

Credit card defaults prediction

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Introduction

In this project, using a dataset containing six months information, we want to create a model that predicts credit card defaults. From a risk management perspective, an accurate prediction and assessment of the credit risk is of relevant importance for the bank issuing the credit card. The dataset we are going to use can be downloaded at the following url:

“<https://archive.ics.uci.edu/ml/machine-learning-databases/00350/default%20of%20credit%20card%20clients.xls>”.

We have downloaded and manually saved a version of the *.xlsx* file in the “data” subfolder you can find within the github repo link we have provided together with the three files or at the following ulr:

“<https://github.com/andrearoetti/Choose-Your-Own/tree/master/data>”.

Before getting started, we load the necessary packages for our work, after installing them in case they are not installed yet.

```
if (!require(tidyverse)) install.packages('tidyverse')
if (!require(lattice)) install.packages('lattice')
if (!require(caret)) install.packages('caret')
if (!require(readxl)) install.packages('readxl')
library(tidyverse)
library(lattice)
library(caret)
library(readxl)
```

We therefore use here below a relative path in order to read the excel file in R: for the sake of simplicity, we will simply call the dataset **credit_card**.

```
credit_card <- read_xlsx("data/default of credit card clients.xlsx")
```

Data cleaning

We first take a look of the first six rows to get a flavour of how the dataset is made.

```
head(credit_card)

## # A tibble: 6 x 25
##   ...1 X1    X2    X3    X4    X5    X6    X7    X8    X9    X10   X11   X12
##   <chr> <chr> <chr> <chr> <chr> <chr> <chr> <chr> <chr> <chr> <chr> <chr> <chr>
## 1 ID   LIMIT~ SEX   EDUC~ MARR~ AGE   PAY_0 PAY_2 PAY_3 PAY_4 PAY_5 PAY_6 BILL~
## 2 1    20000 2     2     1    24    2     2     -1    -1    -2    -2    3913
## 3 2    120000 2     2     2    26    -1    2     0     0     0     2    2682
## 4 3    90000 2     2     2    34    0     0     0     0     0     0    29239
## 5 4    50000 2     2     1    37    0     0     0     0     0     0    46990
## 6 5    50000 1     2     1    57    -1    0     -1    0     0     0    8617
## # ... with 12 more variables: X13 <chr>, X14 <chr>, X15 <chr>, X16 <chr>,
## #   X17 <chr>, X18 <chr>, X19 <chr>, X20 <chr>, X21 <chr>, X22 <chr>,
## #   X23 <chr>, Y <chr>
```

We immediately notice that the first column may be a simple counter of the lines if every ID is different from each other: we confirm this with the code below.

```
nrow(credit_card)
```

```
## [1] 30001
```

```
n_distinct(credit_card$...1)
```

```
## [1] 30001
```

This does not add any value to our data: we are going to delete the first column. In the meanwhile, we acknowledge that our dataset has 30.000 records. Moreover, we also notice that the first line is actually a description of each column: we will save this line under another object called *col_description* and delete from our dataset as well.

```
credit_card <- credit_card[,-1]  
col_description <- credit_card[1,]  
credit_card <- credit_card[-1,]
```

We now take the *col_description*, which is a tibble, and we transpose it so that it is easier to be shown and read.

```
class(col_description)
```

```
## [1] "tbl_df"      "tbl"        "data.frame"
```

```
t(col_description)
```

```
##      [,1]  
## X1  "LIMIT_BAL"  
## X2  "SEX"  
## X3  "EDUCATION"  
## X4  "MARRIAGE"  
## X5  "AGE"  
## X6  "PAY_0"  
## X7  "PAY_2"  
## X8  "PAY_3"  
## X9  "PAY_4"  
## X10 "PAY_5"  
## X11 "PAY_6"  
## X12 "BILL_AMT1"  
## X13 "BILL_AMT2"  
## X14 "BILL_AMT3"  
## X15 "BILL_AMT4"  
## X16 "BILL_AMT5"  
## X17 "BILL_AMT6"  
## X18 "PAY_AMT1"  
## X19 "PAY_AMT2"  
## X20 "PAY_AMT3"  
## X21 "PAY_AMT4"  
## X22 "PAY_AMT5"  
## X23 "PAY_AMT6"  
## Y   "default payment next month"
```

We now take the opportunity to describe the type of information we have in our dataset. First of all, since our data is taken from Taiwan, every money amount is in New Taiwan Dollars, also abbreviated as NT Dollars or TWD. On average in the last year, the TWD has exchanged against USD with a rate of about

0.032, or about 30 TWD for 1 USD.

Columns description

- The first column (**X1** or “LIMIT_BAL”) represent the maximum limit of each credit card.
- The second column (**X2** or “SEX”) represents the gender: 1 = male and 2 = female.
- The Third column (**X3** or “EDUCATION”) represents the education level: 1 = graduate school, 2 = university, 3 = high school, 4 = others, 5, 6 = unknown.
- The fourth column (**X4** or “MARRIAGE”) represents the marital status: 1 = married, 2 = single, 3 = others.
- The fifth column (**X5** or “AGE”) represents the age in years.
- From the column **X6** (“PAY_0”) to the column **X11** (“PAY_6”) we have repayment status from September 2005 back to April 2005 respectively (“PAY_0” is September, “PAY_2” is August, all the way to “PAY_6” that is April): -1 = pay duly, 1 = payment delay for one month, 2 = payment delay for two months, ... 8 = payment delay for 8 months, 9 = payment delay for 9 months or more.
- From the column **X12** (“BILL_AMT1”) to the column **X17** (“BILL_AMT6”), with the same logic we have the amount of bill statements from September 2005, in “BILL_AMT1”, all the way to April 2005 (“BILL_AMT6”).
- From the column **X18** (“PAY_AMT1”) to the column **X23** (“PAY_AMT6”), again with the same logic, we have the amounts of previous payment from September 2005, in “PAY_AMT1”, all the way to April 2005 (“PAY_AMT6”).
- Finally, in the last column (**Y** or ‘default payment next month’) we have the outcome 1 in case of default, 0 otherwise.

Data tidying and partitioning

Based on columns definition, we first change the columns class to factors (for sex, education, marriage and the outcome ‘default payment next month’) or numbers (all the remaining).

```
credit_card[, -c(2,3,4,24)] <- as_tibble(sapply(credit_card[, -c(2,3,4,24)], as.numeric))
credit_card$X2 <- as.factor(credit_card$X2)
credit_card$X3 <- as.factor(credit_card$X3)
credit_card$X4 <- as.factor(credit_card$X4)
credit_card$Y <- as.factor(credit_card$Y)
```

The ultimate goal of this project is to predict, on an unknown dataset, the outcome of column Y given all the Xs. To do this, we split our dataset into two parts: one, called *historic* will be treated as historic series of data at our disposition, where we will do our data analysis and build our model. The second one, called *validation*, will be treated as unknown and only used to evaluate the performance of our final model. The proportion chosen is 80-20% in order to have enough data to build and train our model but also a consistent dataset for evaluating it.

To permit the replica of our work, we set the seed before creating the index.

```
set.seed(1, sample.kind = "Rounding")
validation_index <- createDataPartition(y = credit_card$Y, times = 1, p = 0.2, list = FALSE)
historic <- credit_card[-validation_index,]
validation <- credit_card[validation_index,]
```

Exploratory data analysis

We are now ready to start our data analysis on the *historic* dataset as if it were our historical series of records to use for our model. First, here below a summary of the statistics.

```
summary(historic)
```

```
##           X1           X2           X3           X4           X5
## Min.      : 10000      1: 9495      0:   12      0:   41      Min.      :21.00
## 1st Qu.: 50000      2:14504      1: 8460      1:10855      1st Qu.:28.00
## Median :140000                2:11244      2:12844      Median :34.00
## Mean      :167286                3: 3916      3:  259      Mean      :35.44
## 3rd Qu.:240000                4:  104                3rd Qu.:41.00
## Max.      :800000                5:  220                Max.      :75.00
##                               6:   43
##           X6           X7           X8           X9
## Min.      :-2.00000      Min.      :-2.0000      Min.      :-2.0000      Min.      :-2.0000
## 1st Qu.: -1.00000      1st Qu.: -1.0000      1st Qu.: -1.0000      1st Qu.: -1.0000
## Median :  0.00000      Median :  0.0000      Median :  0.0000      Median :  0.0000
## Mean      : -0.01433      Mean      : -0.1333      Mean      : -0.1699      Mean      : -0.2257
## 3rd Qu.:  0.00000      3rd Qu.:  0.0000      3rd Qu.:  0.0000      3rd Qu.:  0.0000
## Max.      :  8.00000      Max.      :  8.0000      Max.      :  8.0000      Max.      :  8.0000
##
##           X10          X11          X12          X13
## Min.      :-2.0000      Min.      :-2.0000      Min.      :-165580      Min.      :-69777
## 1st Qu.: -1.0000      1st Qu.: -1.0000      1st Qu.:   3526      1st Qu.:   2948
## Median :  0.0000      Median :  0.0000      Median :   22136      Median :   20911
## Mean      : -0.2678      Mean      : -0.2973      Mean      :   51070      Mean      :   49004
## 3rd Qu.:  0.0000      3rd Qu.:  0.0000      3rd Qu.:   67054      3rd Qu.:   63872
## Max.      :  8.0000      Max.      :  8.0000      Max.      :  746814      Max.      :  646770
##
##           X14          X15          X16          X17
## Min.      :-157264      Min.      :-170000      Min.      :-81334      Min.      :-339603
## 1st Qu.:   2628      1st Qu.:   2314      1st Qu.:   1744      1st Qu.:   1231
## Median :   19945      Median :   18926      Median :   17987      Median :   16847
## Mean      :   46821      Mean      :   42943      Mean      :   39972      Mean      :   38555
## 3rd Qu.:   59846      3rd Qu.:   53826      3rd Qu.:   49893      3rd Qu.:   48901
## Max.      :1664089      Max.      :  616836      Max.      :587067      Max.      :  699944
##
##           X18          X19          X20          X21
## Min.      :      0      Min.      :      0.0      Min.      :      0      Min.      :      0
## 1st Qu.:   980      1st Qu.:   835.5      1st Qu.:   390      1st Qu.:   279
## Median :   2100      Median :   2005.0      Median :   1800      Median :   1500
## Mean      :   5603      Mean      :   5802.5      Mean      :   5084      Mean      :   4750
## 3rd Qu.:   5003      3rd Qu.:   5000.0      3rd Qu.:   4514      3rd Qu.:   4006
## Max.      :873552      Max.      :1684259.0      Max.      :889043      Max.      :621000
##
##           X22          X23          Y
## Min.      :      0      Min.      :      0      0:18691
## 1st Qu.:   256      1st Qu.:   101      1: 5308
## Median :   1500      Median :   1500
## Mean      :   4765      Mean      :   5215
## 3rd Qu.:   4034      3rd Qu.:   4000
## Max.      :417990      Max.      :528666
##
```

We notice that our population is aged, on average, almost 35.5, with a range that goes from 21 to 75. 50% of the cases are between 28 and 41 years old. Moreover, the average credit card limit is TWD 167.286 (around

USD 5.500), with a range between TWD 10.000 (something more than USD 300) and 800.000 (more than USD 25.500). Among other statistics, it would be interesting understanding the rate of credit card defaults, the proportion male/female and the proportion of married individuals.

```
mean(historic$Y == "1")
```

```
## [1] 0.2211759
```

```
mean(historic$X2 == "1")
```

```
## [1] 0.3956415
```

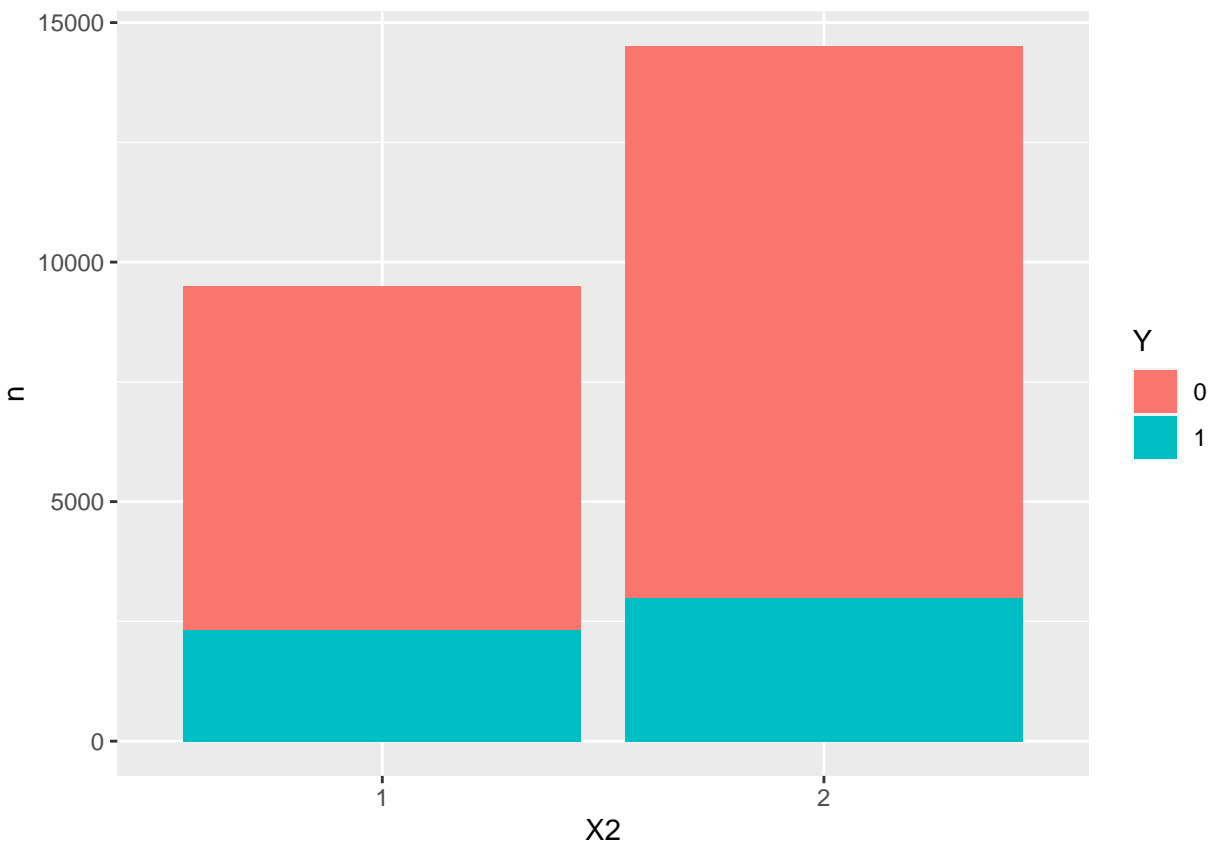
```
mean(historic$X4 == "1")
```

```
## [1] 0.4523105
```

We understand that the 22.1% of the cases has a credit card default payment in the next month, the 39.6% is male and the 45.3% of individuals is married. More than that, before focusing on previous months data, it would be interesting understanding whether and how there is a correlation between the defaults and the other factors as gender, education level, marriage status, age or credit card limit.

Gender

We first check how the default payments are divided by gender and we do it with the following barplot.



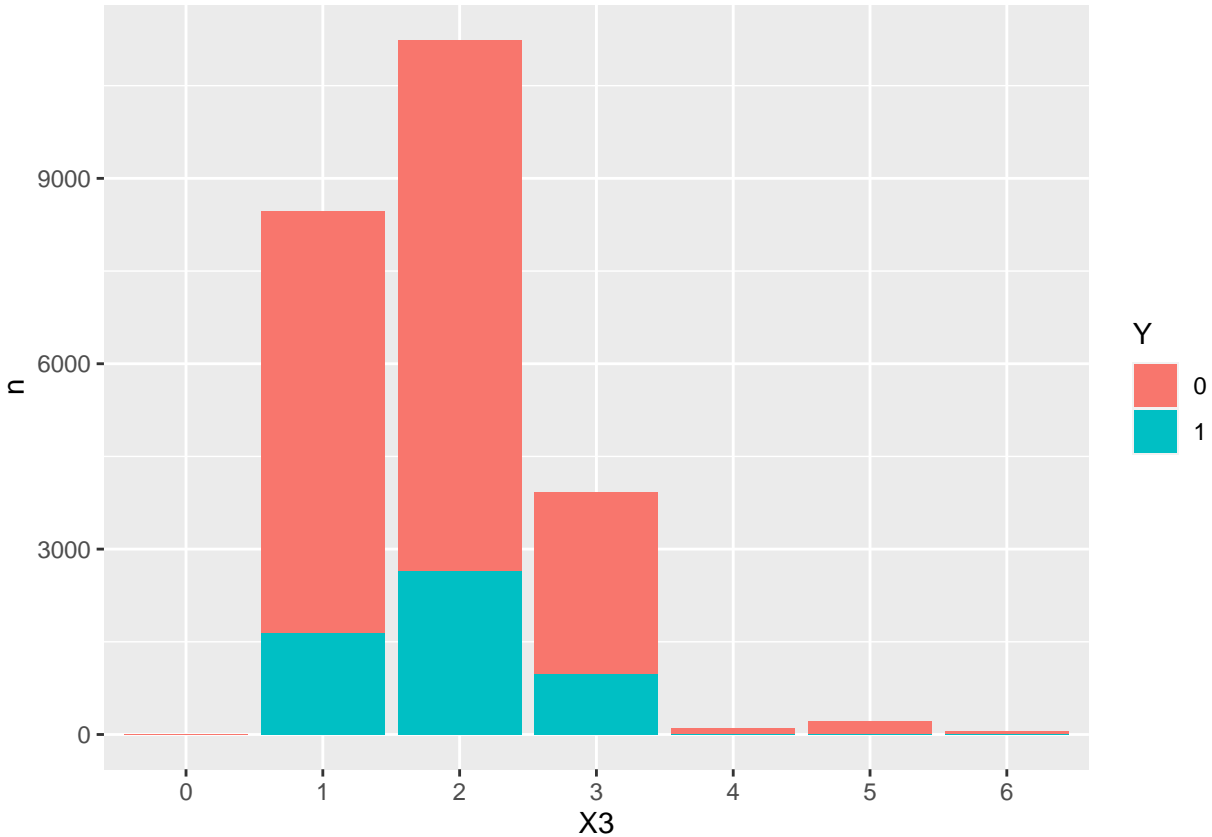
It looks like the default payments for male ($X2 = 1$) are, on percentage, slightly higher than for females ($X2 = 2$), despite the fact that in absolute numbers they are a bit less. The below table confirms our suspect.

```
historic %>% group_by(X2) %>% summarize(rate = mean(Y == "1"), n = n())
```

```
## # A tibble: 2 x 3
##   X2     rate     n
##   <fct> <dbl> <int>
## 1 1     0.244  9495
## 2 2     0.206 14504
```

Education level

We now make the same exercise on education level, here is the barplot.



This last plot is more difficult to read as the number of individuals in the different levels varies a lot. We therefore make a summary table of the default rates by education.

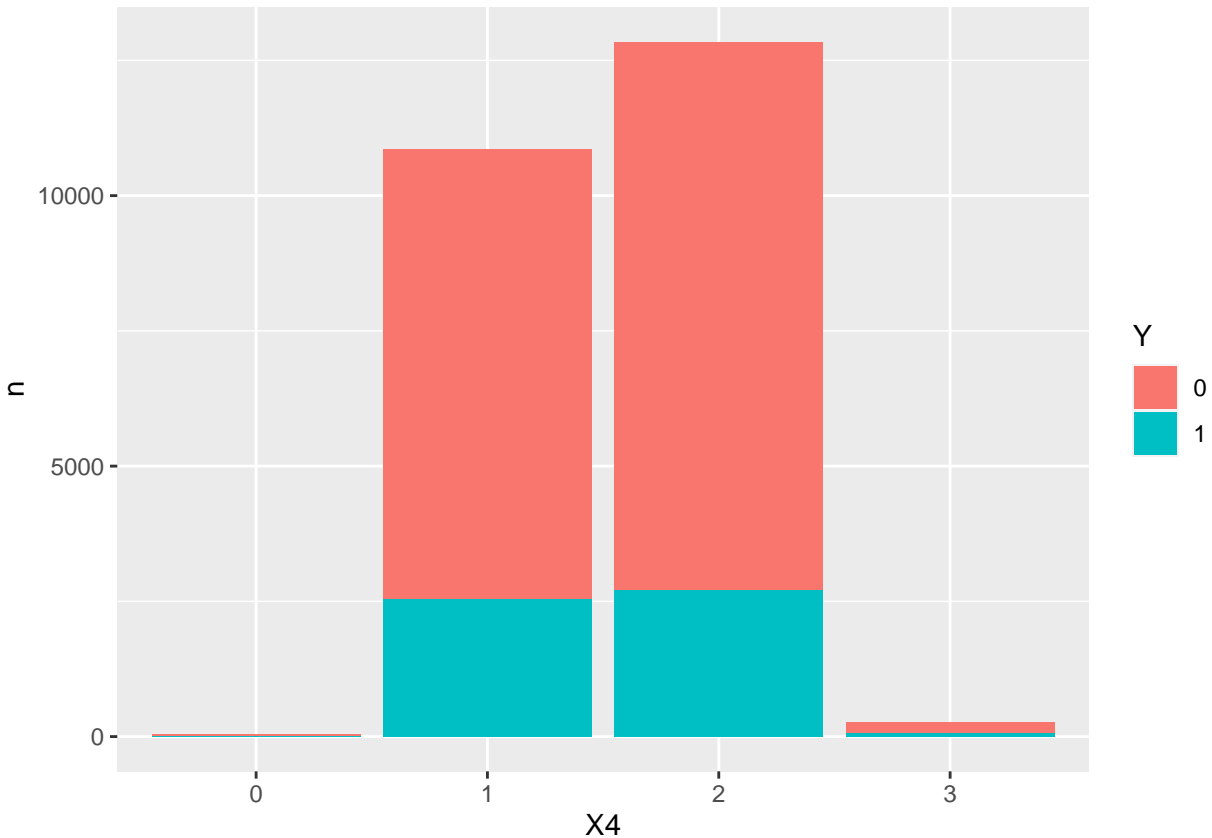
```
historic %>% group_by(X3) %>% summarize(rate = mean(Y == "1"), n = n())
```

```
## # A tibble: 7 x 3
##   X3     rate     n
##   <fct> <dbl> <int>
## 1 0      0      12
## 2 1    0.194  8460
## 3 2    0.236 11244
## 4 3    0.252  3916
## 5 4    0.0673  104
## 6 5    0.0682   220
## 7 6    0.163    43
```

From this table it appears more clearly that actually, among the three main categories (graduate school = 1, university = 2, high school = 3), the education level has an impact on defaults rate: the higher the degree, the lower the rate. No relevant paths can be deducted from the other categories, since the number of individuals is not significant.

Marital status

As done previously, we try to understand if also the marriage status may impact the default payments rate.



Similarly to the gender situation, it appears that in case an individual is married ($X4 = 1$), the default rate is slightly higher than in the case she/he is single ($X4 = 2$), despite the fact in our dataset we have overall more cases of defaults pertaining to singles. We confirm our guess with the table below.

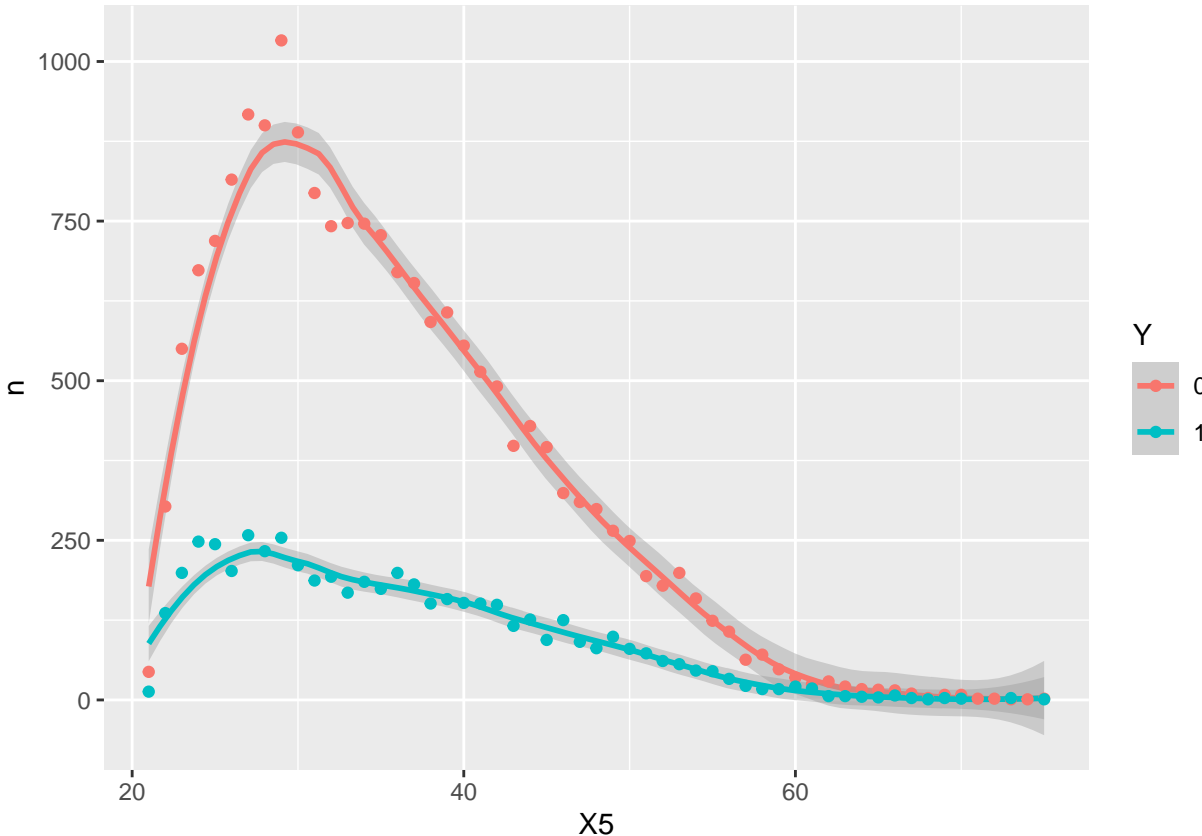
```
historic %>% group_by(X4) %>% summarize(rate = mean(Y == "1"), n = n())
```

```
## # A tibble: 4 x 3
##   X4     rate     n
##   <fct> <dbl> <int>
## 1 0      0.0976    41
## 2 1      0.233  10855
## 3 2      0.210  12844
## 4 3      0.270    259
```

Other marriage status do not appear to be statistically relevant due to the low number of cases.

Age

To understand whether age has an impact on default rate or not we check if the age distribution functions for the two possible outcomes we want to predict ($Y = 1$ or 0) have shapes centred at different ages or follow different paths. We make use of a smooth line since age is not a factor as gender, marital status or education level. Here below the graph.



From this plot it looks like the two curves follow a similar proportional path with no sensible evidences of age disparity. We summarise in the table below the average age for default and non-default cases.

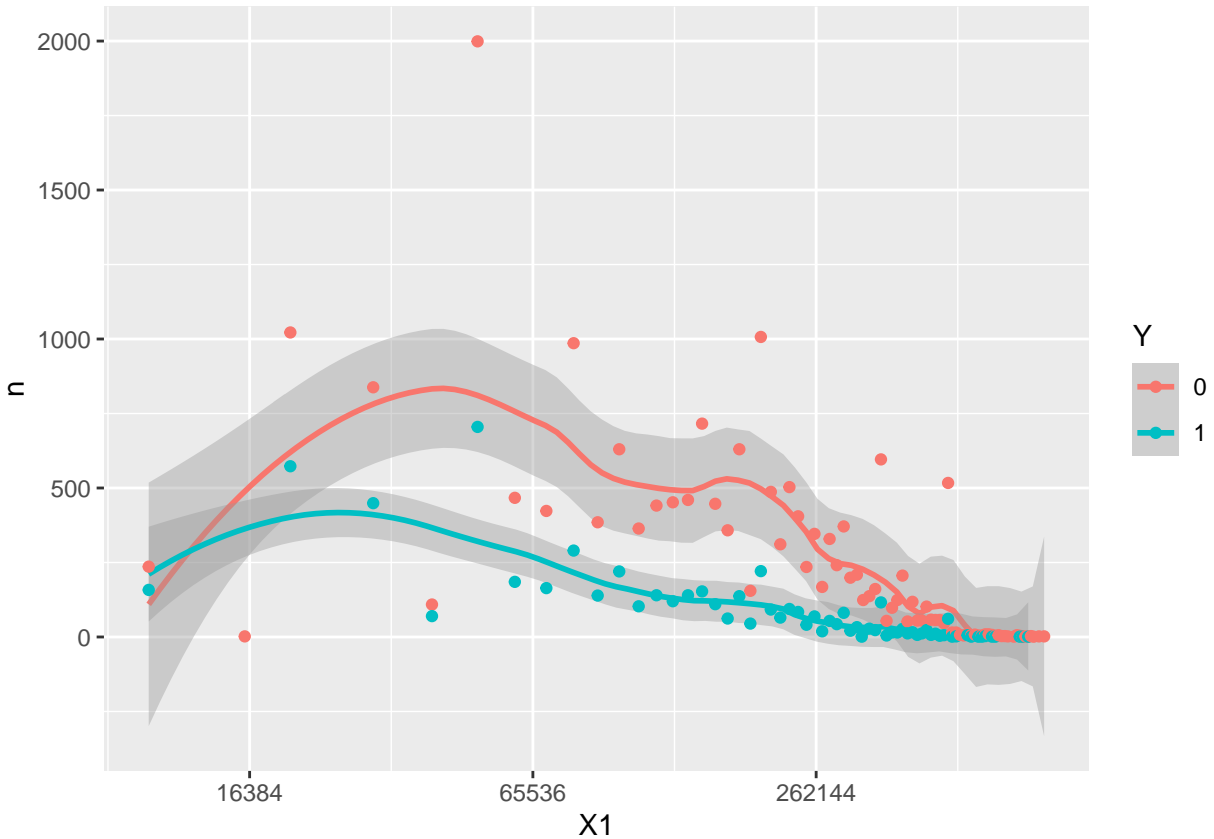
```
historic %>% group_by(Y) %>% summarize(rate = mean(X5), n = n())
```

```
## # A tibble: 2 x 3
##   Y     rate     n
##   <fct> <dbl> <int>
## 1 0      35.4 18691
## 2 1      35.6  5308
```

In our kind of Bayesian analysis it appears that, given the default or not, does not really help in understanding the age of the individual on average, like saying that a younger age does not mean a higher risk and vice-versa. We will therefore not use this predictor any further.

Credit card limit

Our last check, in this chapter, is on the relation between credit card limit and default payments and here we go with the plot. We have used, as for the age, a smooth line, with the x-axis (card limit) rescaled through \log_2 transformation to see top peaks less sparse.



This time it looks like for smaller limits we have higher percentages of defaults. We try to confirm this with an ex-post check on average credit card limits for defaults and non-defaults cases.

```
historic %>% group_by(Y) %>% summarize(rate = mean(X1), n = n())
```

```
## # A tibble: 2 x 3
##   Y     rate     n
##   <fct>   <dbl> <int>
## 1 0    177860. 18691
## 2 1    130052.  5308
```

The table confirms our intuition, since the average limit for default cases is lower. This indicates that, perhaps, who asks for an increase in her/his limit, has actually an even higher economic power than what conceded.

Model

We are now ready to build our model. We will exploit easiness of use of the caret package in order to apply different models to our predictors and then we will choose the best performing ones. Since every model will calculate its accuracy by performing cross-validation on bootstrap samples, we do not need to further split our historical dataset into train and test sets. We will tune, instead, the chosen models in case they had tuning parameters.

Since our categorical outcome (0 or 1 for credit card default, column Y) is unbalanced and contains a majority of non-defaults ($Y = 0$), the benchmark result required to be overperformed is the accuracy rate given by all predictions equal to zero. We keep track of it in a table.

```
zeros <- sample(0, nrow(historic), replace = TRUE, prob = 1)
benchmark <- mean(zeros == historic$Y)
benchmark
```

```
## [1] 0.7788241
```

In this sense, the ‘Kappa’ parameter of every model will be fundamental, being a parameter normalized on the expected accuracy, namely the random chance. It measure how many prediction we are getting correct on top of randomness: of course, the higher, the better.

In the previous chapter we have analysed some possible and curious relations between personal information such as gender or marital status and the probability of default payments. From now on, to make it simple, we will call the information we have previously decided to include in our model (gender, education level, marital status and also credit card limit, with the only exclusion of the age) personal information.

We notice that the remaining columns of the datasets that we have not analysed yet, may be clustered into three groups: monthly repayment status (from X6 to X11), monthly bills (from X12 to X17) and monthly payments (from X18 to X23). To summarise the information contained there, and also to reduce the number of predictors (hopefully, in a meaningful way), we add three columns to our table **historic**, called *sum_delays*, *billed_tot* and *paid_tot* calculated, respectively, as the sum of the columns from X6 to X11, from X12 to X17 and from X18 to X23.

```
historic <- historic %>% mutate(sum_delays = X6 + X7 + X8 + X9 + X10 + X11,
                                billed_tot = X12 + X13 + X14 + X15 + X16 + X17,
                                paid_tot = X18 + X19 + X20 + X21 + X22 + X23)
```

LDA and GamLoess

```
if (!require(readxl)) install.packages('gam')
library(gam)
```

```
## Loading required package: splines
## Loading required package: foreach
##
## Attaching package: 'foreach'
## The following objects are masked from 'package:purrr':
##
##   accumulate, when
## Loaded gam 1.16.1
```

We start (down)loading a necessary package for the next steps.

We are now ready to test the accuracy of a bunch of models on our predictors. We exclude, from the list of models, the K-nearest neighbors (“knn”) Quadratic Discriminant Analysis (“qda”), that have shown not to work on this kind of data, Adaboost, for computational time reasons, and, for the time being, Random Forest. We train the models on personal information, *sum_delays*, *billed_tot* and *paid_tot*, then we show how do they fit.

```
models <- c("glm", "lda", "naive_bayes", "svmLinear", "gamLoess", "multinom")
fits <- lapply(models, function(model){
  train(Y ~ X1 + X2 + X3 + X4 + sum_delays + billed_tot + paid_tot, method = model, data = histor

## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12257.193146
```

```

## iter 20 value 11623.478550
## iter 30 value 11622.841420
## final value 11622.839833
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12259.171189
## iter 20 value 11625.306036
## final value 11624.529371
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12257.084099
## iter 20 value 11623.480995
## iter 30 value 11622.867510
## iter 30 value 11622.867501
## iter 30 value 11622.867501
## final value 11622.867501
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12332.324174
## iter 20 value 11644.622918
## iter 30 value 11644.144849
## final value 11644.141386
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12346.636977
## iter 20 value 11645.875223
## final value 11645.415512
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12332.327329
## iter 20 value 11644.625601
## iter 30 value 11644.163856
## final value 11644.163582
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12203.424262
## iter 20 value 11468.593929
## iter 30 value 11467.836462
## final value 11467.833580
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12213.913909
## iter 20 value 11470.203713
## final value 11470.056162
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186

```

```

## iter 10 value 12203.567270
## iter 20 value 11468.595985
## iter 30 value 11467.863478
## final value 11467.863243
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12188.750330
## iter 20 value 11412.930619
## iter 30 value 11412.135742
## final value 11412.131700
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12198.430646
## iter 20 value 11414.337724
## final value 11414.287494
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12188.802171
## iter 20 value 11412.931765
## iter 30 value 11412.160021
## final value 11412.159644
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12198.800842
## iter 20 value 11528.874614
## iter 30 value 11525.159155
## final value 11525.142144
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12198.132533
## iter 20 value 11535.677401
## final value 11527.529636
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12198.746730
## iter 20 value 11528.845366
## iter 30 value 11525.176813
## final value 11525.167585
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12187.669215
## iter 20 value 11478.537595
## iter 30 value 11477.858469
## final value 11477.855408
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186

```

```

## iter 10 value 12199.460807
## iter 20 value 11479.631578
## final value 11479.599344
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12187.689721
## iter 20 value 11478.539192
## iter 30 value 11477.879657
## final value 11477.879459
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12434.453250
## iter 20 value 11689.749885
## iter 30 value 11688.855154
## final value 11688.851825
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12427.889458
## iter 20 value 11691.159285
## final value 11691.122701
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12433.164890
## iter 20 value 11689.618183
## iter 30 value 11688.875387
## final value 11688.875206
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12079.170218
## iter 20 value 11486.081983
## iter 30 value 11478.268677
## final value 11478.240168
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12094.458059
## iter 20 value 11482.176654
## final value 11481.810375
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12079.111619
## iter 20 value 11486.102633
## iter 30 value 11478.290892
## final value 11478.265786
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 11934.089944

```

```

## iter 20 value 11260.747045
## iter 30 value 11258.546513
## final value 11258.542057
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 11931.952568
## iter 20 value 11260.693160
## final value 11260.104306
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 11934.001369
## iter 20 value 11260.772033
## iter 30 value 11258.569014
## final value 11258.568523
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 11966.909066
## iter 20 value 11355.442437
## iter 30 value 11354.861722
## final value 11354.860402
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 11969.599865
## iter 20 value 11356.292458
## final value 11356.289683
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 11966.886092
## iter 20 value 11355.443815
## final value 11354.886772
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12301.927449
## iter 20 value 11544.927199
## iter 30 value 11544.188860
## final value 11544.186681
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12298.008127
## iter 20 value 11545.723519
## final value 11545.608331
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12301.929020
## iter 20 value 11544.925213
## iter 30 value 11544.213043

```

```

## iter 30 value 11544.213010
## iter 30 value 11544.213010
## final value 11544.213010
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12221.691507
## iter 20 value 11559.483822
## iter 30 value 11558.206641
## final value 11558.201865
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12219.529747
## iter 20 value 11562.132658
## final value 11561.991253
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12221.695140
## iter 20 value 11559.488056
## iter 30 value 11558.237152
## final value 11558.236414
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12130.186959
## iter 20 value 11418.900628
## iter 30 value 11418.341475
## final value 11418.340451
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12134.586128
## iter 20 value 11420.060196
## final value 11420.028428
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12130.189014
## iter 20 value 11418.902133
## final value 11418.366338
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12408.809213
## iter 20 value 11611.307156
## iter 30 value 11608.567344
## final value 11608.545862
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12414.321737
## iter 20 value 11617.704159

```



```

## final value 11611.670816
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12408.810750
## iter 20 value 11611.301696
## iter 30 value 11608.592127
## final value 11608.574728
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12149.855898
## iter 20 value 11459.481292
## iter 30 value 11456.711263
## final value 11456.702346
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12165.810027
## iter 20 value 11459.896483
## final value 11458.274388
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12149.820142
## iter 20 value 11459.460887
## iter 30 value 11456.730944
## final value 11456.727963
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12243.977380
## iter 20 value 11448.993473
## iter 30 value 11447.484171
## final value 11447.481060
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12247.429989
## iter 20 value 11449.998726
## final value 11449.985698
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12244.002036
## iter 20 value 11448.988762
## iter 30 value 11447.511209
## final value 11447.511079
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12261.513371
## iter 20 value 11582.126325
## iter 30 value 11581.426460

```

```

## final value 11581.424230
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12260.820616
## iter 20 value 11582.854365
## final value 11582.816561
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12261.717393
## iter 20 value 11582.133455
## iter 30 value 11581.450132
## iter 30 value 11581.450071
## iter 30 value 11581.450071
## final value 11581.450071
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 11909.902538
## iter 20 value 11283.980423
## iter 30 value 11282.978389
## final value 11282.974654
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 11922.876828
## iter 20 value 11286.087889
## final value 11285.060510
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 11909.905059
## iter 20 value 11283.982745
## iter 30 value 11283.002857
## final value 11283.002498
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12469.859859
## iter 20 value 11709.333424
## iter 30 value 11708.667957
## final value 11708.663525
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12483.599370
## iter 20 value 11710.913430
## final value 11710.407611
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12469.843013
## iter 20 value 11709.327475

```

```

## iter 30 value 11708.690025
## final value 11708.688895
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12010.270891
## iter 20 value 11270.516601
## iter 30 value 11264.198510
## final value 11264.182885
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12007.867066
## iter 20 value 11267.296868
## final value 11266.174912
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12010.272348
## iter 20 value 11270.518416
## iter 30 value 11264.213778
## final value 11264.205043
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12059.263389
## iter 20 value 11413.913876
## iter 30 value 11413.137929
## final value 11413.135832
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12070.614951
## iter 20 value 11414.841969
## final value 11414.813207
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12059.264902
## iter 20 value 11413.915164
## iter 30 value 11413.164274
## iter 30 value 11413.164249
## iter 30 value 11413.164249
## final value 11413.164249
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12434.583222
## iter 20 value 11624.248154
## iter 30 value 11623.575312
## final value 11623.574435
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186

```

```

## iter 10 value 12442.512939
## iter 20 value 11625.192325
## final value 11625.186679
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12434.584125
## iter 20 value 11624.249216
## final value 11623.603571
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12243.459517
## iter 20 value 11550.862759
## iter 30 value 11545.345942
## final value 11545.336939
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12258.956276
## iter 20 value 11547.794915
## final value 11547.740548
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12243.473372
## iter 20 value 11550.885532
## iter 30 value 11545.365246
## final value 11545.362122
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12076.637869
## iter 20 value 11436.095987
## iter 30 value 11435.702614
## final value 11435.701879
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12094.566148
## iter 20 value 11437.157295
## final value 11437.151950
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12076.640829
## iter 20 value 11436.097313
## final value 11435.724202
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12161.185526
## iter 20 value 11476.228419
## iter 30 value 11473.129402

```

```

## final value 11473.102636
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12160.662329
## iter 20 value 11477.260424
## final value 11474.368640
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12161.199638
## iter 20 value 11476.233882
## iter 30 value 11473.133898
## final value 11473.118415
## converged
## # weights: 16 (15 variable)
## initial value 16634.839186
## iter 10 value 12226.717508
## iter 20 value 11519.611241
## final value 11519.498842
## converged

```

```
fits
```

```

## [[1]]
## Generalized Linear Model
##
## 23999 samples
##      7 predictor
##      2 classes: '0', '1'
##
## No pre-processing
## Resampling: Bootstrapped (25 reps)
## Summary of sample sizes: 23999, 23999, 23999, 23999, 23999, 23999, ...
## Resampling results:
##
##   Accuracy   Kappa
##  0.7978622  0.1902544
##
## [[2]]
## Linear Discriminant Analysis
##
## 23999 samples
##      7 predictor
##      2 classes: '0', '1'
##
## No pre-processing
## Resampling: Bootstrapped (25 reps)
## Summary of sample sizes: 23999, 23999, 23999, 23999, 23999, 23999, ...
## Resampling results:
##
##   Accuracy   Kappa
##  0.8001971  0.2037555
##

```

```

##
## [[3]]
## Naive Bayes
##
## 23999 samples
##      7 predictor
##      2 classes: '0', '1'
##
## No pre-processing
## Resampling: Bootstrapped (25 reps)
## Summary of sample sizes: 23999, 23999, 23999, 23999, 23999, 23999, ...
## Resampling results across tuning parameters:
##
##   usekernel  Accuracy  Kappa
##   FALSE      0.4638491  0.1074483
##   TRUE       0.7924961  0.1782719
##
## Tuning parameter 'laplace' was held constant at a value of 0
## Tuning
##   parameter 'adjust' was held constant at a value of 1
## Accuracy was used to select the optimal model using the largest value.
## The final values used for the model were laplace = 0, usekernel = TRUE
##   and adjust = 1.
##
## [[4]]
## Support Vector Machines with Linear Kernel
##
## 23999 samples
##      7 predictor
##      2 classes: '0', '1'
##
## No pre-processing
## Resampling: Bootstrapped (25 reps)
## Summary of sample sizes: 23999, 23999, 23999, 23999, 23999, 23999, ...
## Resampling results:
##
##   Accuracy  Kappa
##   0.779431  0
##
## Tuning parameter 'C' was held constant at a value of 1
##
## [[5]]
## Generalized Additive Model using LOESS
##
## 23999 samples
##      7 predictor
##      2 classes: '0', '1'
##
## No pre-processing
## Resampling: Bootstrapped (25 reps)
## Summary of sample sizes: 23999, 23999, 23999, 23999, 23999, 23999, ...
## Resampling results:
##
##   Accuracy  Kappa

```

```
## 0.8041367 0.2797089
##
## Tuning parameter 'span' was held constant at a value of 0.5
## Tuning
## parameter 'degree' was held constant at a value of 1
##
## [[6]]
## Penalized Multinomial Regression
##
## 23999 samples
## 7 predictor
## 2 classes: '0', '1'
##
## No pre-processing
## Resampling: Bootstrapped (25 reps)
## Summary of sample sizes: 23999, 23999, 23999, 23999, 23999, 23999, ...
## Resampling results across tuning parameters:
##
## decay Accuracy Kappa
## 0e+00 0.7969955 0.1873713
## 1e-04 0.7969955 0.1873713
## 1e-01 0.7970002 0.1873657
##
## Accuracy was used to select the optimal model using the largest value.
## The final value used for the model was decay = 0.1.
```

We see that the best models in terms of accuracy and kappa are Linear Discriminant Analysis (“lda”) and Generalized Additive Model using LOESS (“gamLoess”): both of them overperform our benchmark accuracy. While the former has no tuning parameters because already construct to maximize the accuracy, the latter can be further improved. We therefore set a range for the parameter ‘span’ from 0.3 to 0.7 (default is 0.5), while we keep the degree at 1 (default value). We plot the result.

```
gridloess <- expand.grid(span = seq(0.3, 0.7, len = 5), degree = 1)
train_gamloess <- train(Y ~ X1 + X2 + X3 + X4 + sum_delays + billed_tot + paid_tot,
                        method = "gamLoess", data = historic, tuneGrid = gridloess)
```

```
## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
```



```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 2.3257e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 3.3113e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 2.3257e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 3.3113e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 2.3257e+006

```

```

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 3.3113e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, :
## upperlimit 2.3257e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, : eval
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## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## upperlimit 3.3113e+006

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
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## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, :
## upperlimit 2.3257e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

```

```

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## upperlimit 3.3113e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(X1, span = 0.3, degree = 1)"]], z, w, span = 0.3, :
## eval 8e+005

## Warning in gam.lo(data[["lo(X1, span = 0.3, degree = 1)"]], z, w, span = 0.3, :
## upperlimit 7.8385e+005

## Warning in gam.lo(data[["lo(X1, span = 0.3, degree = 1)"]], z, w, span = 0.3, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(X1, span = 0.3, degree = 1)"]], z, w, span = 0.3, :
## eval 8e+005

## Warning in gam.lo(data[["lo(X1, span = 0.3, degree = 1)"]], z, w, span = 0.3, :
## upperlimit 7.8385e+005

## Warning in gam.lo(data[["lo(X1, span = 0.3, degree = 1)"]], z, w, span = 0.3, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 3.1663e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 3.2931e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 3.1663e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
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## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
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## too small. (Discovered by lowesd)  
  
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
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## too small. (Discovered by lowesd)  
  
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## too small. (Discovered by lowesd)
```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, :
## lo.wam convergence not obtained in 30 iterations

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

```



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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

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## too small. (Discovered by lowesd)

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## lo.wam convergence not obtained in 30 iterations

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
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## lo.wam convergence not obtained in 30 iterations

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## too small. (Discovered by lowesd)

```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, :
## lo.wam convergence not obtained in 30 iterations

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

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## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, :
## lo.wam convergence not obtained in 30 iterations

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

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## too small. (Discovered by lowesd)

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## lo.wam convergence not obtained in 30 iterations

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, :
## lo.wam convergence not obtained in 30 iterations

```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

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## lo.wam convergence not obtained in 30 iterations

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## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, :
## lo.wam convergence not obtained in 30 iterations

## Warning in gam.lo(data[["lo(X1, span = 0.4, degree = 1)"]], z, w, span = 0.4, :
## eval 8e+005

## Warning in gam.lo(data[["lo(X1, span = 0.4, degree = 1)"]], z, w, span = 0.4, :
## upperlimit 7.8385e+005

## Warning in gam.lo(data[["lo(X1, span = 0.4, degree = 1)"]], z, w, span = 0.4, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(X1, span = 0.4, degree = 1)"]], z, w, span = 0.4, :
## eval 8e+005

## Warning in gam.lo(data[["lo(X1, span = 0.4, degree = 1)"]], z, w, span = 0.4, :
## upperlimit 7.8385e+005

## Warning in gam.lo(data[["lo(X1, span = 0.4, degree = 1)"]], z, w, span = 0.4, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 3.1663e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, : eval
## 3.2931e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 3.1663e+006

```

```

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
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## too small. (Discovered by lowesd)  
  
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## too small. (Discovered by lowesd)  
  
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## too small. (Discovered by lowesd)  
  
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## too small. (Discovered by lowesd)  
  
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## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, :
## lo.wam convergence not obtained in 30 iterations

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

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## lo.wam convergence not obtained in 30 iterations

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```



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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, :
## lo.wam convergence not obtained in 30 iterations

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## lo.wam convergence not obtained in 30 iterations

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```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, :
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## lo.wam convergence not obtained in 30 iterations

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## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, :
## lo.wam convergence not obtained in 30 iterations

```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, :
## lo.wam convergence not obtained in 30 iterations

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, :
## lo.wam convergence not obtained in 30 iterations

## Warning in gam.lo(data[["lo(X1, span = 0.5, degree = 1)"]], z, w, span = 0.5, :
## eval 8e+005

## Warning in gam.lo(data[["lo(X1, span = 0.5, degree = 1)"]], z, w, span = 0.5, :
## upperlimit 7.8385e+005

## Warning in gam.lo(data[["lo(X1, span = 0.5, degree = 1)"]], z, w, span = 0.5, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(X1, span = 0.5, degree = 1)"]], z, w, span = 0.5, :
## eval 8e+005

## Warning in gam.lo(data[["lo(X1, span = 0.5, degree = 1)"]], z, w, span = 0.5, :
## upperlimit 7.8385e+005

## Warning in gam.lo(data[["lo(X1, span = 0.5, degree = 1)"]], z, w, span = 0.5, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 3.1663e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, : eval
## 3.2931e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 3.1663e+006

```

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## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
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## too small. (Discovered by lowesd)  
  
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
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```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
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## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

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## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, :
## lo.wam convergence not obtained in 30 iterations

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, :
## lo.wam convergence not obtained in 30 iterations

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, :
## lo.wam convergence not obtained in 30 iterations

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

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## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

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## lo.wam convergence not obtained in 30 iterations

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

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## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

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## too small. (Discovered by lowesd)

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## too small. (Discovered by lowesd)

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## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, :
## lo.wam convergence not obtained in 30 iterations

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## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

```



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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, :
## lo.wam convergence not obtained in 30 iterations

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, :
## lo.wam convergence not obtained in 30 iterations

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, :
## lo.wam convergence not obtained in 30 iterations

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, :
## lo.wam convergence not obtained in 30 iterations

```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, :
## lo.wam convergence not obtained in 30 iterations

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, :
## lo.wam convergence not obtained in 30 iterations

## Warning in gam.lo(data[["lo(X1, span = 0.6, degree = 1)"]], z, w, span = 0.6, :
## eval 8e+005

## Warning in gam.lo(data[["lo(X1, span = 0.6, degree = 1)"]], z, w, span = 0.6, :
## upperlimit 7.8385e+005

## Warning in gam.lo(data[["lo(X1, span = 0.6, degree = 1)"]], z, w, span = 0.6, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(X1, span = 0.6, degree = 1)"]], z, w, span = 0.6, :
## eval 8e+005

## Warning in gam.lo(data[["lo(X1, span = 0.6, degree = 1)"]], z, w, span = 0.6, :
## upperlimit 7.8385e+005

## Warning in gam.lo(data[["lo(X1, span = 0.6, degree = 1)"]], z, w, span = 0.6, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## upperlimit 3.1663e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, : eval
## 3.2931e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## upperlimit 3.1663e+006

```

```

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```



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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, :
## lo.wam convergence not obtained in 30 iterations

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, :
## lo.wam convergence not obtained in 30 iterations

```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, :
## lo.wam convergence not obtained in 30 iterations

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, :
## lo.wam convergence not obtained in 30 iterations

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## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, :
## lo.wam convergence not obtained in 30 iterations

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

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## lo.wam convergence not obtained in 30 iterations

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, :
## lo.wam convergence not obtained in 30 iterations

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, :
## lo.wam convergence not obtained in 30 iterations

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

```



```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, :
## lo.wam convergence not obtained in 30 iterations

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, :
## lo.wam convergence not obtained in 30 iterations

## Warning in gam.lo(data[["lo(X1, span = 0.7, degree = 1)"]], z, w, span = 0.7, :
## eval 8e+005

## Warning in gam.lo(data[["lo(X1, span = 0.7, degree = 1)"]], z, w, span = 0.7, :
## upperlimit 7.8385e+005

## Warning in gam.lo(data[["lo(X1, span = 0.7, degree = 1)"]], z, w, span = 0.7, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(X1, span = 0.7, degree = 1)"]], z, w, span = 0.7, :
## eval 8e+005

## Warning in gam.lo(data[["lo(X1, span = 0.7, degree = 1)"]], z, w, span = 0.7, :
## upperlimit 7.8385e+005

## Warning in gam.lo(data[["lo(X1, span = 0.7, degree = 1)"]], z, w, span = 0.7, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## upperlimit 3.1663e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, : eval
## 3.2931e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## upperlimit 3.1663e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(sum_delays, span = 0.3, degree = 1)"]], z, w, : eval
## 36

## Warning in gam.lo(data[["lo(sum_delays, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 33.225

## Warning in gam.lo(data[["lo(sum_delays, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(sum_delays, span = 0.4, degree = 1)"]], z, w, : eval
## 36

## Warning in gam.lo(data[["lo(sum_delays, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 33.225

## Warning in gam.lo(data[["lo(sum_delays, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)
```



```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```
## Warning in gam.lo(data[["lo(sum_delays, span = 0.5, degree = 1)"]], z, w, : eval  
## 36  
  
## Warning in gam.lo(data[["lo(sum_delays, span = 0.5, degree = 1)"]], z, w, :  
## upperlimit 33.225  
  
## Warning in gam.lo(data[["lo(sum_delays, span = 0.5, degree = 1)"]], z, w, :  
## extrapolation not allowed with blending  
  
## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument  
## ignored  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)
```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(sum_delays, span = 0.6, degree = 1)"]], z, w, : eval
## 36

## Warning in gam.lo(data[["lo(sum_delays, span = 0.6, degree = 1)"]], z, w, :
## upperlimit 33.225

## Warning in gam.lo(data[["lo(sum_delays, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)
```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
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## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```



```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(sum_delays, span = 0.7, degree = 1)"]], z, w, : eval
## 36
```

```

## Warning in gam.lo(data[["lo(sum_delays, span = 0.7, degree = 1)"]], z, w, :
## upperlimit 33.225

## Warning in gam.lo(data[["lo(sum_delays, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

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## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(sum_delays, span = 0.3, degree = 1)"]], z, w, : eval
## 36

## Warning in gam.lo(data[["lo(sum_delays, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 33.225

## Warning in gam.lo(data[["lo(sum_delays, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 2.3142e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(sum_delays, span = 0.4, degree = 1)"]], z, w, : eval
## 36

## Warning in gam.lo(data[["lo(sum_delays, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 33.225

## Warning in gam.lo(data[["lo(sum_delays, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, : eval
## 2.3142e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)
```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(sum_delays, span = 0.5, degree = 1)"]], z, w, : eval
## 36

## Warning in gam.lo(data[["lo(sum_delays, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 33.225
```

```

## Warning in gam.lo(data[["lo(sum_delays, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, : eval
## 2.3142e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```



```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(sum_delays, span = 0.6, degree = 1)"]], z, w, : eval
## 36

## Warning in gam.lo(data[["lo(sum_delays, span = 0.6, degree = 1)"]], z, w, :
## upperlimit 33.225

## Warning in gam.lo(data[["lo(sum_delays, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, : eval
## 2.3142e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

```



```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(sum_delays, span = 0.7, degree = 1)"]], z, w, : eval
## 36

## Warning in gam.lo(data[["lo(sum_delays, span = 0.7, degree = 1)"]], z, w, :
## upperlimit 33.225

## Warning in gam.lo(data[["lo(sum_delays, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, : eval
## 2.3142e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
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## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
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```

```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval
## -3.3626e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## lowerlimit -1.4149e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 3.4655e+006

```

```

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 3.0916e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 3.1123e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 3.0916e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 3.1275e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 3.0916e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 3.2931e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 3.0916e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 3.1488e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 3.0916e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

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```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, : eval
## -3.3626e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## lowerlimit -1.4149e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, : eval
## 3.4655e+006

```

```

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 3.0916e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, : eval
## 3.1123e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 3.0916e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, : eval
## 3.1275e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 3.0916e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, : eval
## 3.2931e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 3.0916e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, : eval
## 3.1488e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 3.0916e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

```



```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, : eval
## -3.3626e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## lowerlimit -1.4149e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 3.0916e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, : eval
## 3.1123e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 3.0916e+006

```

```
## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :  
## extrapolation not allowed with blending  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, : eval  
## 3.1275e+006  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :  
## upperlimit 3.0916e+006  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :  
## extrapolation not allowed with blending  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, : eval  
## 3.2931e+006  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :  
## upperlimit 3.0916e+006  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :  
## extrapolation not allowed with blending  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, : eval  
## 3.1488e+006  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :  
## upperlimit 3.0916e+006  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :  
## extrapolation not allowed with blending  
## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument  
## ignored  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, : eval
## -3.3626e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## lowerlimit -1.4149e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## upperlimit 3.0916e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, : eval
## 3.1123e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## upperlimit 3.0916e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, : eval
## 3.1275e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## upperlimit 3.0916e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, : eval
## 3.2931e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## upperlimit 3.0916e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, : eval
## 3.1488e+006

```

```
## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :  
## upperlimit 3.0916e+006  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :  
## extrapolation not allowed with blending  
  
## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument  
## ignored  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, : eval
## -3.3626e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## lowerlimit -1.4149e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## upperlimit 3.0916e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, : eval
## 3.1123e+006

```

```
## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :  
## upperlimit 3.0916e+006  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :  
## extrapolation not allowed with blending  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, : eval  
## 3.1275e+006  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :  
## upperlimit 3.0916e+006  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :  
## extrapolation not allowed with blending  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, : eval  
## 3.2931e+006  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :  
## upperlimit 3.0916e+006  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :  
## extrapolation not allowed with blending  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, : eval  
## 3.1488e+006  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :  
## upperlimit 3.0916e+006  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :  
## extrapolation not allowed with blending  
  
## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument  
## ignored  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)
```



```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(sum_delays, span = 0.3, degree = 1)"]], z, w, : eval
## 36

## Warning in gam.lo(data[["lo(sum_delays, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 33.225

## Warning in gam.lo(data[["lo(sum_delays, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval
## -3.3626e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## lowerlimit -97255

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval
## -1.2548e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## lowerlimit -97255

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)
```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(sum_delays, span = 0.4, degree = 1)"]], z, w, : eval
## 36

## Warning in gam.lo(data[["lo(sum_delays, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 33.225

## Warning in gam.lo(data[["lo(sum_delays, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, : eval
## -3.3626e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## lowerlimit -97255

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, : eval
## -1.2548e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## lowerlimit -97255

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)
```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(sum_delays, span = 0.5, degree = 1)"]], z, w, : eval
## 36

## Warning in gam.lo(data[["lo(sum_delays, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 33.225

## Warning in gam.lo(data[["lo(sum_delays, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, : eval
## -3.3626e+005

```

```

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## lowerlimit -97255

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, : eval
## -1.2548e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## lowerlimit -97255

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```



```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(sum_delays, span = 0.6, degree = 1)"]], z, w, : eval
## 36

## Warning in gam.lo(data[["lo(sum_delays, span = 0.6, degree = 1)"]], z, w, :
## upperlimit 33.225

## Warning in gam.lo(data[["lo(sum_delays, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, : eval
## -3.3626e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## lowerlimit -97255

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, : eval
## -1.2548e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## lowerlimit -97255

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

```

[illegible]

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(sum_delays, span = 0.7, degree = 1)"]], z, w, : eval
## 36

## Warning in gam.lo(data[["lo(sum_delays, span = 0.7, degree = 1)"]], z, w, :
## upperlimit 33.225

## Warning in gam.lo(data[["lo(sum_delays, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, : eval
## -3.3626e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## lowerlimit -97255

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, : eval
## -1.2548e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## lowerlimit -97255

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 3.3113e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 3.3113e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```



```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

[illegible]

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## upperlimit 3.3113e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## upperlimit 3.3113e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval
## -3.3626e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## lowerlimit -1.4343e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)
```



```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, : eval
## -3.3626e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## lowerlimit -1.4343e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, : eval
## -3.3626e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## lowerlimit -1.4343e+005
```

```

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, : eval
## -3.3626e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## lowerlimit -1.4343e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, : eval
## -3.3626e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## lowerlimit -1.4343e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```



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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 2.3142e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 3.3113e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, : eval
## 2.3142e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 3.3113e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
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## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
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## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, : eval
## 2.3142e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 3.3113e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, : eval
## 2.3142e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

```

```
## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, : eval  
## 3.7641e+006  
  
## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, :  
## upperlimit 1.9058e+006  
  
## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, :  
## extrapolation not allowed with blending  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, : eval  
## 3.4655e+006  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :  
## upperlimit 3.3113e+006  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :  
## extrapolation not allowed with blending  
  
## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument  
## ignored  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
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```



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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)
```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, : eval
## 2.3142e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## upperlimit 3.3113e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)
```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 2.3257e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)
```



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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 2.3257e+006

```

```

## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
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## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
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## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 2.3257e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)
```



```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, :
## upperlimit 2.3257e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```



```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, :
## upperlimit 2.3257e+006

```

```

## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(sum_delays, span = 0.3, degree = 1)"]], z, w, : eval
## 36

## Warning in gam.lo(data[["lo(sum_delays, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 33.225

## Warning in gam.lo(data[["lo(sum_delays, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 3.3113e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(sum_delays, span = 0.4, degree = 1)"]], z, w, : eval
## 36

## Warning in gam.lo(data[["lo(sum_delays, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 33.225

## Warning in gam.lo(data[["lo(sum_delays, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 3.3113e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(sum_delays, span = 0.5, degree = 1)"]], z, w, : eval
## 36

## Warning in gam.lo(data[["lo(sum_delays, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 33.225

## Warning in gam.lo(data[["lo(sum_delays, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

```


[illegible]

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(sum_delays, span = 0.6, degree = 1)"]], z, w, : eval
## 36

## Warning in gam.lo(data[["lo(sum_delays, span = 0.6, degree = 1)"]], z, w, :
## upperlimit 33.225

```

```

## Warning in gam.lo(data[["lo(sum_delays, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## upperlimit 3.3113e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)
```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in gam.lo(data[["lo(sum_delays, span = 0.7, degree = 1)"]], z, w, : eval  
## 36
```



```

## Warning in gam.lo(data[["lo(sum_delays, span = 0.7, degree = 1)"]], z, w, :
## upperlimit 33.225

## Warning in gam.lo(data[["lo(sum_delays, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## upperlimit 3.3113e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```
## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, : eval  
## 3.7641e+006  
  
## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, :  
## upperlimit 2.3257e+006  
  
## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, :  
## extrapolation not allowed with blending  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval  
## 3.4655e+006  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :  
## upperlimit 3.3113e+006  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :  
## extrapolation not allowed with blending  
  
## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument  
## ignored  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 2.3257e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

```

```
## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, : eval  
## 3.4655e+006  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :  
## upperlimit 3.3113e+006  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :  
## extrapolation not allowed with blending  
  
## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument  
## ignored  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 2.3257e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 3.3113e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

```

[illegible]

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, :
## upperlimit 2.3257e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## upperlimit 3.3113e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

```



```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)
```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)
```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, :
## upperlimit 2.3257e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## upperlimit 3.3113e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 2.3257e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```



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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 2.3257e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 2.3257e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
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## too small. (Discovered by lowesd)  
  
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, :
## upperlimit 2.3257e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

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## too small. (Discovered by lowesd)

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## too small. (Discovered by lowesd)

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## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
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## too small. (Discovered by lowesd)  
  
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## too small. (Discovered by lowesd)  
  
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
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## too small. (Discovered by lowesd)
```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
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```



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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
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```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

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## too small. (Discovered by lowesd)

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## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, :
## upperlimit 2.3257e+006

```

```

## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## too small. (Discovered by lowesd)

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## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

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## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
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## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 2.3142e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, : eval
## 2.3142e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

```

```
## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, : eval  
## 3.7641e+006  
  
## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, :  
## upperlimit 1.9058e+006  
  
## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, :  
## extrapolation not allowed with blending  
  
## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument  
## ignored  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)
```



```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, : eval
## 2.3142e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)
```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)
```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, : eval
## 2.3142e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, : eval  
## 2.3142e+006  
  
## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, :  
## upperlimit 1.9058e+006  
  
## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, :  
## extrapolation not allowed with blending  
  
## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, : eval  
## 3.7641e+006  
  
## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, :  
## upperlimit 1.9058e+006  
  
## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, :  
## extrapolation not allowed with blending  
  
## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument  
## ignored  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
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## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval
## -3.3626e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## lowerlimit -97255

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

```

```
## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval  
## -1.2548e+005  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :  
## lowerlimit -97255  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :  
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## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, : eval
## -3.3626e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## lowerlimit -97255

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
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## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, : eval
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, : eval
## -3.3626e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## lowerlimit -97255

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, : eval
## -1.2548e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## lowerlimit -97255

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
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## too small. (Discovered by lowesd)
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## too small. (Discovered by lowesd)  
  
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## too small. (Discovered by lowesd)  
  
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## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
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## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, : eval
## -3.3626e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## lowerlimit -97255

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, : eval
## -1.2548e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## lowerlimit -97255

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 2.3142e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

```

```

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
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```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
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## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, : eval  
## 2.3142e+006  
  
## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, :  
## upperlimit 1.9058e+006  
  
## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, :  
## extrapolation not allowed with blending  
  
## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, : eval  
## 3.7641e+006  
  
## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, :  
## upperlimit 1.9058e+006  
  
## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, :  
## extrapolation not allowed with blending  
  
## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument  
## ignored  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
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## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)
```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
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## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
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## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```



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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, : eval
## 2.3142e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, : eval
## 3.7641e+006

```

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## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, : eval
## 2.3142e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
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```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
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## too small. (Discovered by lowesd)  
  
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, : eval
## 2.3142e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

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## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
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```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```



```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(sum_delays, span = 0.3, degree = 1)"]], z, w, : eval
## 36

## Warning in gam.lo(data[["lo(sum_delays, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 33.225

## Warning in gam.lo(data[["lo(sum_delays, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 3.3113e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)
```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(sum_delays, span = 0.4, degree = 1)"]], z, w, : eval
## 36

## Warning in gam.lo(data[["lo(sum_delays, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 33.225
```

```

## Warning in gam.lo(data[["lo(sum_delays, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 3.3113e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(sum_delays, span = 0.5, degree = 1)"]], z, w, : eval
## 36

## Warning in gam.lo(data[["lo(sum_delays, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 33.225

## Warning in gam.lo(data[["lo(sum_delays, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 3.3113e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
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## too small. (Discovered by lowesd)  
  
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## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(sum_delays, span = 0.6, degree = 1)"]], z, w, : eval
## 36

## Warning in gam.lo(data[["lo(sum_delays, span = 0.6, degree = 1)"]], z, w, :
## upperlimit 33.225

## Warning in gam.lo(data[["lo(sum_delays, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## upperlimit 3.3113e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

```



```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)
```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(sum_delays, span = 0.7, degree = 1)"]], z, w, : eval
## 36

## Warning in gam.lo(data[["lo(sum_delays, span = 0.7, degree = 1)"]], z, w, :
## upperlimit 33.225

## Warning in gam.lo(data[["lo(sum_delays, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## upperlimit 3.3113e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval
## -3.3626e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## lowerlimit -1.4174e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

```



```
## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 3.1438e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 3.2931e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 3.1438e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 3.1488e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 3.1438e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, : eval
## -3.3626e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## lowerlimit -1.4174e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, : eval
## 3.4655e+006

```

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## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 3.1438e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, : eval
## 3.2931e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 3.1438e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, : eval
## 3.1488e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 3.1438e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, : eval
## -3.3626e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## lowerlimit -1.4174e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 3.1438e+006
```

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## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, : eval
## 3.2931e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 3.1438e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, : eval
## 3.1488e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 3.1438e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, : eval
## -3.3626e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## lowerlimit -1.4174e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## upperlimit 3.1438e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, : eval
## 3.2931e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## upperlimit 3.1438e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, : eval
## 3.1488e+006

```

```
## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :  
## upperlimit 3.1438e+006  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :  
## extrapolation not allowed with blending  
  
## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument  
## ignored  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
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## too small. (Discovered by lowesd)  
  
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## too small. (Discovered by lowesd)  
  
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
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## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```



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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
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```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
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## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)
```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, : eval
## -3.3626e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## lowerlimit -1.4174e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

```

```
## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, : eval  
## 3.4655e+006  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :  
## upperlimit 3.1438e+006  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :  
## extrapolation not allowed with blending  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, : eval  
## 3.2931e+006  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :  
## upperlimit 3.1438e+006  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :  
## extrapolation not allowed with blending  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, : eval  
## 3.1488e+006  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :  
## upperlimit 3.1438e+006  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :  
## extrapolation not allowed with blending  
  
## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument  
## ignored  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)
```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval
## -3.3626e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## lowerlimit -1.4343e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```



```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, : eval
## -3.3626e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## lowerlimit -1.4343e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

```

[illegible]

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, : eval
## -3.3626e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## lowerlimit -1.4343e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, : eval
## -3.3626e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## lowerlimit -1.4343e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, : eval
## -3.3626e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## lowerlimit -1.4343e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

```



```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 2.3142e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval
## -3.3626e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## lowerlimit -95305

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 3.0913e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 3.1123e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 3.0913e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 3.1275e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 3.0913e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval
## -1.2548e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## lowerlimit -95305

```

```

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 3.2931e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 3.0913e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 3.1488e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 3.0913e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, : eval
## 2.3142e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, : eval
## -3.3626e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## lowerlimit -95305

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, : eval
## 3.4655e+006

```

```

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 3.0913e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, : eval
## 3.1123e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 3.0913e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, : eval
## 3.1275e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 3.0913e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, : eval
## -1.2548e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## lowerlimit -95305

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, : eval
## 3.2931e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 3.0913e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, : eval
## 3.1488e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 3.0913e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
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## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, : eval
## 2.3142e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, : eval
## -3.3626e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## lowerlimit -95305

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 3.0913e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, : eval
## 3.1123e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 3.0913e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, : eval
## 3.1275e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 3.0913e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, : eval
## -1.2548e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## lowerlimit -95305

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

```

```

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, : eval
## 3.2931e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 3.0913e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, : eval
## 3.1488e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 3.0913e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## too small. (Discovered by lowesd)

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## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

```



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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## too small. (Discovered by lowesd)

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## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, : eval
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## upperlimit 1.9058e+006

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## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, : eval
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## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## lowerlimit -95305

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## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
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## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, : eval
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## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## upperlimit 3.0913e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, : eval
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## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
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## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
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## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, : eval
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## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, : eval
## 2.3142e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, :
## upperlimit 1.9058e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, : eval
## -3.3626e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## lowerlimit -95305

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, : eval
## 3.4655e+006

```



```

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## upperlimit 3.0913e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, : eval
## 3.1123e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## upperlimit 3.0913e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, : eval
## 3.1275e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## upperlimit 3.0913e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, : eval
## -1.2548e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## lowerlimit -95305

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, : eval
## 3.2931e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## upperlimit 3.0913e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, : eval
## 3.1488e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## upperlimit 3.0913e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(sum_delays, span = 0.3, degree = 1)"]], z, w, : eval
## 36

## Warning in gam.lo(data[["lo(sum_delays, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 33.225

## Warning in gam.lo(data[["lo(sum_delays, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 2.3257e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval
## -3.3626e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## lowerlimit -1.4257e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 3.3102e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

```



```
## Warning in gam.lo(data[["lo(sum_delays, span = 0.4, degree = 1)"]], z, w, :  
## upperlimit 33.225  
  
## Warning in gam.lo(data[["lo(sum_delays, span = 0.4, degree = 1)"]], z, w, :  
## extrapolation not allowed with blending  
  
## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, : eval  
## 3.7641e+006  
  
## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, :  
## upperlimit 2.3257e+006  
  
## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, :  
## extrapolation not allowed with blending  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, : eval  
## -3.3626e+005  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :  
## lowerlimit -1.4257e+005  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :  
## extrapolation not allowed with blending  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, : eval  
## 3.4655e+006  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :  
## upperlimit 3.3102e+006  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :  
## extrapolation not allowed with blending  
  
## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument  
## ignored  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(sum_delays, span = 0.5, degree = 1)"]], z, w, : eval
## 36

## Warning in gam.lo(data[["lo(sum_delays, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 33.225

## Warning in gam.lo(data[["lo(sum_delays, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 2.3257e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

```

```

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, : eval
## -3.3626e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## lowerlimit -1.4257e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 3.3102e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(sum_delays, span = 0.6, degree = 1)"]], z, w, : eval
## 36

## Warning in gam.lo(data[["lo(sum_delays, span = 0.6, degree = 1)"]], z, w, :
## upperlimit 33.225

## Warning in gam.lo(data[["lo(sum_delays, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, :
## upperlimit 2.3257e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, : eval
## -3.3626e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## lowerlimit -1.4257e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## upperlimit 3.3102e+006

```



```

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(sum_delays, span = 0.7, degree = 1)"]], z, w, : eval
## 36

## Warning in gam.lo(data[["lo(sum_delays, span = 0.7, degree = 1)"]], z, w, :
## upperlimit 33.225

## Warning in gam.lo(data[["lo(sum_delays, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, :
## upperlimit 2.3257e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, : eval
## -3.3626e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## lowerlimit -1.4257e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## upperlimit 3.3102e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

```

[illegible]

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 3.1663e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 3.2931e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 3.1663e+006

```

```

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 3.1663e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, : eval
## 3.2931e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 3.1663e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```



```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 3.1663e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, : eval
## 3.2931e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 3.1663e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## too small. (Discovered by lowesd)  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, : eval  
## 3.4655e+006  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :  
## upperlimit 3.1663e+006  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :  
## extrapolation not allowed with blending  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, : eval  
## 3.2931e+006  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :  
## upperlimit 3.1663e+006  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :  
## extrapolation not allowed with blending  
  
## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument  
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
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## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## upperlimit 3.1663e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, : eval
## 3.2931e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## upperlimit 3.1663e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 2.3257e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 3.1663e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

```

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## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 3.2931e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 3.1663e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 2.3257e+006

```

```

## Warning in gam.lo(data[["lo(paid_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 3.1663e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, : eval
## 3.2931e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 3.1663e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```



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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 2.3257e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 3.1663e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, : eval
## 3.2931e+006

```

```
## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :  
## upperlimit 3.1663e+006  
  
## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :  
## extrapolation not allowed with blending  
  
## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument  
## ignored  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)
```

```

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, : eval
## 3.7641e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, :
## upperlimit 2.3257e+006

## Warning in gam.lo(data[["lo(paid_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, : eval
## 3.4655e+006

```

```

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## upperlimit 3.1663e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, : eval
## 3.2931e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## upperlimit 3.1663e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## too small. (Discovered by lowesd)

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## Warning in gam.lo(data[["lo(paid_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, : eval
## 3.4655e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## upperlimit 3.1663e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, : eval
## 3.2931e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## upperlimit 3.1663e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
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## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
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## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
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## too small. (Discovered by lowesd)  
  
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
## too small. (Discovered by lowesd)
```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

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## too small. (Discovered by lowesd)

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(sum_delays, span = 0.3, degree = 1)"]], z, w, : eval
## 36

## Warning in gam.lo(data[["lo(sum_delays, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 33.225

## Warning in gam.lo(data[["lo(sum_delays, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval
## -3.3626e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## lowerlimit -83036

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval
## -1.2548e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## lowerlimit -83036

```



```

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
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## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in gam.lo(data[["lo(sum_delays, span = 0.4, degree = 1)"]], z, w, : eval
## 36

## Warning in gam.lo(data[["lo(sum_delays, span = 0.4, degree = 1)"]], z, w, :
## upperlimit 33.225

## Warning in gam.lo(data[["lo(sum_delays, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, : eval
## -3.3626e+005

```

```

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## lowerlimit -83036

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, : eval
## -1.2548e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
## lowerlimit -83036

## Warning in gam.lo(data[["lo(billed_tot, span = 0.4, degree = 1)"]], z, w, :
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## ignored

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## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## too small. (Discovered by lowesd)

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
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## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in gam.lo(data[["lo(sum_delays, span = 0.5, degree = 1)"]], z, w, : eval
## 36

## Warning in gam.lo(data[["lo(sum_delays, span = 0.5, degree = 1)"]], z, w, :
## upperlimit 33.225

## Warning in gam.lo(data[["lo(sum_delays, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, : eval
## -3.3626e+005

```

```

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## lowerlimit -83036

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.5, degree = 1)"]], z, w, : eval
## -1.2548e+005

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## lowerlimit -83036

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## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
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```

```

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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv
## too small. (Discovered by lowesd)

## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv
## too small. (Discovered by lowesd)

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## 36

## Warning in gam.lo(data[["lo(sum_delays, span = 0.6, degree = 1)"]], z, w, :
## upperlimit 33.225

## Warning in gam.lo(data[["lo(sum_delays, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, : eval
## -3.3626e+005

```

```

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## lowerlimit -83036

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, : eval
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## Warning in gam.lo(data[["lo(billed_tot, span = 0.6, degree = 1)"]], z, w, :
## lowerlimit -83036

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```

```
## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : lv  
## too small. (Discovered by lowesd)  
  
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## Warning in lo.wam(x, z, wz, fit$smooth, which, fit$smooth.frame, bf.maxit, : liv  
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```

```

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## upperlimit 33.225

## Warning in gam.lo(data[["lo(sum_delays, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, : eval
## -3.3626e+005

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## lowerlimit -83036

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, : eval
## -1.2548e+005

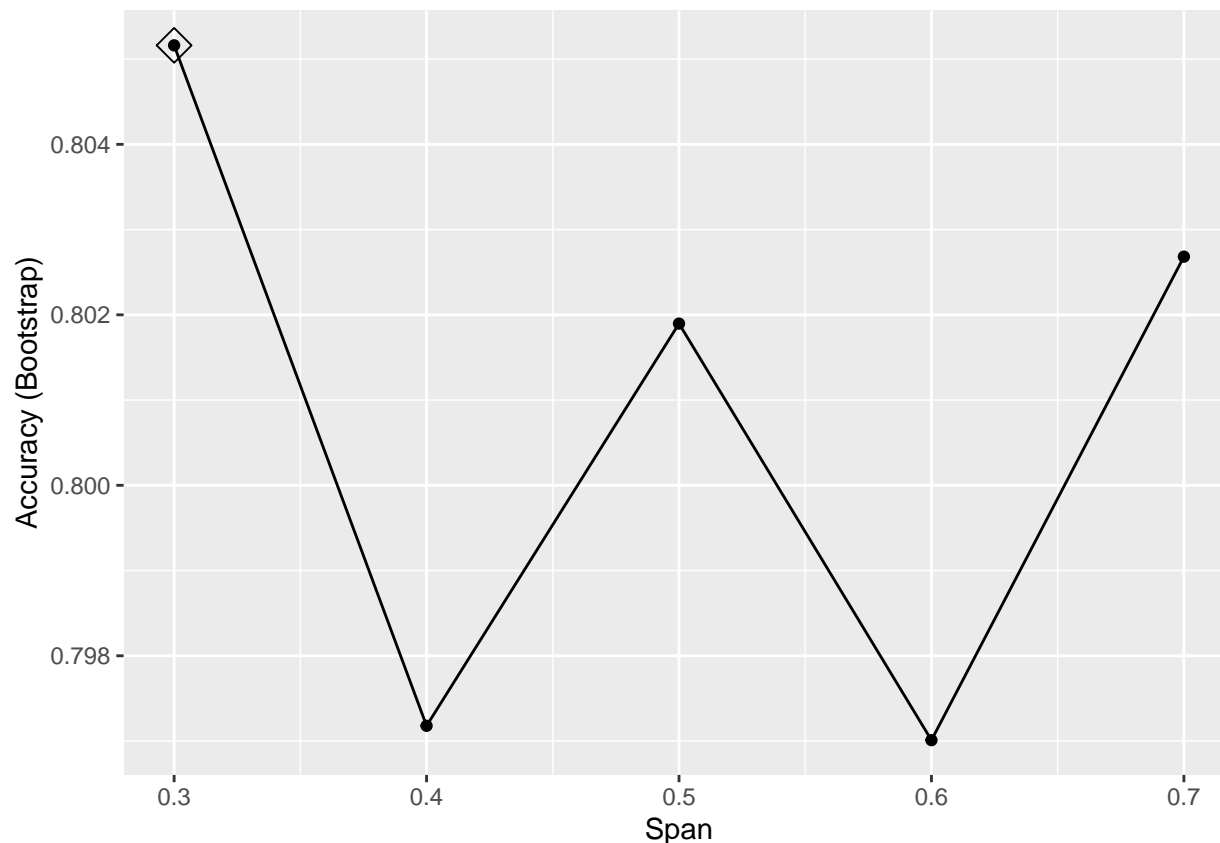
## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## lowerlimit -83036

## Warning in gam.lo(data[["lo(billed_tot, span = 0.7, degree = 1)"]], z, w, :
## extrapolation not allowed with blending

## Warning in model.matrix.default(mt, mf, contrasts): non-list contrasts argument
## ignored

ggplot(train_gamloess, highlight = TRUE)

```



We also separately train the LDA model.

```
train_lda <- train(Y ~ X1 + X2 + X3 + X4 + sum_delays + billed_tot + paid_tot, method = "lda", data = h
```

Random Forest and naive Bayes

While working on the dataset we have discovered that the Random Forest (“rf”) and naive Bayes (“naive_bayes”) models work pretty well if applied only on the predictor *sum_delays*. We show it here below.

```
models2 <- c("naive_bayes", "rf")
fits2 <- lapply(models2, function(model){
  train(Y ~ sum_delays, method = model, data = historic)})
```

```
## Warning in randomForest.default(x, y, mtry = param$mtry, ...): invalid mtry:
## reset to within valid range
```

```
## Warning in randomForest.default(x, y, mtry = param$mtry, ...): invalid mtry:
## reset to within valid range
```

```
## Warning in randomForest.default(x, y, mtry = param$mtry, ...): invalid mtry:
## reset to within valid range
```

```
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## reset to within valid range
```

```
## Warning in randomForest.default(x, y, mtry = param$mtry, ...): invalid mtry:
```



```
## reset to within valid range

## Warning in randomForest.default(x, y, mtry = param$mtry, ...): invalid mtry:
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## Warning in randomForest.default(x, y, mtry = param$mtry, ...): invalid mtry:
## reset to within valid range

## Warning in randomForest.default(x, y, mtry = param$mtry, ...): invalid mtry:
## reset to within valid range
```

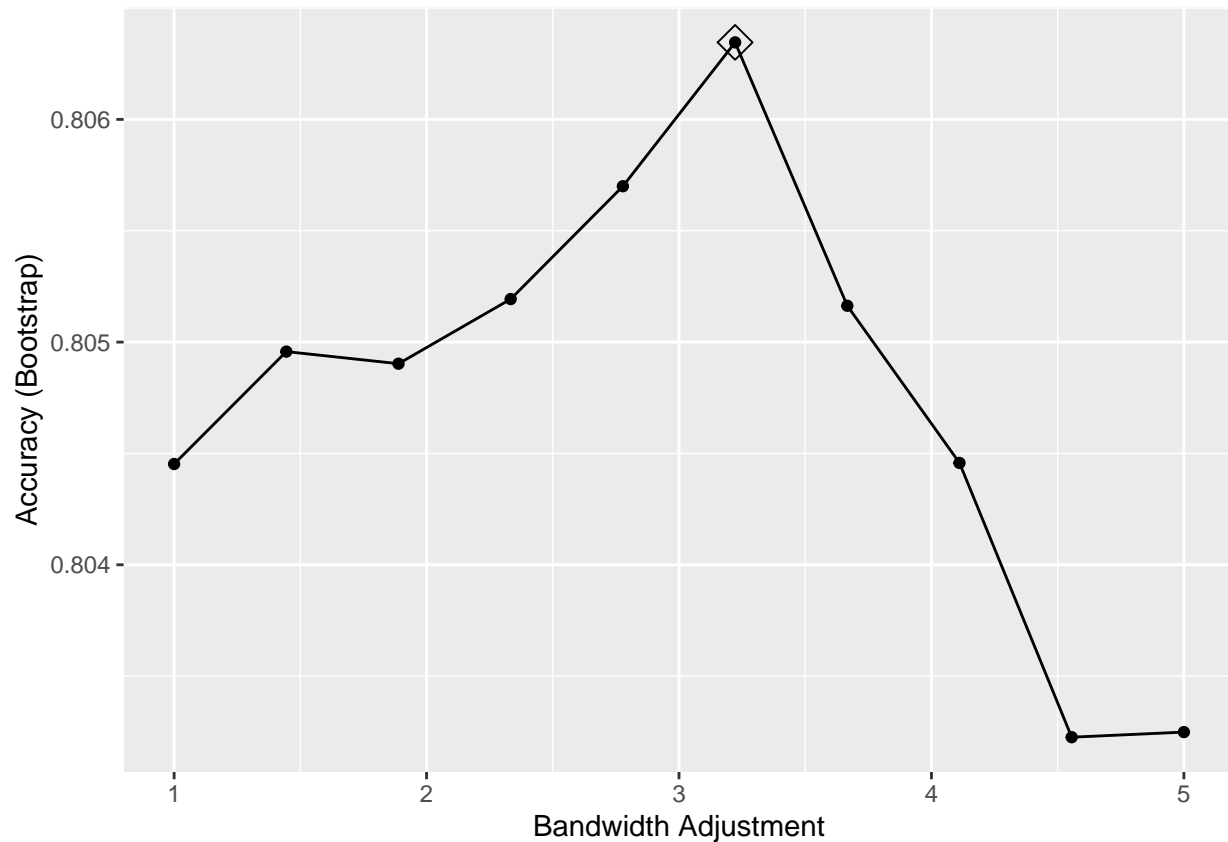
```
fits2
```

```
## [[1]]
## Naive Bayes
##
## 23999 samples
##      1 predictor
##      2 classes: '0', '1'
##
## No pre-processing
## Resampling: Bootstrapped (25 reps)
## Summary of sample sizes: 23999, 23999, 23999, 23999, 23999, 23999, ...
## Resampling results across tuning parameters:
##
##   usekernel  Accuracy  Kappa
##   FALSE      0.8020406  0.2407954
##   TRUE       0.8043858  0.3142868
##
## Tuning parameter 'laplace' was held constant at a value of 0
## Tuning
##   parameter 'adjust' was held constant at a value of 1
## Accuracy was used to select the optimal model using the largest value.
## The final values used for the model were laplace = 0, usekernel = TRUE
##   and adjust = 1.
##
## [[2]]
## Random Forest
##
## 23999 samples
##      1 predictor
##      2 classes: '0', '1'
##
## No pre-processing
## Resampling: Bootstrapped (25 reps)
## Summary of sample sizes: 23999, 23999, 23999, 23999, 23999, 23999, ...
## Resampling results:
##
##   Accuracy  Kappa
##   0.8047786  0.2936002
##
## Tuning parameter 'mtry' was held constant at a value of 2
```

Both the models contain tuning parameters and we train to master their performances. In the naive Bayes model we keep the parameter 'laplace' equal to 0 and 'usekernel' TRUE, while we make 'adjust' vary from 1

to 5 (10 values). We plot the result.

```
gridbayes <- expand.grid(laplace = 0, usekernel = TRUE, adjust = seq(1, 5, len = 10))
train_bayes <- train(Y ~ sum_delays, method = "naive_bayes", data = historic, tuneGrid = gridbayes)
ggplot(train_bayes, highlight = TRUE)
```



We do the same exercise on the Random Forest model. We let the ‘mtry’ parameter vary from 2 (default) to 150, with 7 values. We also use the argument “nodesize = 1” to allow small sizes to our nodes, in case we have few extreme cases.

```
gridrf <- data.frame(mtry = seq(50, 200, 25))
train_rf <- train(Y ~ sum_delays, method = "rf", data = historic, nodesize = 1, tuneGrid = gridrf)
```

```
## Warning in randomForest.default(x, y, mtry = param$mtry, ...): invalid mtry:
## reset to within valid range
```

```
## Warning in randomForest.default(x, y, mtry = param$mtry, ...): invalid mtry:
## reset to within valid range
```

```
## Warning in randomForest.default(x, y, mtry = param$mtry, ...): invalid mtry:
## reset to within valid range
```

```
## Warning in randomForest.default(x, y, mtry = param$mtry, ...): invalid mtry:
## reset to within valid range
```

```
## Warning in randomForest.default(x, y, mtry = param$mtry, ...): invalid mtry:
```

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]


```

## reset to within valid range

## Warning in randomForest.default(x, y, mtry = param$mtry, ...): invalid mtry:
## reset to within valid range

## Warning in randomForest.default(x, y, mtry = param$mtry, ...): invalid mtry:
## reset to within valid range

## Warning in randomForest.default(x, y, mtry = param$mtry, ...): invalid mtry:
## reset to within valid range

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## reset to within valid range

## Warning in randomForest.default(x, y, mtry = param$mtry, ...): invalid mtry:
## reset to within valid range

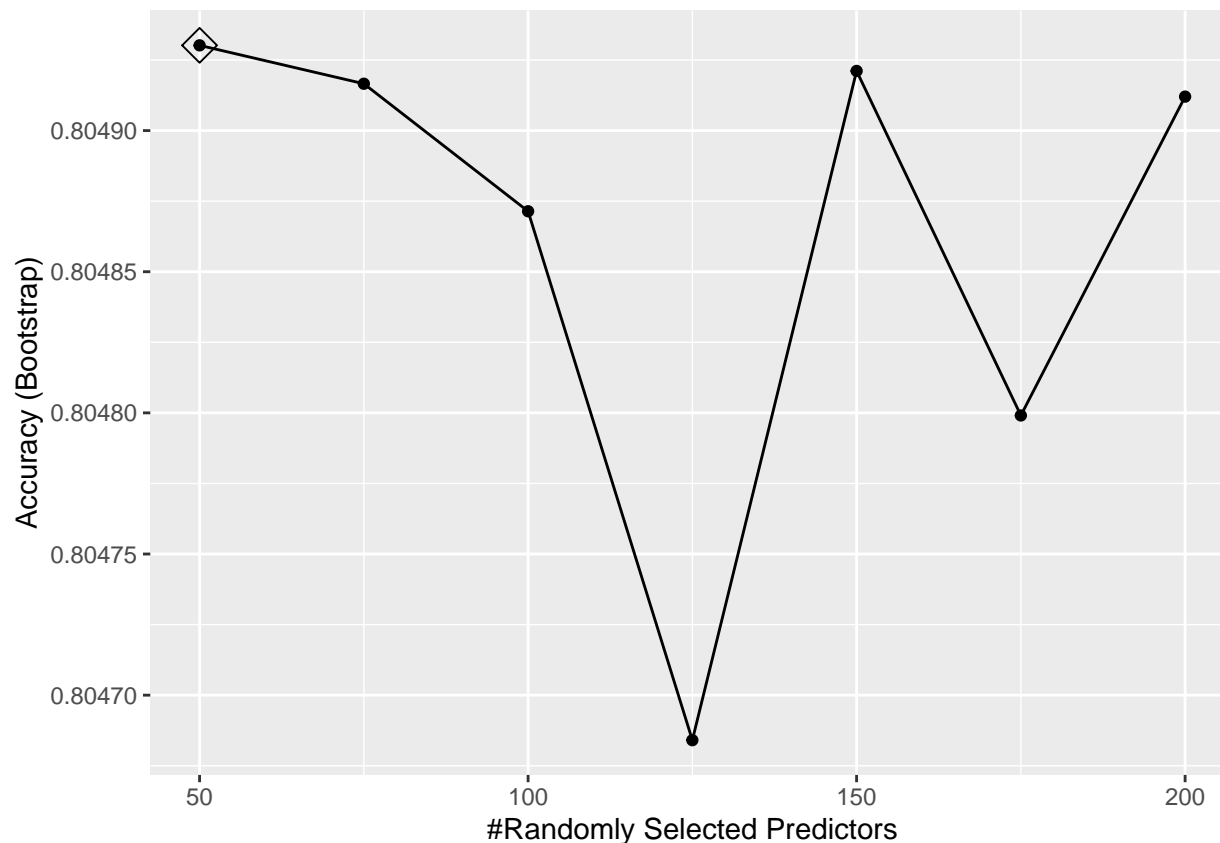
## Warning in randomForest.default(x, y, mtry = param$mtry, ...): invalid mtry:
## reset to within valid range

## Warning in randomForest.default(x, y, mtry = param$mtry, ...): invalid mtry:
## reset to within valid range

## Warning in randomForest.default(x, y, mtry = param$mtry, ...): invalid mtry:
## reset to within valid range

ggplot(train_rf, highlight = TRUE)

```

Result

Finally we are ready to test the accuracy of our models on the **validation** set. We then predict the outcome for the credit card default using LDA and GamLoess using, as predictors, the personal information, *sum_delays*, *billed_tot* and *paid_tot*, and naive Bayes and Random Forest using the only predictor *sum_delays*. Before the evaluation, we have to create in the validation set the required predictors.

```
validation <- validation %>% mutate(sum_delays = X6 + X7 + X8 + X9 + X10 + X11,
                                   billed_tot = X12 + X13 + X14 + X15 + X16 + X17,
                                   paid_tot = X18 + X19 + X20 + X21 + X22 + X23)
```

And now we apply the methods, calculating every accuracy.

```
pred_lda <- predict(train_lda, validation)
pred_gamloess <- predict(train_gamloess, validation)

## Warning in gam.lo(data[["lo(X1, span = 0.3, degree = 1)"]], z, w, span = 0.3, :
## eval 1e+006

## Warning in gam.lo(data[["lo(X1, span = 0.3, degree = 1)"]], z, w, span = 0.3, :
## upperlimit 8.0395e+005

## Warning in gam.lo(data[["lo(X1, span = 0.3, degree = 1)"]], z, w, span = 0.3, :
## extrapolation not allowed with blending

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 5.2639e+006

## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
```

```
## upperlimit 3.4845e+006
## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending
## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, : eval
## 3.5546e+006
## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## upperlimit 3.4845e+006
## Warning in gam.lo(data[["lo(billed_tot, span = 0.3, degree = 1)"]], z, w, :
## extrapolation not allowed with blending
pred_bayes <- predict(train_bayes, validation)
pred_rf <- predict(train_rf, validation)
acc_lda <- confusionMatrix(data = pred_lda, reference = validation$Y)$overall["Accuracy"]
acc_gamloess <- confusionMatrix(data = pred_gamloess, reference = validation$Y)$overall["Accuracy"]
acc_bayes <- confusionMatrix(data = pred_bayes, reference = validation$Y)$overall["Accuracy"]
acc_rf <- confusionMatrix(data = pred_rf, reference = validation$Y)$overall["Accuracy"]
```

We end up with the following final table.

```
accuracies <- tibble(method = c("LDA", "GamLoess", "naive Bayes", "Random Forest"),
                     accuracy = c(acc_lda, acc_gamloess, acc_bayes, acc_rf))
accuracies %>% knitr::kable()
```

method	accuracy
LDA	0.8002000
GamLoess	0.8071988
naive Bayes	0.8086986
Random Forest	0.8071988

#Conclusion