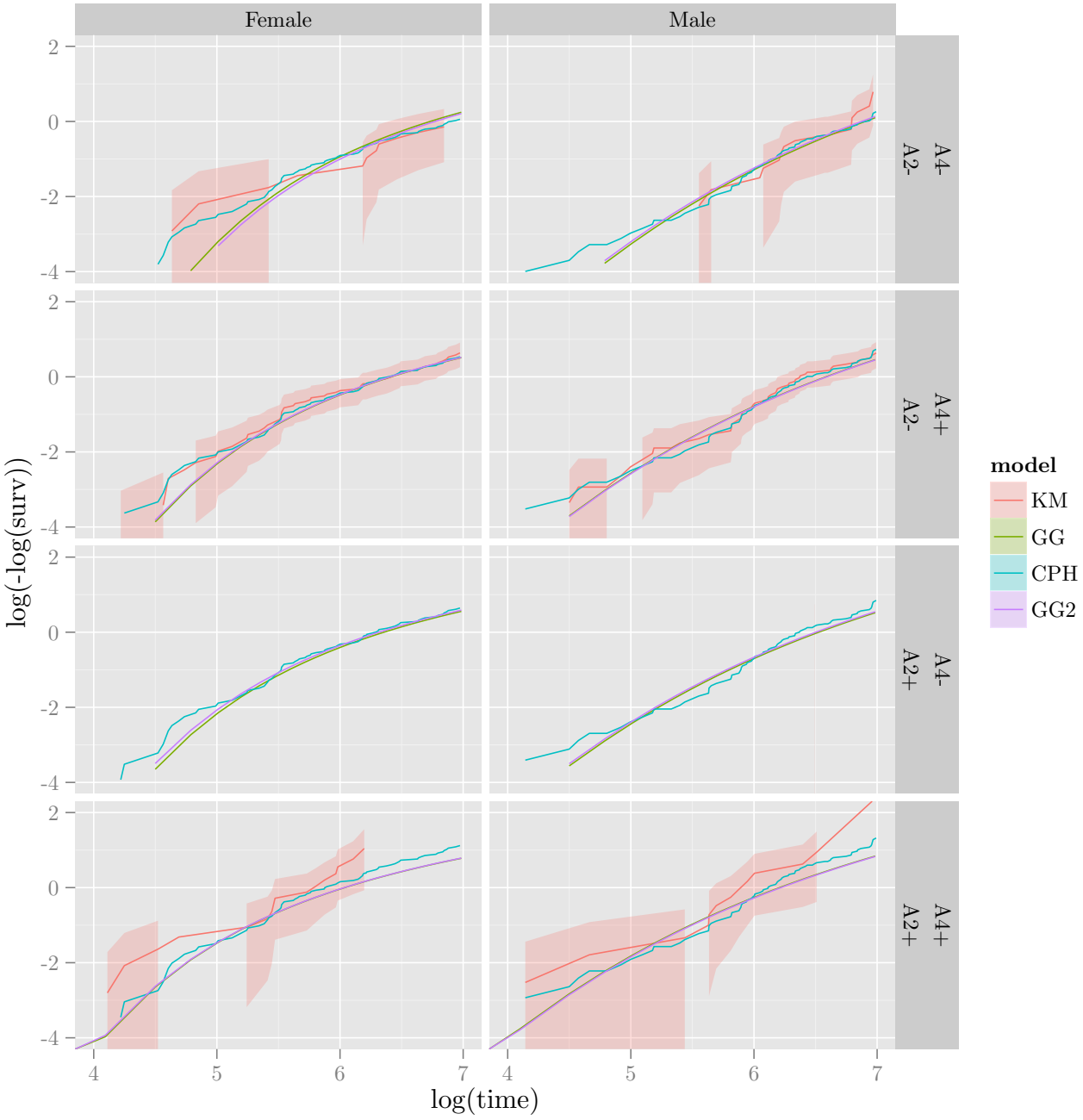
```
## Warning:  Removed 9 rows containing missing values (geom_path).
## Warning:  Removed 3 rows containing missing values (geom_path).
## Warning:  Removed 12 rows containing missing values (geom_path).
## Warning:  Removed 6 rows containing missing values (geom_path).
## Warning:  Removed 7 rows containing missing values (geom_path).
## Warning:  Removed 3 rows containing missing values (geom_path).
## Warning:  Removed 7 rows containing missing values (geom_path).
## Warning:  Removed 3 rows containing missing values (geom_path).
```



An alternative take, showing errors with the KMs only.

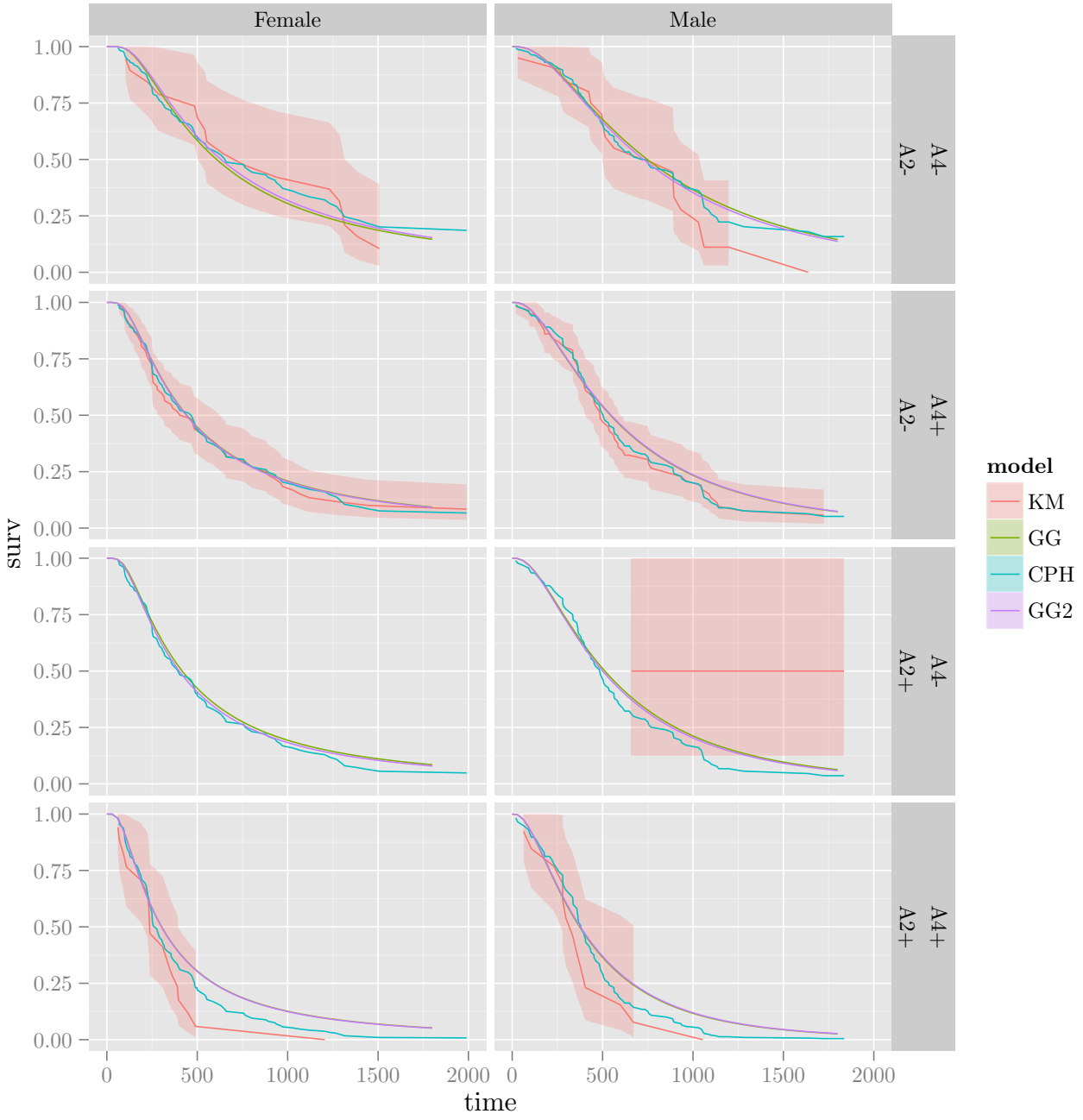
```
temp.data$lower[temp.data$model != "KM"] = NA
temp.data$upper[temp.data$model != "KM"] = NA
ggplot(temp.data, aes(x = log(time), y = log(-log(surv)), ymin = log(-log(lower)), ymax = log(-log(upper
        geom_ribbon(alpha = 0.25, colour = NA) +
        geom_line() +
        xlim(4, 7) + ylim(-4, 2) +
        facet_grid(A2 ~ A4 ~ Sex)

## Warning:  Removed 79 rows containing missing values (geom_path).
## Warning:  Removed 66 rows containing missing values (geom_path).
## Warning:  Removed 80 rows containing missing values (geom_path).
## Warning:  Removed 72 rows containing missing values (geom_path).
```

```
## Warning:  Removed 69 rows containing missing values (geom_path).
## Warning:  Removed 64 rows containing missing values (geom_path).
## Warning:  Removed 70 rows containing missing values (geom_path).
## Warning:  Removed 63 rows containing missing values (geom_path).
```



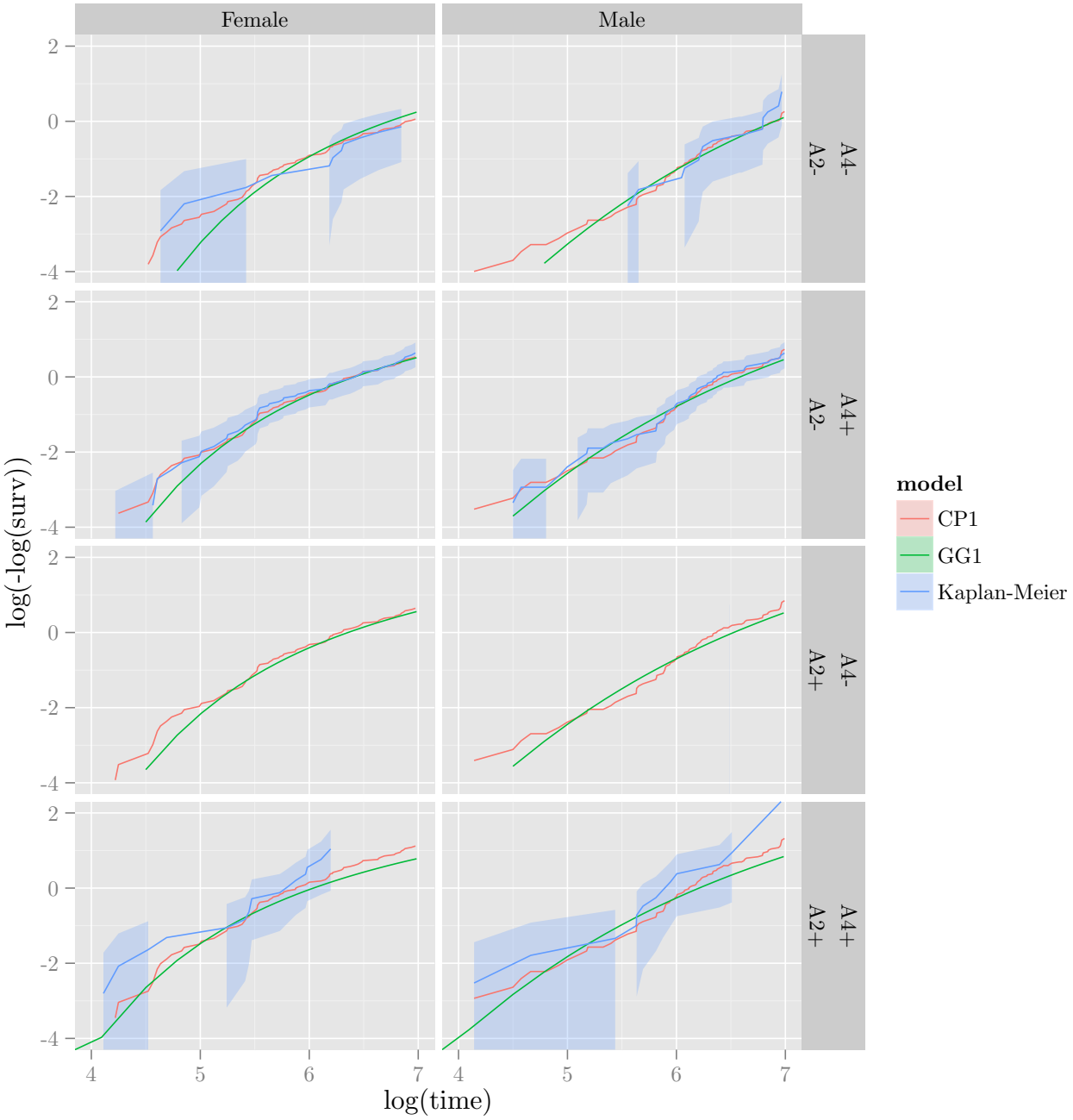

```
ggplot(temp.data, aes(x = time, y = surv, ymin = lower, ymax = upper, colour = model, fill = model)) +
        geom_ribbon(alpha = 0.25, colour = NA) +
        geom_line() + xlim(0, 2000) + ylim(0, 1) +
        facet_grid(A2 ~ A4 ~ Sex)

## Warning:  Removed 9 rows containing missing values (geom_path).
## Warning:  Removed 3 rows containing missing values (geom_path).
```

```
## Warning:  Removed 12 rows containing missing values (geom_path).
## Warning:  Removed 6 rows containing missing values (geom_path).
## Warning:  Removed 7 rows containing missing values (geom_path).
## Warning:  Removed 3 rows containing missing values (geom_path).
## Warning:  Removed 7 rows containing missing values (geom_path).
## Warning:  Removed 3 rows containing missing values (geom_path).
```

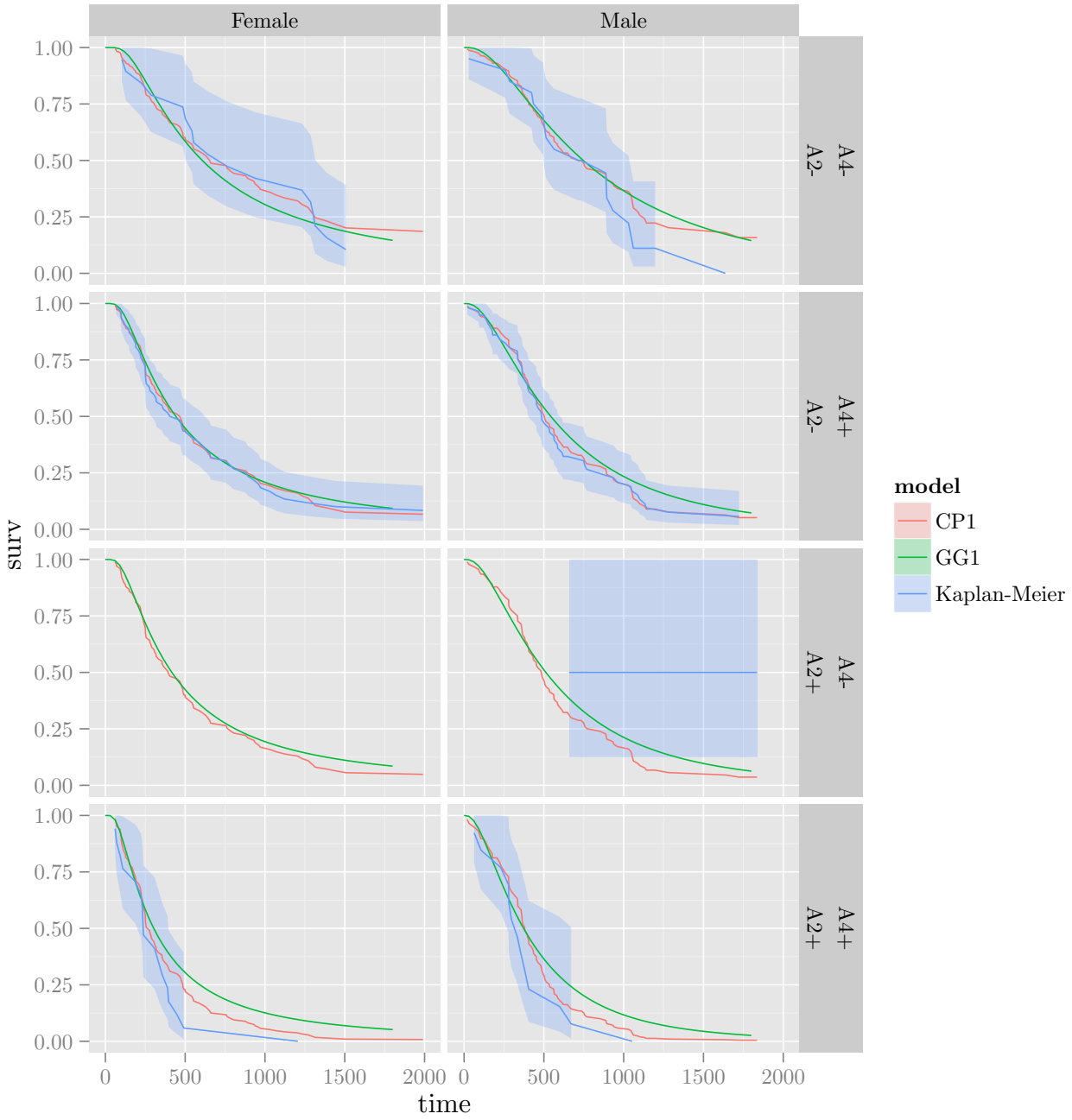



```
temp.data$lower[temp.data$model != "KM"] = NA
temp.data$upper[temp.data$model != "KM"] = NA
temp.data = temp.data[temp.data$model != "GG2",]
temp.data$model = c("KM" = "Kaplan-Meier", "GG" = "GG1", "CPH" = "CP1")[temp.data$model]
ggplot(temp.data, aes(x = log(time), y = log(-log(surv)), ymin = log(-log(lower)), ymax = log(-log(upper
        geom_ribbon(alpha = 0.25, colour = NA) +
```

```
        geom_line() +
        xlim(4, 7) + ylim(-4, 2) +
        facet_grid(A2 ~ A4 ~ Sex)

## Warning:  Removed 54 rows containing missing values (geom_path).
## Warning:  Removed 41 rows containing missing values (geom_path).
## Warning:  Removed 55 rows containing missing values (geom_path).
## Warning:  Removed 47 rows containing missing values (geom_path).
## Warning:  Removed 44 rows containing missing values (geom_path).
## Warning:  Removed 39 rows containing missing values (geom_path).
## Warning:  Removed 45 rows containing missing values (geom_path).
## Warning:  Removed 38 rows containing missing values (geom_path).
```



```
ggplot(temp.data, aes(x = time, y = surv, ymin = lower, ymax = upper, colour = model, fill = model)) +
        geom_ribbon(alpha = 0.25, colour = NA) +
        geom_line() + xlim(0, 2000) + ylim(0, 1) +
        facet_grid(A2 ~ A4 ~ Sex)

## Warning:  Removed 9 rows containing missing values (geom_path).
## Warning:  Removed 3 rows containing missing values (geom_path).
## Warning:  Removed 12 rows containing missing values (geom_path).
## Warning:  Removed 6 rows containing missing values (geom_path).
## Warning:  Removed 7 rows containing missing values (geom_path).
## Warning:  Removed 3 rows containing missing values (geom_path).
## Warning:  Removed 7 rows containing missing values (geom_path).
## Warning:  Removed 3 rows containing missing values (geom_path).
```



7 Model selection

It looks like that's as far as we can go with tweaking the fits. Time to put the different models against each other on the holdout data, and choose a winner.

DIY IBS, wooo.

```
calcIBS = function(surv, pred, pred_times, max_time)
{
        stopifnot(nrow(surv) == nrow(pred) && length(pred_times) == ncol(pred))

        n = nrow(surv)
        marg_survfit = survfit(surv ~ 1)
        marg_censfit = survfit(Surv(surv[,1], !surv[,2]) ~ 1)
        marg_surv_func = approxfun(marg_survfit$time, marg_survfit$surv, method = "constant", yleft = 1,
        marg_cens_func = approxfun(marg_censfit$time, marg_censfit$surv, method = "constant", yleft = 1,

        pred_funcs = apply(pred, 1, function(pat_preds) approxfun(pred_times, pat_preds, yleft = 1, yrig

        indiv_patient_bsc = function(pat_i, tstars)
        {
                observed_time = surv[pat_i, 1]
                observed_event = surv[pat_i, 2]
                pred_func = pred_funcs[[pat_i]]
                category = 1*(observed_time <= tstars & observed_event) + 2*(observed_time > tstars) + 3
                bsc = rep(NA, length(tstars))
                bsc[category == 1] = pred_func(tstars[category == 1])^2 / marg_cens_func(observed_time)
                bsc[category == 2] = (1 - pred_func(tstars[category == 2]))^2 / marg_cens_func(tstars[ca
                bsc[category == 3] = 0
                bsc
        }

        bsc_func = function(tstars) { rowMeans(sapply(1:n, function(pat_i) indiv_patient_bsc(pat_i, tsta

        weight_func = function(tstars) { (1 - marg_surv_func(tstars)) / (1 - marg_surv_func(max_time)) }

        # Be slack and do trapezoidal int. with a fine grid.  It should be possible
        # to calulate the int. exactly but I cbfed.
        int_grid = seq(0, max_time, length.out = 1e3)
        bsc_vals = bsc_func(int_grid)
        weight_vals = weight_func(int_grid)
        int_vals = bsc_vals * weight_vals
        ibsc = (2*sum(int_vals) - int_vals[1] - int_vals[length(int_vals)]) * (diff(range(int_grid))) /

        return(list(bsc = bsc_vals, weights = weight_vals, eval_times = int_grid, ibsc = ibsc))
}
```

Calculate survival probability predictions for each of the models, on the validation data.

```
ibs_times = sort(unique(data.val$Time))
ibs_preds_gg = as.matrix(t(sapply(summary(fit.gg, newdata = data.val, type = "survival", t = ibs_times),
ibs_preds_gg2 = as.matrix(t(sapply(summary(fit.gg2, newdata = data.val, type = "survival", t = ibs_times
temp_cox_preds = survfit(fit.cph, newdata = data.val)
ibs_preds_cph = simplify2array(tapply(1:length(temp_cox_preds$time), rep(names(temp_cox_preds$strata), t
        approx(x = temp_cox_preds$time[strat_i], y = temp_cox_preds$surv[strat_i], xout = ibs_times, met
```

```
ibs_preds_cph = t(ibs_preds_cph[,rownames(data.val)])
temp_rsf_preds = predict(fit.rsf, newdata = data.val)
ibs_preds_rsf = t(apply(temp_rsf_preds$survival, 1, function(survs) approx(temp_rsf_preds$time.interest,
# Patients (from data.val) are in rows, times (from ibs_times) in columns.

# Add a no-information KM predictor
temp_km0 = survfit(Surv(Time, DSD) ~ 1, data)
ibs_preds_km0 = t(matrix(rep(approx(temp_km0$time, temp_km0$surv, xout = ibs_times, method = "constant",
ibs_preds_all = list(gg = ibs_preds_gg, gg2 = ibs_preds_gg2, cph = ibs_preds_cph, rsf = ibs_preds_rsf, k
```

```
val.prob.times = seq(0, max(data.val$Time), 1)

temp.coefs = coef(fit.gg)
val.linpred.gg = sapply(1:length(temp.coefs), function(coef_i) {
    if (names(temp.coefs)[coef_i] %in% colnames(data.val)) {
        temp.coefs[coef_i] * data.val[,names(temp.coefs)[coef_i]]
    } else if (gsub("TRUE$", "", names(temp.coefs)[coef_i]) %in% colnames(data.val)) {
        temp.coefs[coef_i] * data.val[,gsub("TRUE$", "", names(temp.coefs)[coef_i])]
    } else {
        rep(0, nrow(data.val))
    } })
val.linpred.gg = -rowSums(val.linpred.gg)   # Negate to bring into concordance with the direction of Cox
temp = summary(fit.gg, newdata = data.val, ci = FALSE)
val.prob.gg = sapply(temp, function(x) approx(x[,1], x[,2], xout = val.prob.times, yleft = 1, yright = 0
colnames(val.prob.gg) = rownames(data.val)

temp.coefs = coef(fit.gg2)
val.linpred.gg2 = sapply(1:length(temp.coefs), function(coef_i) {
    if (names(temp.coefs)[coef_i] %in% colnames(data.val)) {
        temp.coefs[coef_i] * data.val[,names(temp.coefs)[coef_i]]
    } else if (gsub("TRUE$", "", names(temp.coefs)[coef_i]) %in% colnames(data.val)) {
        temp.coefs[coef_i] * data.val[,gsub("TRUE$", "", names(temp.coefs)[coef_i])]
    } else {
        rep(0, nrow(data.val))
    } })
val.linpred.gg2 = -rowSums(val.linpred.gg2)   # Negate to bring into concordance with the direction of C
temp = summary(fit.gg2, newdata = data.val, ci = FALSE)
val.prob.gg2 = sapply(temp, function(x) approx(x[,1], x[,2], xout = val.prob.times, yleft = 1, yright =
colnames(val.prob.gg2) = rownames(data.val)

val.linpred.cph = predict(fit.cph, newdata = data.val)
temp = survfit(fit.cph, newdata = data.val)
val.prob.cph = simplify2array(tapply(1:length(temp$surv), rep(names(temp$strata), temp$strata), function

temp = predict(fit.rsf, newdata = data.val)
# val.linpred.rsf = temp$predicted
# Median survival time:
val.linpred.rsf = apply(temp$survival, 1, function(s1) {
    sfunc = approxfun(temp$time.interest, s1, yleft = 1, yright = 0, rule = 2)
    med = uniroot(function(x) sfunc(x) - 0.5, lower = min(temp$time.interest), upper = max(temp$time.int
    med
})
val.linpred.rsf = -val.linpred.rsf
```

```r
val.prob.rsf = apply(temp$survival, 1, function(s1) approx(temp$time.interest, s1, xout = val.prob.times
colnames(val.prob.rsf) = rownames(data.val)

summary(coxph(Surv(Time, DSD) ~ val.linpred.gg, data.val))
```

```
## Call:
## coxph(formula = Surv(Time, DSD) ~ val.linpred.gg, data = data.val)
##
##   n= 64, number of events= 60
##
##                 coef exp(coef) se(coef)    z Pr(>|z|)
## val.linpred.gg 0.724     2.062    0.316 2.29    0.022
##
##                exp(coef) exp(-coef) lower .95 upper .95
## val.linpred.gg      2.06      0.485      1.11      3.83
##
## Concordance= 0.606  (se = 0.043 )
## Rsquare= 0.08   (max possible= 0.998 )
## Likelihood ratio test= 5.31  on 1 df,   p=0.0212
## Wald test            = 5.25  on 1 df,   p=0.0219
## Score (logrank) test = 5.31  on 1 df,   p=0.0212
```

```r
summary(coxph(Surv(Time, DSD) ~ val.linpred.gg2, data.val))
```

```
## Call:
## coxph(formula = Surv(Time, DSD) ~ val.linpred.gg2, data = data.val)
##
##   n= 64, number of events= 60
##
##                 coef exp(coef) se(coef)    z Pr(>|z|)
## val.linpred.gg2 0.71      2.03     0.32 2.22    0.026
##
##                 exp(coef) exp(-coef) lower .95 upper .95
## val.linpred.gg2      2.03      0.492      1.09      3.81
##
## Concordance= 0.602  (se = 0.043 )
## Rsquare= 0.075   (max possible= 0.998 )
## Likelihood ratio test= 4.96  on 1 df,   p=0.0259
## Wald test            = 4.92  on 1 df,   p=0.0265
## Score (logrank) test = 4.97  on 1 df,   p=0.0257
```

```r
summary(coxph(Surv(Time, DSD) ~ val.linpred.cph, data.val))
```

```
## Call:
## coxph(formula = Surv(Time, DSD) ~ val.linpred.cph, data = data.val)
##
##   n= 64, number of events= 60
##
##                  coef exp(coef) se(coef)    z Pr(>|z|)
## val.linpred.cph 1.139     3.123    0.366 3.11   0.0019
##
##                 exp(coef) exp(-coef) lower .95 upper .95
## val.linpred.cph      3.12       0.32      1.52       6.4
##
## Concordance= 0.583  (se = 0.043 )
```

```
## Rsquare= 0.141   (max possible= 0.998 )
## Likelihood ratio test= 9.74  on 1 df,   p=0.0018
## Wald test            = 9.68  on 1 df,   p=0.00186
## Score (logrank) test = 9.88  on 1 df,   p=0.00167

summary(coxph(Surv(Time, DSD) ~ val.linpred.rsf, data.val))

## Call:
## coxph(formula = Surv(Time, DSD) ~ val.linpred.rsf, data = data.val)
##
##   n= 64, number of events= 60
##
##                     coef exp(coef) se(coef)    z Pr(>|z|)
## val.linpred.rsf 0.00405   1.00406  0.00149 2.73   0.0064
##
##                 exp(coef) exp(-coef) lower .95 upper .95
## val.linpred.rsf         1      0.996         1      1.01
##
## Concordance= 0.584  (se = 0.043 )
## Rsquare= 0.116   (max possible= 0.998 )
## Likelihood ratio test= 7.88  on 1 df,   p=0.00499
## Wald test            = 7.43  on 1 df,   p=0.00641
## Score (logrank) test = 7.59  on 1 df,   p=0.00587

anova(coxph(Surv(Time, DSD) ~ offset(val.linpred.gg) + val.linpred.gg, data.val))

## Analysis of Deviance Table
##  Cox model: response is Surv(Time, DSD)
## Terms added sequentially (first to last)
##
##                loglik Chisq Df Pr(>|Chi|)
## NULL             -197
## val.linpred.gg   -196  0.76  1       0.38

anova(coxph(Surv(Time, DSD) ~ offset(val.linpred.gg2) + val.linpred.gg2, data.val))

## Analysis of Deviance Table
##  Cox model: response is Surv(Time, DSD)
## Terms added sequentially (first to last)
##
##                 loglik Chisq Df Pr(>|Chi|)
## NULL              -197
## val.linpred.gg2   -196  0.82  1       0.37

anova(coxph(Surv(Time, DSD) ~ offset(val.linpred.cph) + val.linpred.cph, data.val))

## Analysis of Deviance Table
##  Cox model: response is Surv(Time, DSD)
## Terms added sequentially (first to last)
##
##                 loglik Chisq Df Pr(>|Chi|)
## NULL              -194
## val.linpred.cph   -194  0.14  1        0.7

anova(coxph(Surv(Time, DSD) ~ offset(val.linpred.rsf) + val.linpred.rsf, data.val))
```

```
## Warning in fitter(X, Y, strats, offset, init, control, weights = weights, :  Ran out of
iterations and did not converge
## Error in fitter(X, Y, strats, offset, init, control, weights = weights, :  NA/NaN/Inf in
foreign function call (arg 6)
```

```
summary(coxph(Surv(Time, DSD) ~ offset(val.linpred.gg) + SexM + AgeCent + LocBody + SizeCent + A2 + A4,
```

```
## Call:
## coxph(formula = Surv(Time, DSD) ~ offset(val.linpred.gg) + SexM +
##     AgeCent + LocBody + SizeCent + A2 + A4, data = data.val)
##
##   n= 64, number of events= 60
##
##                 coef exp(coef) se(coef)     z Pr(>|z|)
## SexMTRUE     0.58927   1.80266  0.28021  2.10    0.035
## AgeCent     -0.01865   0.98152  0.01281 -1.46    0.145
## LocBodyTRUE  0.48333   1.62146  0.38322  1.26    0.207
## SizeCent    -0.00832   0.99172  0.01121 -0.74    0.458
## A2TRUE       0.46336   1.58941  0.44038  1.05    0.293
## A4TRUE       0.40395   1.49773  0.30581  1.32    0.187
##
##             exp(coef) exp(-coef) lower .95 upper .95
## SexMTRUE        1.803      0.555     1.041      3.12
## AgeCent         0.982      1.019     0.957      1.01
## LocBodyTRUE     1.621      0.617     0.765      3.44
## SizeCent        0.992      1.008     0.970      1.01
## A2TRUE          1.589      0.629     0.670      3.77
## A4TRUE          1.498      0.668     0.822      2.73
##
## Concordance= 0.604  (se = 0.043 )
## Rsquare= 0.138   (max possible= 0.998 )
## Likelihood ratio test= 9.53  on 6 df,   p=0.146
## Wald test            = 9.66  on 6 df,   p=0.14
## Score (logrank) test = 9.85  on 6 df,   p=0.131
```

```
summary(coxph(Surv(Time, DSD) ~ offset(val.linpred.gg2) + SexM + AgeCent + LocBody + SizeCent + A2 + A4,
```

```
## Call:
## coxph(formula = Surv(Time, DSD) ~ offset(val.linpred.gg2) + SexM +
##     AgeCent + LocBody + SizeCent + A2 + A4, data = data.val)
##
##   n= 64, number of events= 60
##
##                 coef exp(coef) se(coef)     z Pr(>|z|)
## SexMTRUE     0.60138   1.82464  0.28021  2.15    0.032
## AgeCent     -0.01865   0.98152  0.01281 -1.46    0.145
## LocBodyTRUE  0.48333   1.62146  0.38322  1.26    0.207
## SizeCent    -0.00822   0.99181  0.01121 -0.73    0.464
## A2TRUE       0.46717   1.59547  0.44038  1.06    0.289
## A4TRUE       0.43954   1.55200  0.30581  1.44    0.151
##
##             exp(coef) exp(-coef) lower .95 upper .95
## SexMTRUE        1.825      0.548     1.054      3.16
## AgeCent         0.982      1.019     0.957      1.01
## LocBodyTRUE     1.621      0.617     0.765      3.44
```

```
## SizeCent        0.992      1.008     0.970      1.01
## A2TRUE          1.595      0.627     0.673      3.78
## A4TRUE          1.552      0.644     0.852      2.83
##
## Concordance= 0.604  (se = 0.043 )
## Rsquare= 0.144   (max possible= 0.998 )
## Likelihood ratio test= 9.93  on 6 df,   p=0.128
## Wald test            = 10  on 6 df,   p=0.123
## Score (logrank) test = 10.2  on 6 df,   p=0.115
```

```
summary(coxph(Surv(Time, DSD) ~ offset(val.linpred.cph) + SexM + AgeCent + LocBody + SizeCent + A2 + A4,
```

```
## Call:
## coxph(formula = Surv(Time, DSD) ~ offset(val.linpred.cph) + SexM +
##     AgeCent + LocBody + SizeCent + A2 + A4, data = data.val)
##
##   n= 64, number of events= 60
##
##                 coef exp(coef) se(coef)     z Pr(>|z|)
## SexMTRUE     0.12760   1.13609  0.28021  0.46     0.65
## AgeCent     -0.01865   0.98152  0.01281 -1.46     0.15
## LocBodyTRUE  0.48333   1.62146  0.38322  1.26     0.21
## SizeCent    -0.00461   0.99540  0.01121 -0.41     0.68
## A2TRUE       0.25303   1.28792  0.44038  0.57     0.57
## A4TRUE       0.24724   1.28049  0.30581  0.81     0.42
##
##             exp(coef) exp(-coef) lower .95 upper .95
## SexMTRUE        1.136      0.880     0.656      1.97
## AgeCent         0.982      1.019     0.957      1.01
## LocBodyTRUE     1.621      0.617     0.765      3.44
## SizeCent        0.995      1.005     0.974      1.02
## A2TRUE          1.288      0.776     0.543      3.05
## A4TRUE          1.280      0.781     0.703      2.33
##
## Concordance= 0.604  (se = 0.043 )
## Rsquare= 0.068   (max possible= 0.998 )
## Likelihood ratio test= 4.48  on 6 df,   p=0.612
## Wald test            = 4.72  on 6 df,   p=0.58
## Score (logrank) test = 4.78  on 6 df,   p=0.572
```

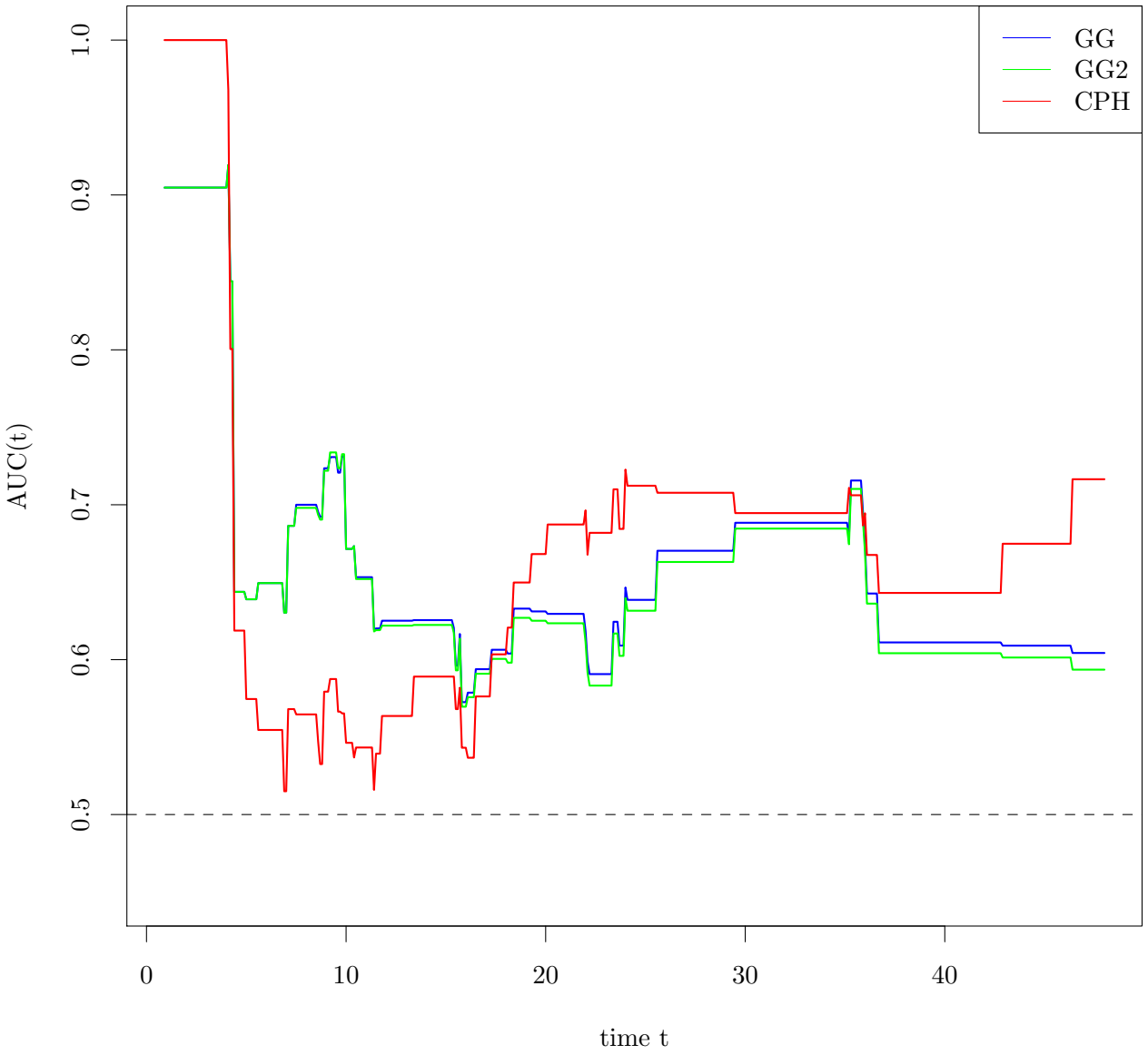
```
summary(coxph(Surv(Time, DSD) ~ offset(val.linpred.rsf) + SexM + AgeCent + LocBody + SizeCent + A2 + A4,
```

```
## Warning in fitter(X, Y, strats, offset, init, control, weights = weights, :  Ran out of
iterations and did not converge
## Error in fitter(X, Y, strats, offset, init, control, weights = weights, :  NA/NaN/Inf in
foreign function call (arg 6)
```

TD-ROC AUC

```
temp.times = seq(0.1, 48, 0.1)
temp.gg = timeROC(data.val$Time/365.25*12, data.val$DSD, val.linpred.gg, cause = 1, times = temp.times,
temp.gg2 = timeROC(data.val$Time/365.25*12, data.val$DSD, val.linpred.gg2, cause = 1, times = temp.times
temp.cph = timeROC(data.val$Time/365.25*12, data.val$DSD, val.linpred.cph, cause = 1, times = temp.times
plotAUCcurve(temp.gg, conf.int = FALSE, add = FALSE, col = "blue")
plotAUCcurve(temp.gg2, conf.int = FALSE, add = TRUE, col = "green")
```

```
plotAUCcurve(temp.cph, conf.int = FALSE, add = TRUE, col = "red")
legend("topright", legend = c("GG", "GG2", "CPH"), col = c("blue", "green", "red"), lty = "solid")
```



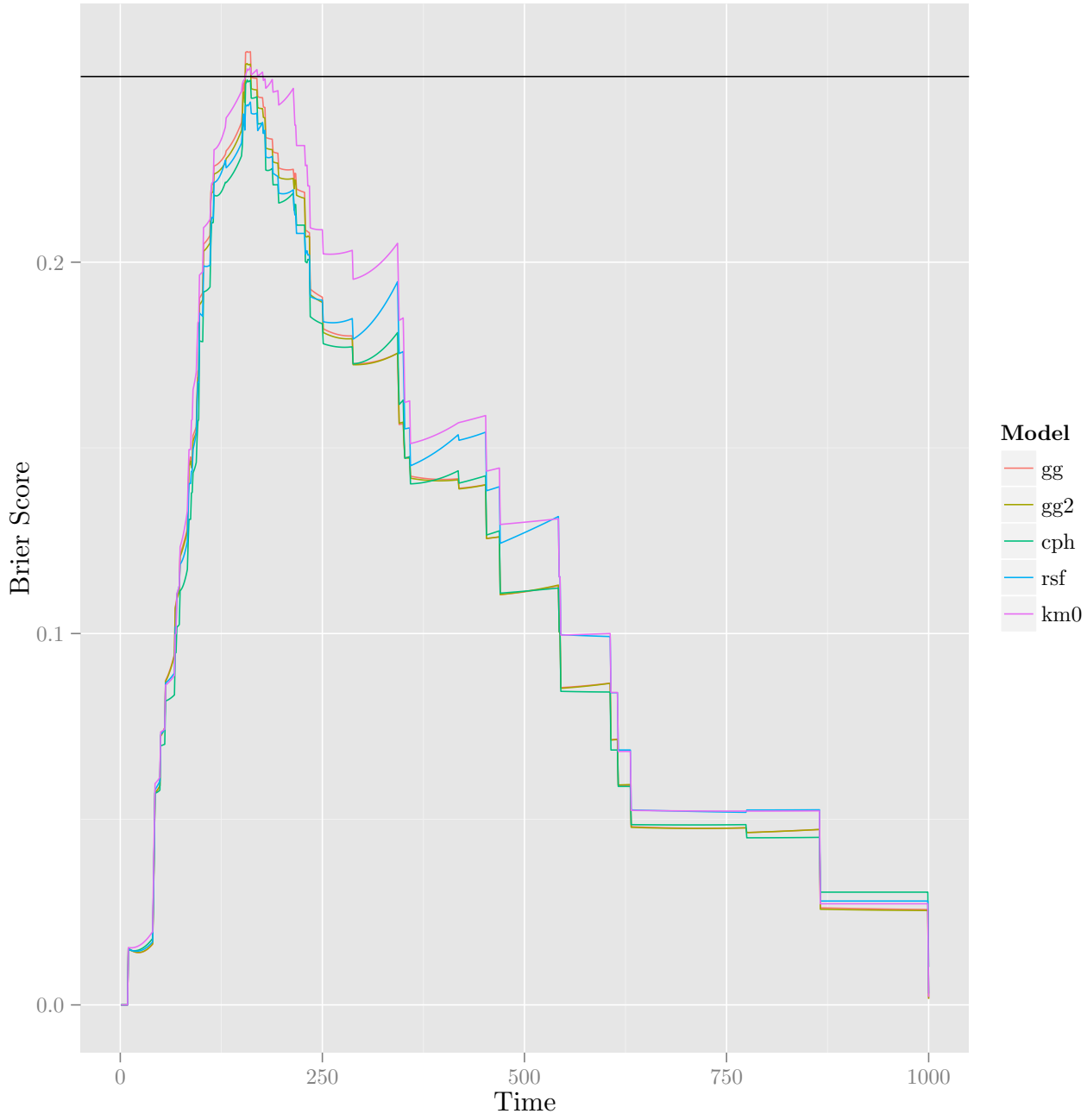
Decision curve analysis.

```
temp.data = data.frame(Time = data.val$Time, DSD = data.val$DSD*1,
    gg.1 = 1-val.prob.gg[val.prob.times == 365,], gg.2 = 1-val.prob.gg[val.prob.times == 365*2,], gg.3 =
    gg2.1 = 1-val.prob.gg2[val.prob.times == 365,], gg2.2 = 1-val.prob.gg2[val.prob.times == 365*2,], gg
    cph.1 = 1-val.prob.cph[val.prob.times == 365,], cph.2 = 1-val.prob.cph[val.prob.times == 365*2,], cp
    rsf.1 = 1-val.prob.rsf[val.prob.times == 365,], rsf.2 = 1-val.prob.rsf[val.prob.times == 365*2,], rs
stdca(data = temp.data, outcome = "DSD", ttoutcome = "Time", predictors = c("gg.1", "cph.1", "rsf.1"), t

## Error in eval(expr, envir, enclos):  could not find function "stdca"

stdca(data = temp.data, outcome = "DSD", ttoutcome = "Time", predictors = c("gg.2", "cph.2", "rsf.2"), t

## Error in eval(expr, envir, enclos):  could not find function "stdca"

stdca(data = temp.data, outcome = "DSD", ttoutcome = "Time", predictors = c("gg.3", "cph.3", "rsf.3"), t

## Error in eval(expr, envir, enclos):  could not find function "stdca"
```

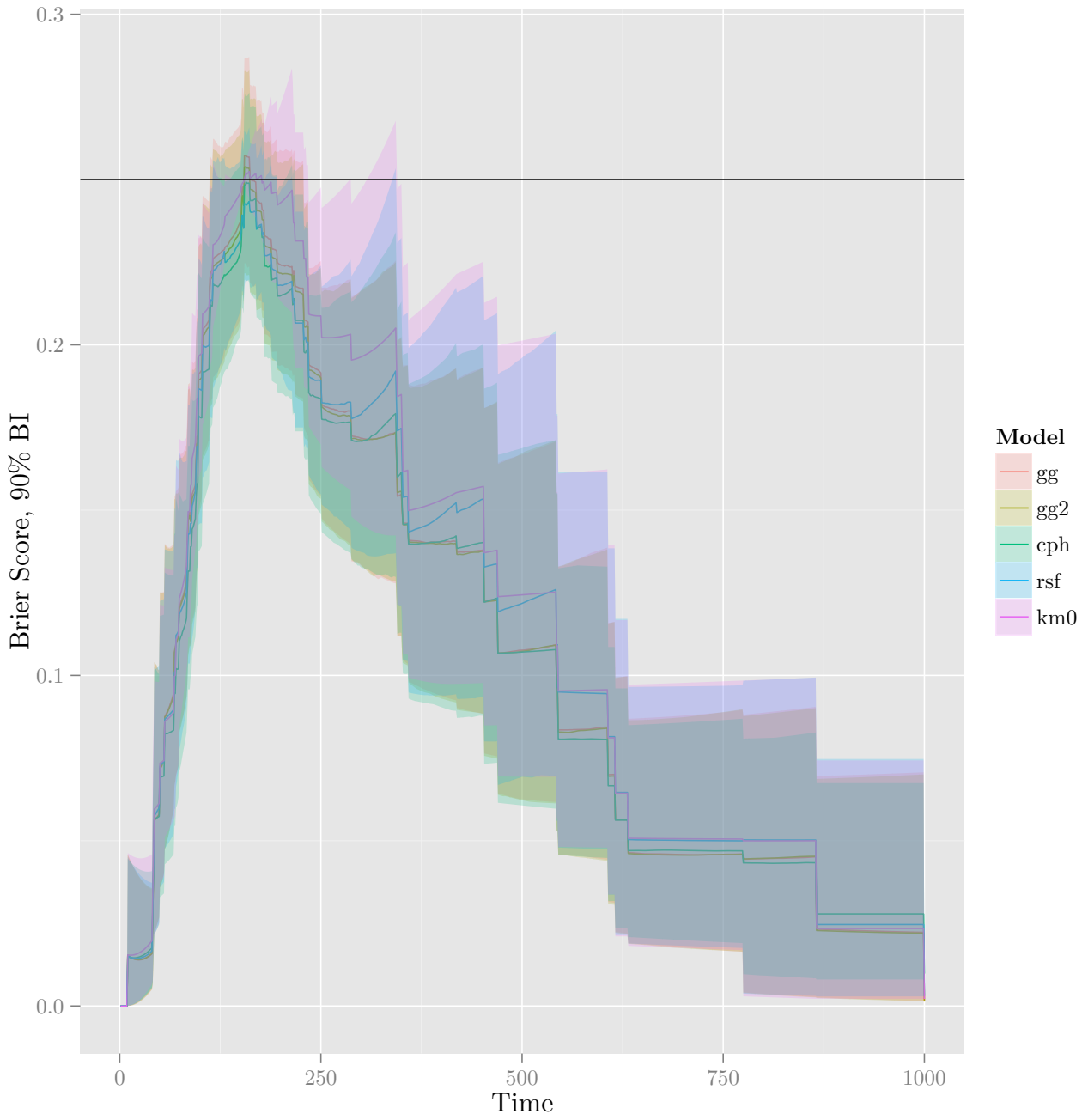
Evaluate IBS point estimates. BS paths over time on bootstrap samples of the holdout set.

```
set.seed(20150111)
ibs_eval_times = calcIBS(Surv(data.val$Time, data.val$DSD), ibs_preds_gg, ibs_times, max(data.val$Time))
# bsc_boot2 = lapply(ibs_preds_all, function(preds) boot(data.val, statistic = function(d, i) calcIBS(S
# bsc_boot2ci = lapply(bsc_boot2, function(single_boot) t(sapply(1:length(ibs_eval_times), function(time
#  temp = try(boot.ci(single_boot, index = time_index, type = "bca")$bca, silent = TRUE)
#  if (class(temp) == "try-error" || is.null(temp)) { temp = rep(NA, 5) }
#  temp })))
bsc_boots = laply(1:500, function(i) {
        if (i %% 50 == 0)       { message(i) }
        boot_samp = sample.int(nrow(data.val), replace = TRUE)
        gg = calcIBS(Surv(data.val$Time, data.val$DSD)[boot_samp,], ibs_preds_gg[boot_samp,], ibs_times,
        gg2 = calcIBS(Surv(data.val$Time, data.val$DSD)[boot_samp,], ibs_preds_gg2[boot_samp,], ibs_time
        cph = calcIBS(Surv(data.val$Time, data.val$DSD)[boot_samp,], ibs_preds_cph[boot_samp,], ibs_time
        rsf = calcIBS(Surv(data.val$Time, data.val$DSD)[boot_samp,], ibs_preds_rsf[boot_samp,], ibs_time
        km0 = calcIBS(Surv(data.val$Time, data.val$DSD)[boot_samp,], ibs_preds_km0[boot_samp,], ibs_time
        rbind(gg, gg2, cph, rsf, km0)
})

## 50
## 100
## 150
## 200
## 250
## 300
## 350
## 400
## 450
## 500
```

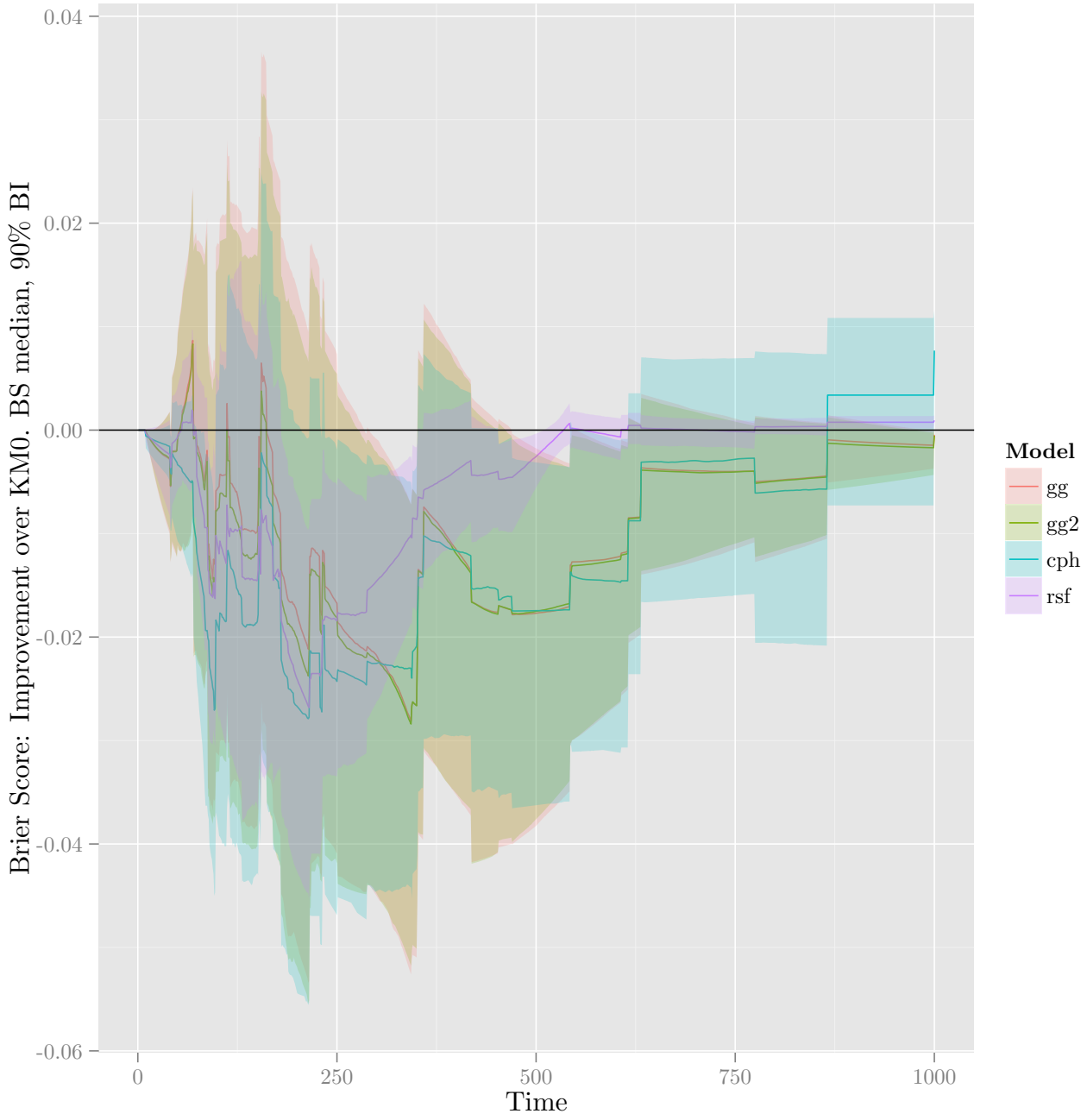
```
temp = sapply(list(gg = ibs_preds_gg, gg2 = ibs_preds_gg2, cph = ibs_preds_cph, rsf = ibs_preds_rsf, km0
temp = melt(temp)
colnames(temp) = c("Time", "Model", "BS")
ggplot(temp, aes(x = Time, y = BS, colour = Model)) + geom_line() + ylab("Brier Score") + geom_hline(yi
```




```
temp = melt(aaply(bsc_boots, 2:3, quantile, probs = c(0.05, 0.5, 0.95)))
colnames(temp) = c("Model", "Time", "Quantile", "Value")
temp$Quantile = paste("Q", gsub("%", "", temp$Quantile), sep = "")
temp = dcast(temp, Model + Time ~ Quantile, value.var = "Value")
ggplot(temp, aes(x = Time, y = Q50, ymin = Q5, ymax = Q95, colour = Model, fill = Model)) + geom_line()
```

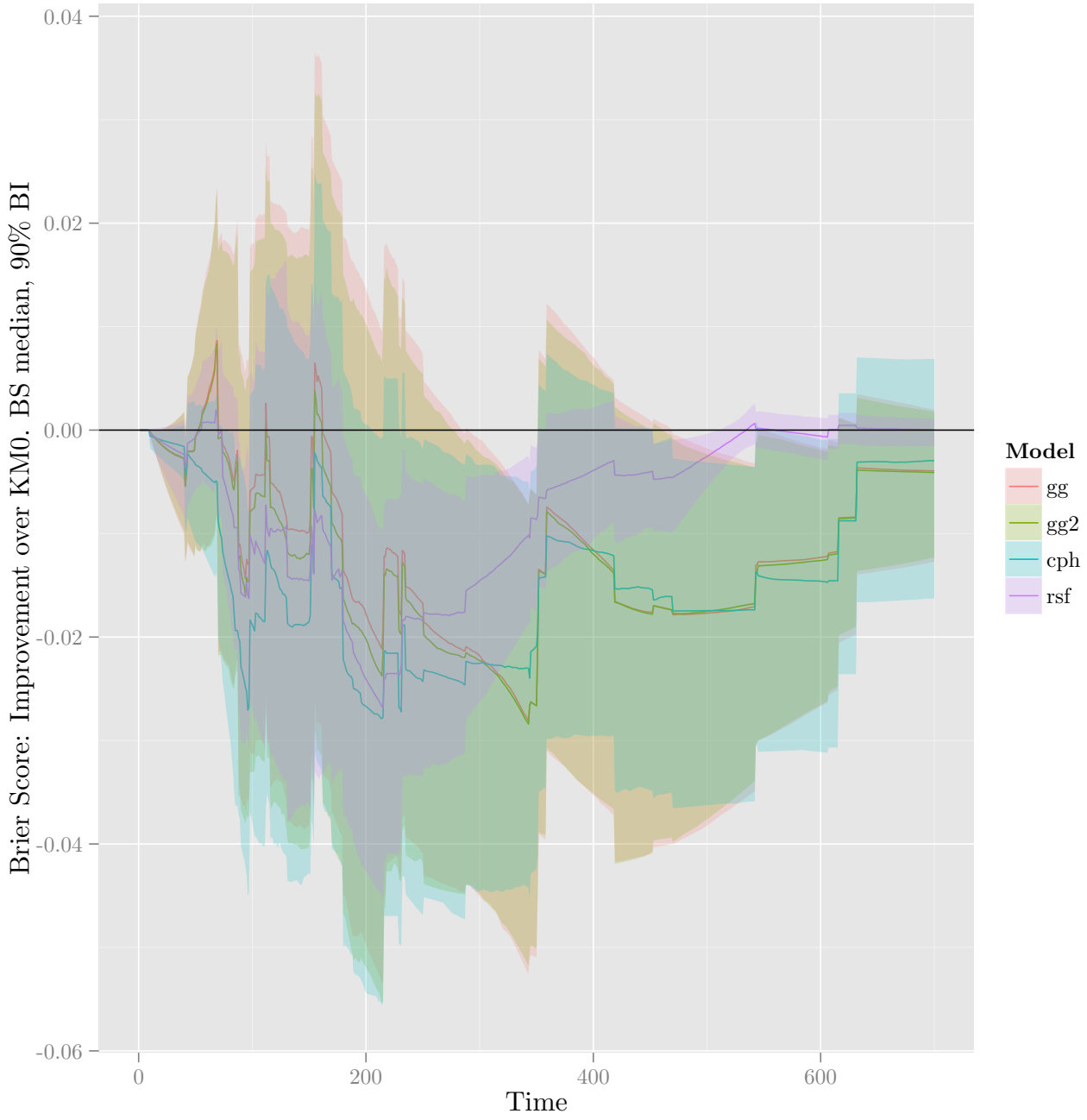



```
bsc_boots_diff = aaply(bsc_boots, 2, function(x) x - bsc_boots[,5,])[1:4,,]
temp = melt(aaply(bsc_boots_diff, c(1,3), quantile, probs = c(0.05, 0.5, 0.95)))
colnames(temp) = c("Model", "Time", "Quantile", "Value")
temp$Quantile = paste("Q", gsub("%", "", temp$Quantile), sep = "")
temp = dcast(temp, Model + Time ~ Quantile, value.var = "Value")
ggplot(temp, aes(x = Time, y = Q50, ymin = Q5, ymax = Q95, colour = Model, fill = Model)) + geom_line()
```

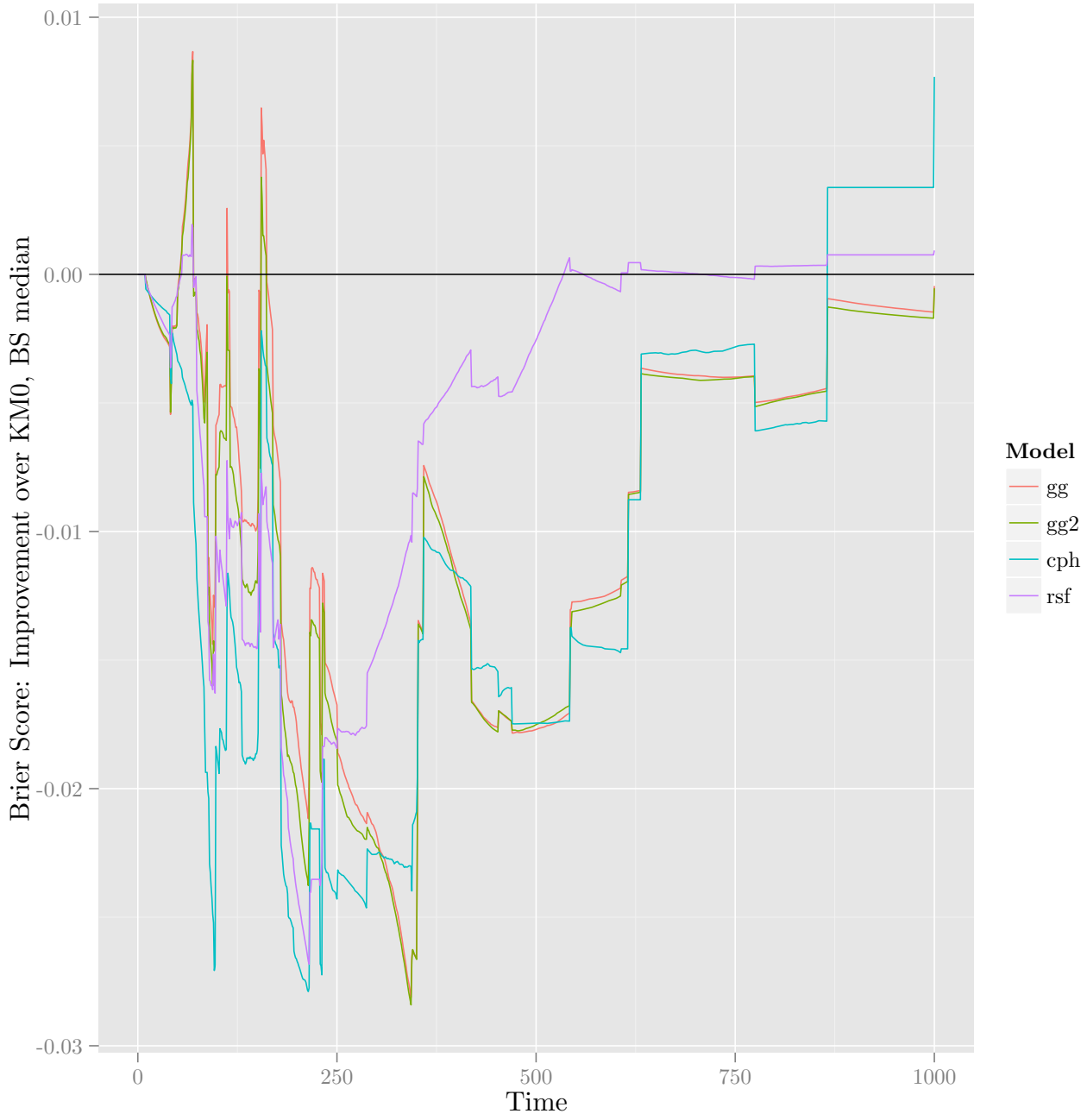



```
ggplot(temp, aes(x = Time, y = Q50, ymin = Q5, ymax = Q95, colour = Model, fill = Model)) + geom_line()
```

```
## Warning:  Removed 1200 rows containing missing values (geom_path).
```

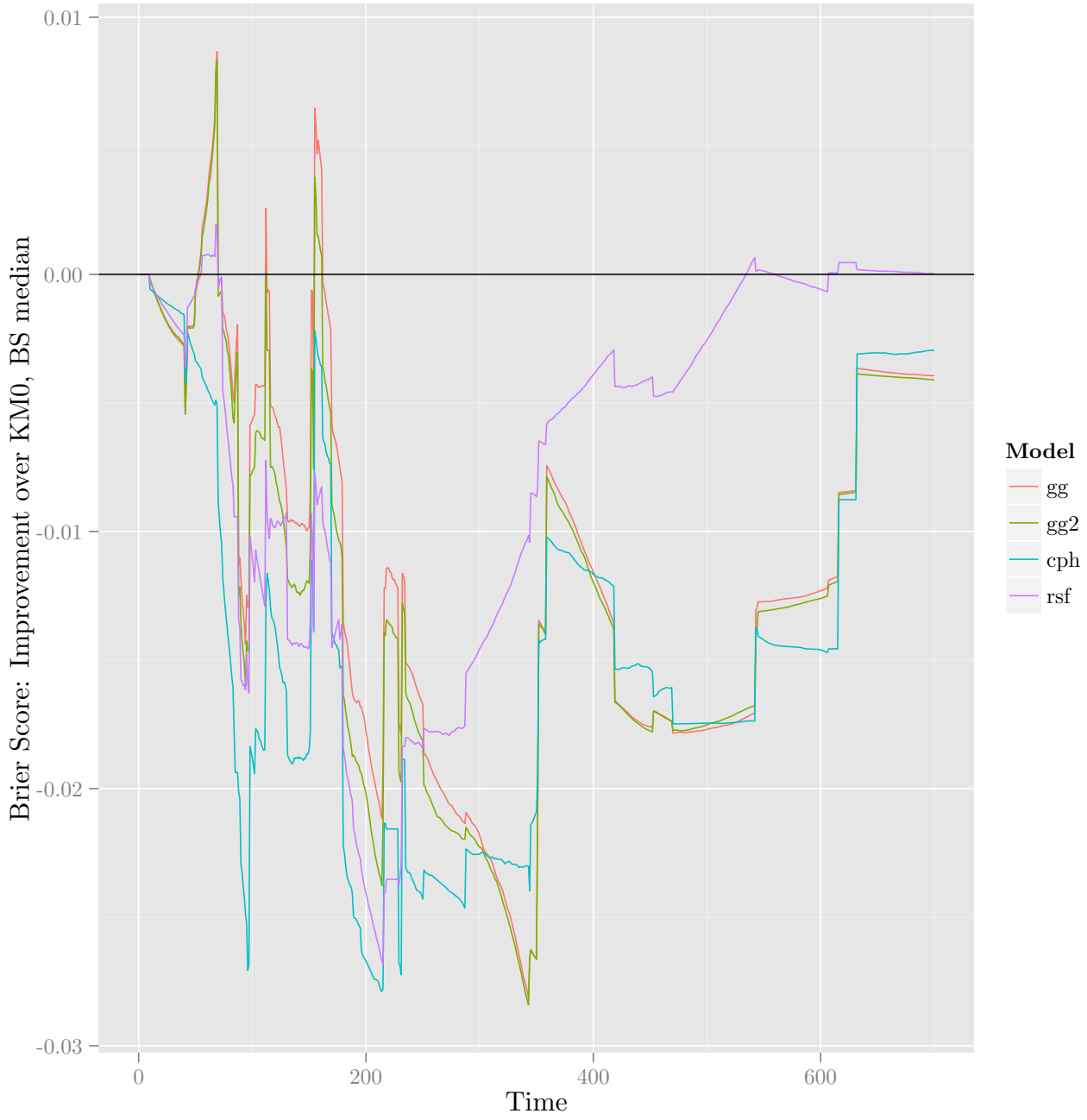



```
ggplot(temp, aes(x = Time, y = Q50, colour = Model)) + geom_line() + ylab("Brier Score: Improvement over
```




```
ggplot(temp, aes(x = Time, y = Q50, colour = Model)) + geom_line() + ylab("Brier Score: Improvement over
```

```
## Warning:  Removed 1200 rows containing missing values (geom_path).
```

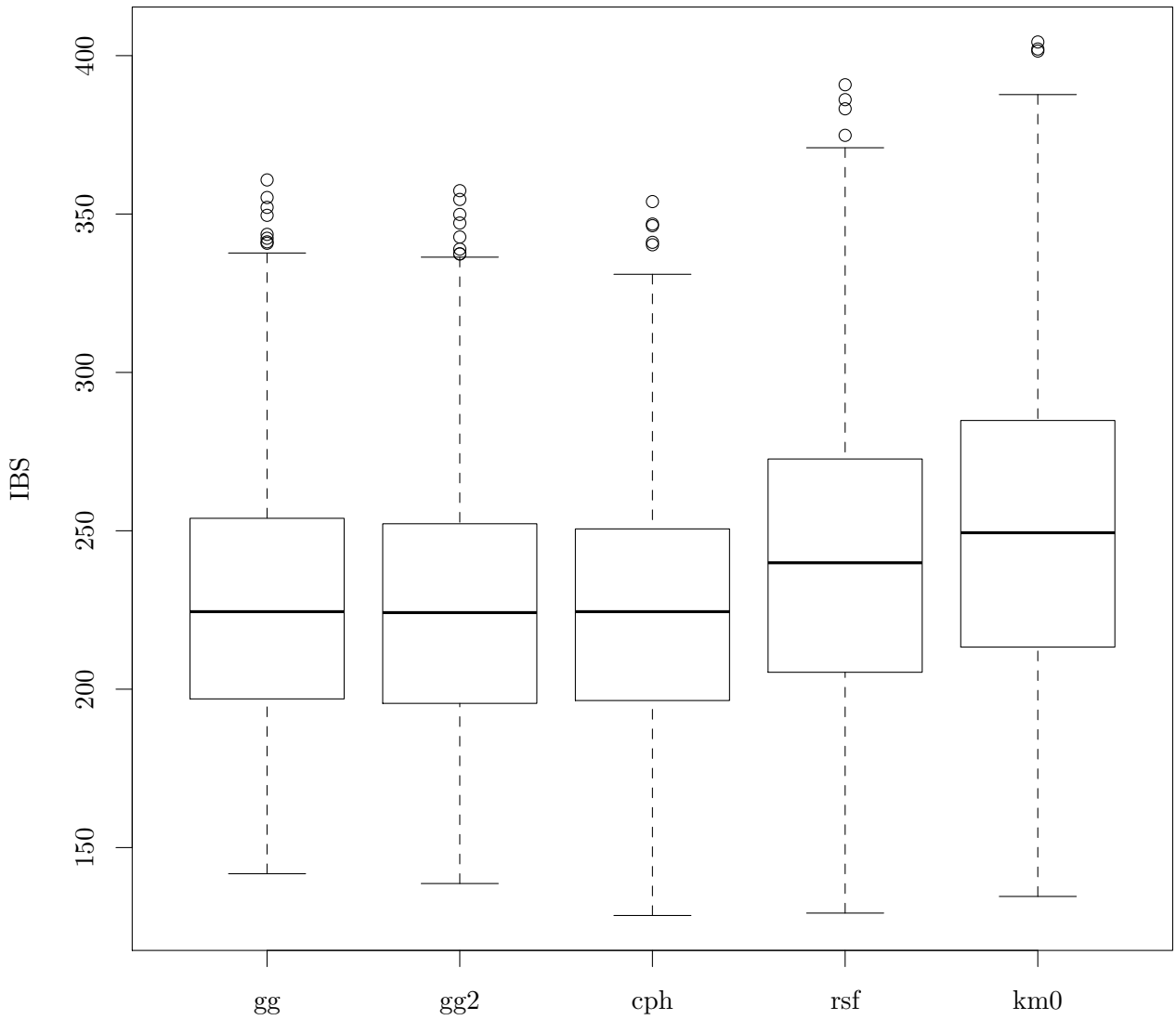


IBS comparisons.

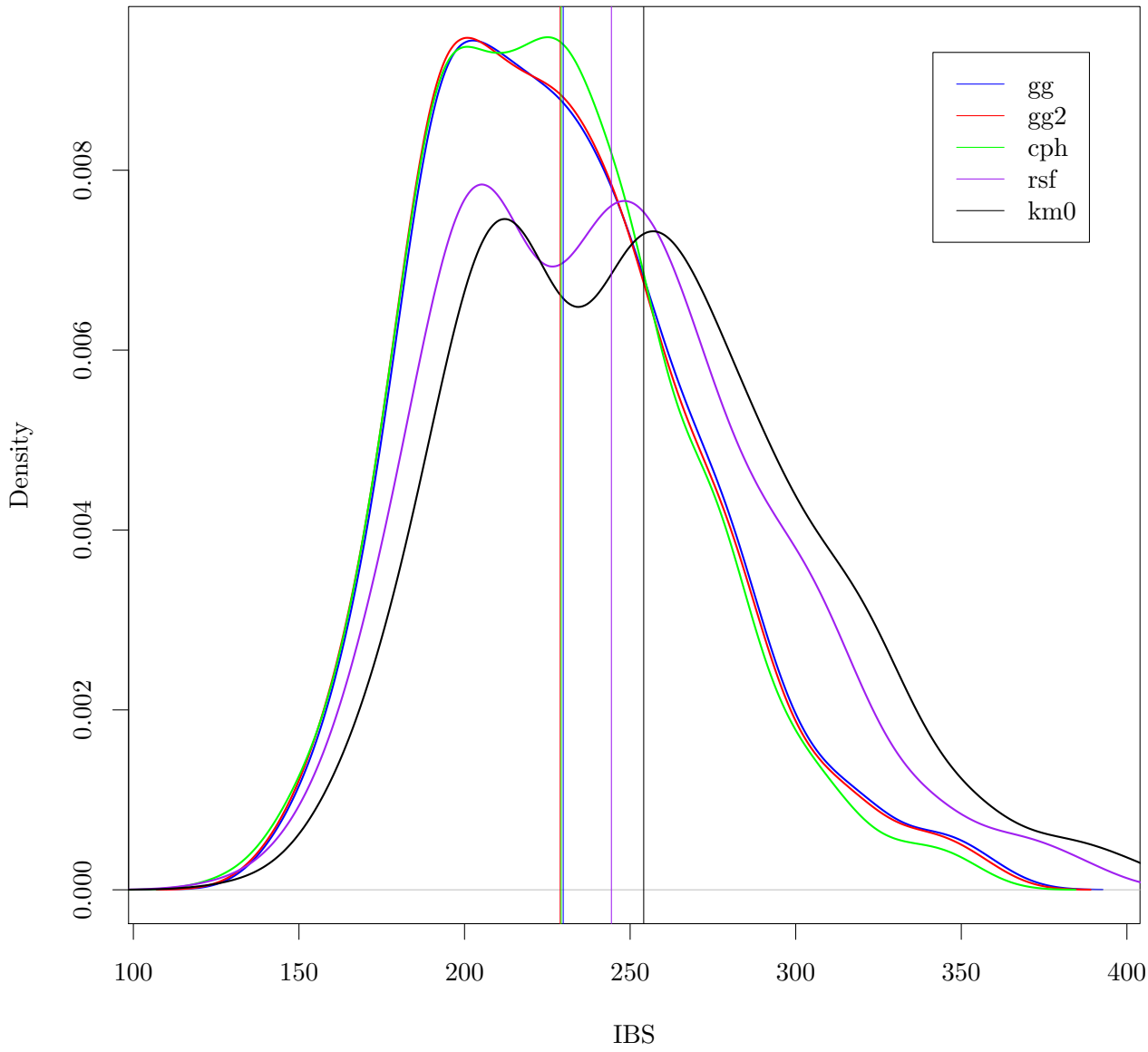
```
set.seed(20150111)
ibsc_boots = t(sapply(1:5e2, function(i) {
        if (i %% 5e1 == 0)      { message(i) }
        boot_samp = sample.int(nrow(data.val), replace = TRUE)
        gg = calcIBS(Surv(data.val$Time, data.val$DSD)[boot_samp,], ibs_preds_gg[boot_samp,], ibs_times
        gg2 = calcIBS(Surv(data.val$Time, data.val$DSD)[boot_samp,], ibs_preds_gg2[boot_samp,], ibs_time
        cph = calcIBS(Surv(data.val$Time, data.val$DSD)[boot_samp,], ibs_preds_cph[boot_samp,], ibs_time
        rsf = calcIBS(Surv(data.val$Time, data.val$DSD)[boot_samp,], ibs_preds_rsf[boot_samp,], ibs_time
        km0 = calcIBS(Surv(data.val$Time, data.val$DSD)[boot_samp,], ibs_preds_km0[boot_samp,], ibs_time
        c(gg, gg2, cph, rsf, km0)
}))
```

```
## 50
## 100
## 150
## 200
## 250
## 300
## 350
## 400
## 450
## 500
colnames(ibsc_boots) = c("gg", "gg2", "cph", "rsf", "km0")
```

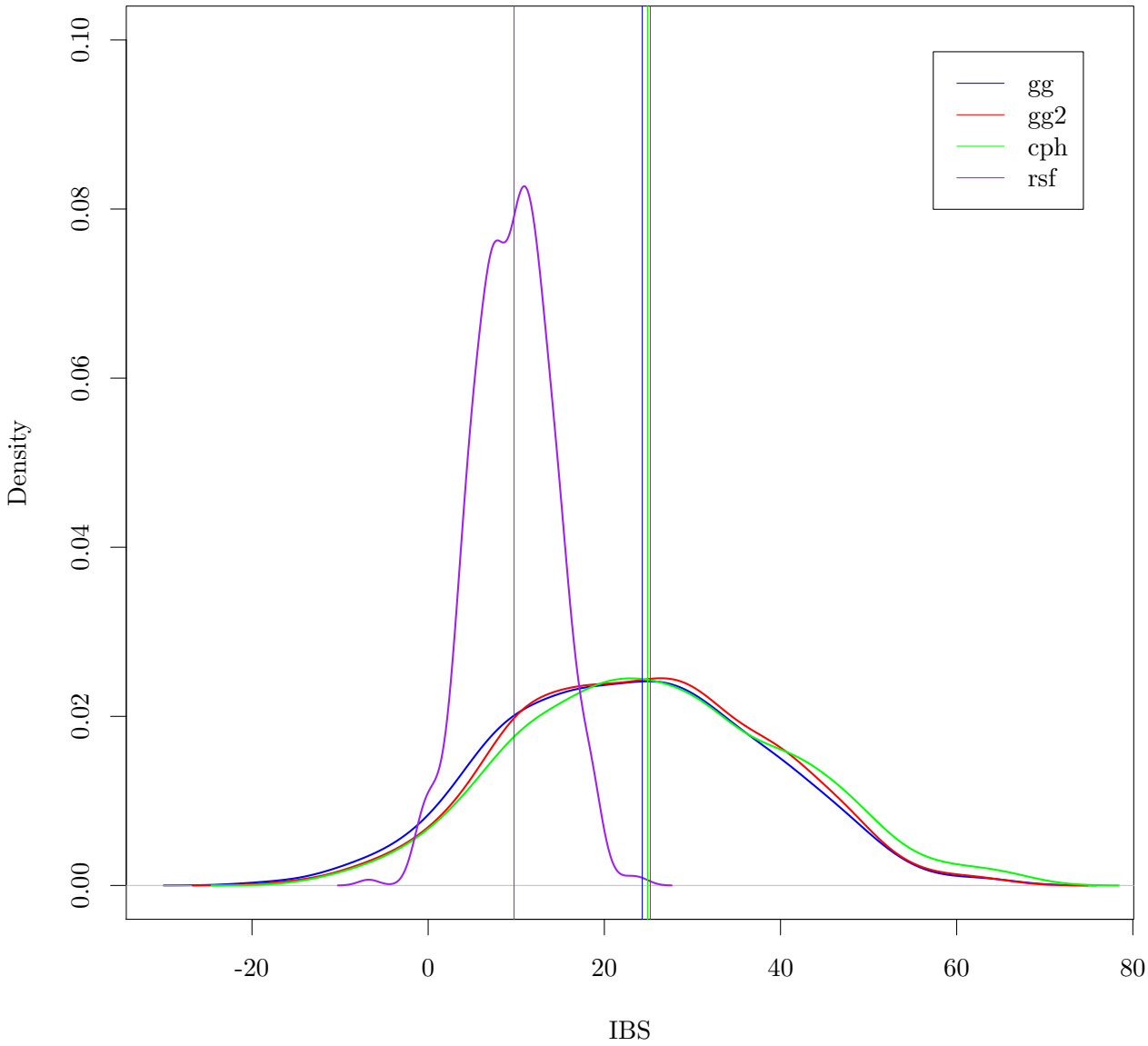
```
calcIBS(Surv(data.val$Time, data.val$DSD), ibs_preds_gg, ibs_times, max(data.val$Time))$ibs
## [1] 229.8
calcIBS(Surv(data.val$Time, data.val$DSD), ibs_preds_gg2, ibs_times, max(data.val$Time))$ibs
## [1] 228.9
calcIBS(Surv(data.val$Time, data.val$DSD), ibs_preds_cph, ibs_times, max(data.val$Time))$ibs
## [1] 229.2
calcIBS(Surv(data.val$Time, data.val$DSD), ibs_preds_rsf, ibs_times, max(data.val$Time))$ibs
## [1] 244.3
calcIBS(Surv(data.val$Time, data.val$DSD), ibs_preds_km0, ibs_times, max(data.val$Time))$ibs
## [1] 254.1
boxplot(ibsc_boots, main = "IBS BS Distribution", ylab = "IBS")
```




```
plot(density(ibsc_boots[,1]), col = "blue", lwd = 2, main = "IBS BS Distribution", xlab = "IBS")
lines(density(ibsc_boots[,2]), col = "red", lwd = 2)
lines(density(ibsc_boots[,3]), col = "green", lwd = 2)
lines(density(ibsc_boots[,4]), col = "purple", lwd = 2)
lines(density(ibsc_boots[,5]), col = "black", lwd = 2)
abline(v = calcIBS(Surv(data.val$Time, data.val$DSD), ibs_preds_gg, ibs_times, max(data.val$Time))$ibs,
abline(v = calcIBS(Surv(data.val$Time, data.val$DSD), ibs_preds_gg2, ibs_times, max(data.val$Time))$ibs
abline(v = calcIBS(Surv(data.val$Time, data.val$DSD), ibs_preds_cph, ibs_times, max(data.val$Time))$ibs
abline(v = calcIBS(Surv(data.val$Time, data.val$DSD), ibs_preds_rsf, ibs_times, max(data.val$Time))$ibs
abline(v = calcIBS(Surv(data.val$Time, data.val$DSD), ibs_preds_km0, ibs_times, max(data.val$Time))$ibs
legend("topright", legend = c("gg", "gg2", "cph", "rsf", "km0"), col = c("blue", "red", "green", "purple
```




```
plot(density(ibsc_boots[,5] - ibsc_boots[,1]), col = "blue", lwd = 2, main = "IBS\\_KM0 - IBS\\_x BS Dis
lines(density(ibsc_boots[,5] - ibsc_boots[,2]), col = "red", lwd = 2)
lines(density(ibsc_boots[,5] - ibsc_boots[,3]), col = "green", lwd = 2)
lines(density(ibsc_boots[,5] - ibsc_boots[,4]), col = "purple", lwd = 2)
abline(v = (calcIBS(Surv(data.val$Time, data.val$DSD), ibs_preds_km0, ibs_times, max(data.val$Time))$ibs
abline(v = (calcIBS(Surv(data.val$Time, data.val$DSD), ibs_preds_km0, ibs_times, max(data.val$Time))$ibs
abline(v = (calcIBS(Surv(data.val$Time, data.val$DSD), ibs_preds_km0, ibs_times, max(data.val$Time))$ibs
abline(v = (calcIBS(Surv(data.val$Time, data.val$DSD), ibs_preds_km0, ibs_times, max(data.val$Time))$ibs
legend("topright", legend = c("gg", "gg2", "cph", "rsf"), col = c("blue", "red", "green", "purple"), lty
```



Do some proper BCA bootstrapping on the differences, just as a double-check test.

```
set.seed(20150111)
ibsc_boots2 = boot(data.val, statistic = function(d, i) {
        gg = calcIBS(Surv(d$Time, d$DSD)[i,], ibs_preds_gg[i,], ibs_times, max(d$Time[i]))$ibs
        gg2 = calcIBS(Surv(d$Time, d$DSD)[i,], ibs_preds_gg2[i,], ibs_times, max(d$Time[i]))$ibs
        cph = calcIBS(Surv(d$Time, d$DSD)[i,], ibs_preds_cph[i,], ibs_times, max(d$Time[i]))$ibs
        rsf = calcIBS(Surv(d$Time, d$DSD)[i,], ibs_preds_rsf[i,], ibs_times, max(d$Time[i]))$ibs
        km0 = calcIBS(Surv(d$Time, d$DSD)[i,], ibs_preds_km0[i,], ibs_times, max(d$Time[i]))$ibs
        c(gg - km0, gg2 - km0, cph - km0, rsf - km0, gg - rsf, gg2 - rsf, cph - rsf, gg - cph, gg2 - cph
}, R = 500)
ibsc_boots2_ci = t(sapply(1:length(ibsc_boots2$t0), function(i) boot.ci(ibsc_boots2, index = i, type = '
rownames(ibsc_boots2_ci) = c("gg-km0", "gg2-km0", "cph-km0", "rsf-km0", "gg-rsf", "gg2-rsf", "cph-rsf",
colnames(ibsc_boots2_ci) = c("level", "orderi1", "orderi2", "lci", "uci")
ibsc_boots2
```

```
##
## ORDINARY NONPARAMETRIC BOOTSTRAP
##
##
## Call:
## boot(data = data.val, statistic = function(d, i) {
##     gg = calcIBS(Surv(d$Time, d$DSD)[i, ], ibs_preds_gg[i, ],
##         ibs_times, max(d$Time[i]))$ibs
##     gg2 = calcIBS(Surv(d$Time, d$DSD)[i, ], ibs_preds_gg2[i,
##         ], ibs_times, max(d$Time[i]))$ibs
##     cph = calcIBS(Surv(d$Time, d$DSD)[i, ], ibs_preds_cph[i,
##         ], ibs_times, max(d$Time[i]))$ibs
##     rsf = calcIBS(Surv(d$Time, d$DSD)[i, ], ibs_preds_rsf[i,
##         ], ibs_times, max(d$Time[i]))$ibs
##     km0 = calcIBS(Surv(d$Time, d$DSD)[i, ], ibs_preds_km0[i,
##         ], ibs_times, max(d$Time[i]))$ibs
##     c(gg - km0, gg2 - km0, cph - km0, rsf - km0, gg - rsf, gg2 -
##         rsf, cph - rsf, gg - cph, gg2 - cph, gg - gg2)
## }, R = 500)
##
##
## Bootstrap Statistics :
##      original  bias    std. error
## t1*  -24.3034  1.1918      14.894
## t2*  -25.2147  1.0596      14.482
## t3*  -24.9089 -0.7322      15.377
## t4*   -9.7522  0.1162       4.794
## t5*  -14.5513  1.0756      11.107
## t6*  -15.4625  0.9433      10.713
## t7*  -15.1567 -0.8484      11.854
## t8*    0.6055  1.9241       4.722
## t9*   -0.3058  1.7918       4.017
## t10*   0.9113  0.1323       1.103

ibsc_boots2_ci

##         level orderi1 orderi2     lci     uci
## gg-km0   0.95    4.47   474.5 -59.691  0.5252
## gg2-km0  0.95    4.94   476.1 -59.344 -1.0800
## cph-km0  0.95    8.52   484.0 -60.139  0.1848
## rsf-km0  0.95    7.55   481.6 -19.739 -1.4941
## gg-rsf   0.95    3.93   473.4 -41.474  4.2906
## gg2-rsf  0.95    4.26   474.6 -41.579  2.7881
## cph-rsf  0.95    7.41   482.6 -44.945  3.3254
## gg-cph   0.95    2.82   454.1  -7.557  9.2330
## gg2-cph  0.95    2.35   449.6  -6.796  6.6235
## gg-gg2   0.95    5.97   476.6  -1.492  2.8741
```

All models perform equivalently on the validation set. Select the simplest: gg.
Final model fitting:

```
data.all = rbind(data[colnames(data.val)], data.val)
head(data.all)

##           Time  DSD  SexM AgeCent LocBody SizeCent    A2    A4
```

```
## NSWPCN_4   937 TRUE  TRUE     -16   FALSE       -1 FALSE  TRUE
## NSWPCN_7   247 TRUE FALSE      -1   FALSE       -2 FALSE  TRUE
## NSWPCN_10  177 TRUE  TRUE      -9   FALSE       10 FALSE  TRUE
## NSWPCN_13  247 TRUE FALSE     -19    TRUE       20 FALSE  TRUE
## NSWPCN_20  256 TRUE FALSE      -8   FALSE        0 FALSE  TRUE
## NSWPCN_21  763 TRUE FALSE      -1   FALSE       -2 FALSE FALSE

fit.final.gg = flexsurvreg(Surv(Time, DSD) ~ SexM + SizeCent + A2 + A4,
        anc = list(
                sigma = ~ SexM,
                Q = ~ SexM),
        data = data.all, dist = "gengamma")
fit.final.gg2 = flexsurvreg(Surv(Time, DSD) ~ SexM + SizeCent + A2 + A4 + I(SexM == FALSE & A2 == FALSE
    anc = list(
        sigma = ~ SexM,
        Q = ~ SexM),
    data = data.all, dist = "gengamma")
fit.final.cph = coxph(Surv(Time, DSD) ~ strata(SexM) + SizeCent + A2 + A4, data = data.all, x = TRUE, y
set.seed(20150111)
fit.final.rsf = rfsrc(Surv(Time, DSD) ~ SexM + AgeCent + LocBody + SizeCent + A2 + A4, data = data.all,
fit.final.km0 = survfit(Surv(Time, DSD) ~ 1, data.all)
saveRDS(list(gg = fit.final.gg, km0 = fit.final.km0, gg2 = fit.final.gg2, cph = fit.final.cph, rsf = fit
```

```
save.image("05_train_NSWPCN_2.rda")
```

8 Session information

```
sessionInfo()

## R version 3.1.1 (2014-07-10)
## Platform: x86_64-unknown-linux-gnu (64-bit)
##
## locale:
##  [1] LC_CTYPE=en_US.UTF-8          LC_NUMERIC=C
##  [3] LC_TIME=en_US.UTF-8           LC_COLLATE=en_US.UTF-8
##  [5] LC_MONETARY=en_US.UTF-8       LC_MESSAGES=en_US.UTF-8
##  [7] LC_PAPER=en_US.UTF-8          LC_NAME=en_US.UTF-8
##  [9] LC_ADDRESS=en_US.UTF-8        LC_TELEPHONE=en_US.UTF-8
## [11] LC_MEASUREMENT=en_US.UTF-8    LC_IDENTIFICATION=en_US.UTF-8
##
## attached base packages:
## [1] parallel  methods   splines   stats     graphics  grDevices utils
## [8] datasets  base
##
## other attached packages:
##  [1] timeROC_0.2           timereg_1.8.6         mvtnorm_1.0-2
##  [4] pec_2.4.4             boot_1.3-14           MASS_7.3-37
##  [7] ggplot2_1.0.0         plyr_1.8.1            reshape2_1.4.1
## [10] randomForestSRC_1.6.0 flexsurv_0.5          glmulti_1.0.7
## [13] rJava_0.9-6           survival_2.37-7       tikzDevice_0.8.1
## [16] knitr_1.9
```

```
##
## loaded via a namespace (and not attached):
##  [1] codetools_0.2-10 colorspace_1.2-4 deSolve_1.11     digest_0.6.8
##  [5] evaluate_0.5.5   filehash_2.2-2   foreach_1.4.2    formatR_1.0
##  [9] grid_3.1.1       gtable_0.1.2     highr_0.4        iterators_1.0.7
## [13] labeling_0.3     lava_1.3         muhaz_1.2.6      munsell_0.4.2
## [17] prodlim_1.5.1    proto_0.3-10     Rcpp_0.11.4      scales_0.2.4
## [21] stringr_0.6.2    tools_3.1.1
```