

Bedeutungswandel: Anteil der Reiseausgaben am Einkommen

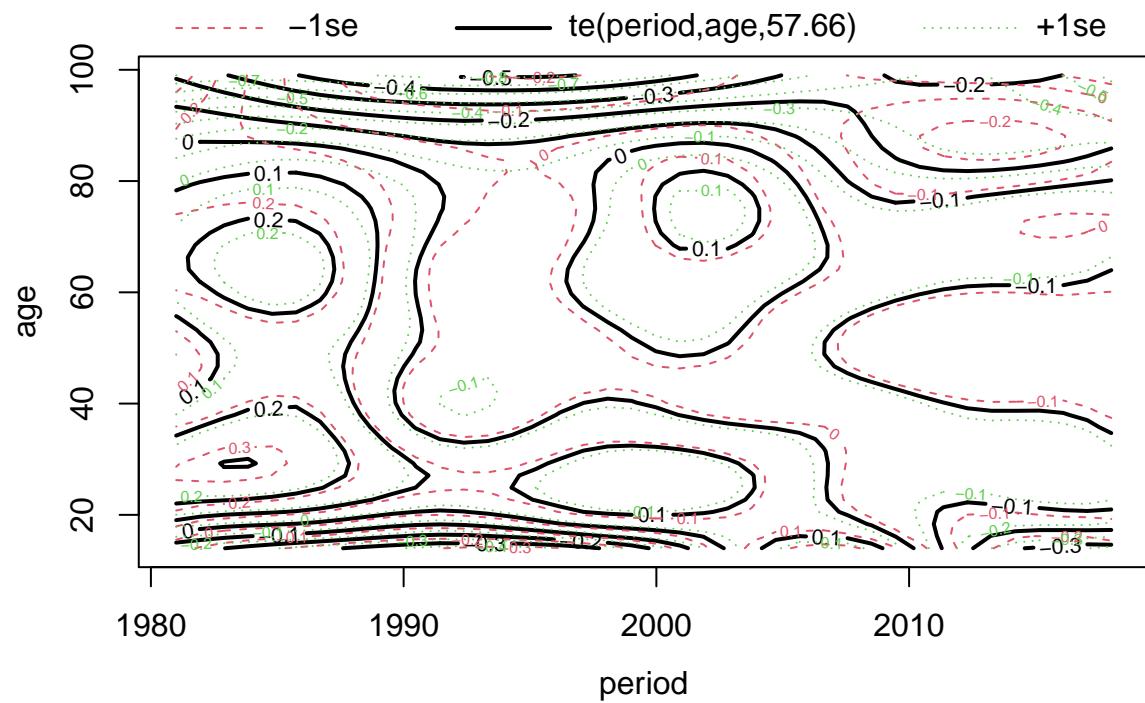
Juliana Schäfer, Maximilian Weigert, Alexander Bauer

30.06.2021

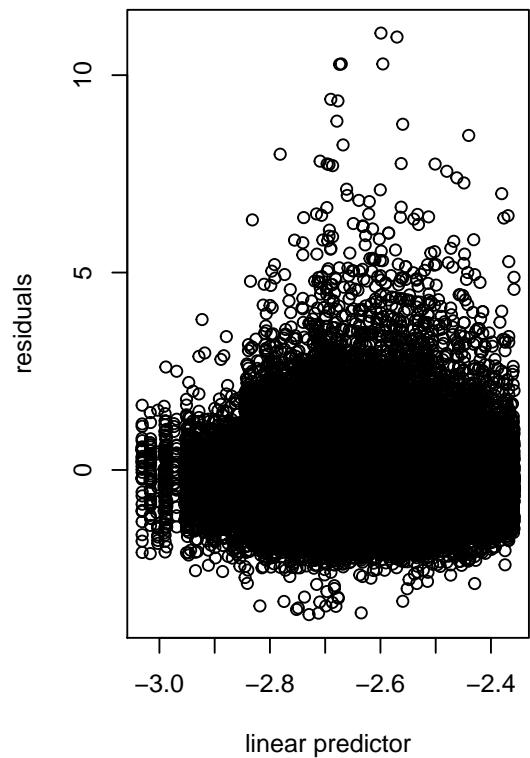
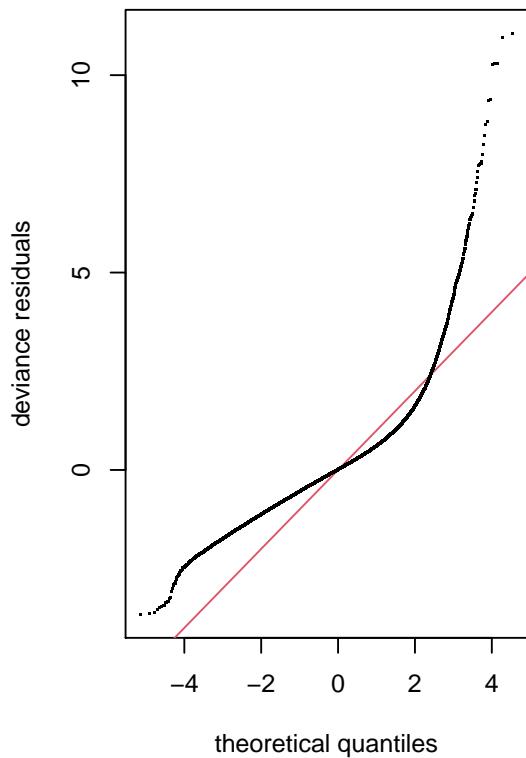
Pure

Model:

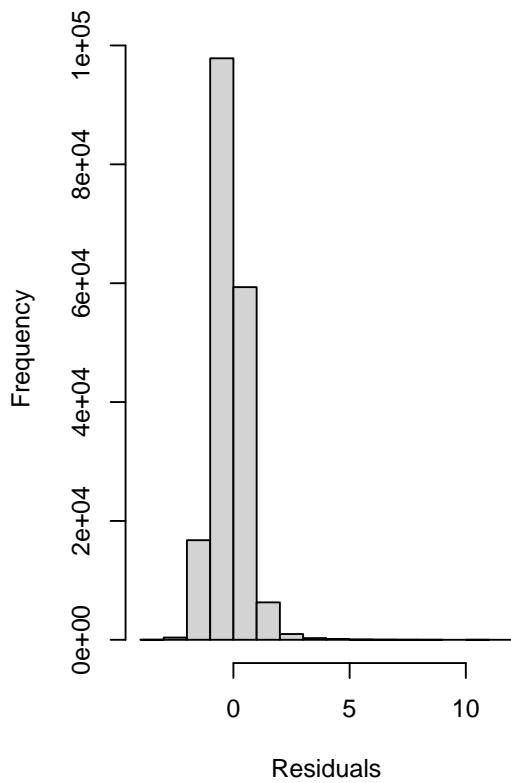
```
## Estimate model JS_Gesamt_Ausgaben_AnteilEinkHH...  
  
##  
## Family: Gamma  
## Link function: log  
##  
## Formula:  
## y ~ te(period, age, k = c(10, 10), bs = "ps")  
##  
## Parametric coefficients:  
##             Estimate Std. Error t value Pr(>|t|)  
## (Intercept) -2.661146   0.002482  -1072   <2e-16 ***  
## ---  
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1  
##  
## Approximate significance of smooth terms:  
##             edf Ref.df    F p-value  
## te(period,age) 57.66  66.84 29.81   <2e-16 ***  
## ---  
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1  
##  
## R-sq.(adj) =  0.0107  Deviance explained = 2.41%  
## fREML = 2.6845e+05  Scale est. = 1.1154    n = 182112
```



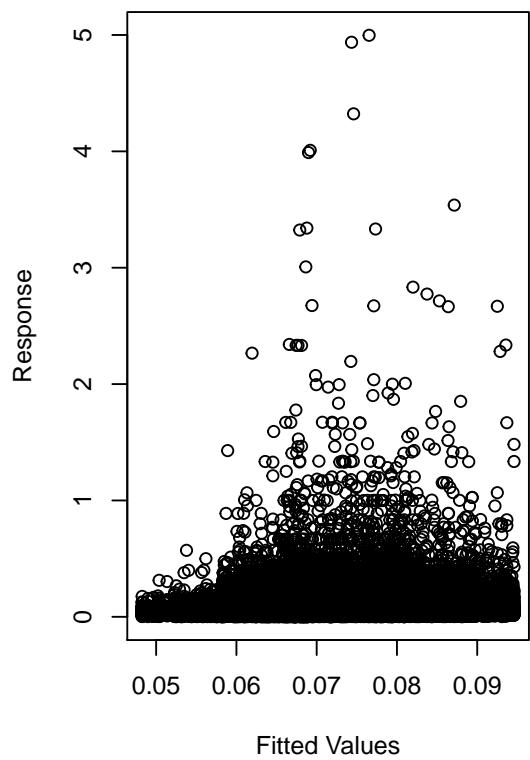
Resids vs. linear pred.



Histogram of residuals



Response vs. Fitted Values



```

## 
## Method: fREML   Optimizer: perf newton
## full convergence after 3 iterations.
## Gradient range [-0.002590137,0.0007984235]
## (score 268454.6 & scale 1.115396).
## Hessian positive definite, eigenvalue range [3.455872,91054.01].
## Model rank = 100 / 100
##
## Basis dimension (k) checking results. Low p-value (k-index<1) may
## indicate that k is too low, especially if edf is close to k'.
##
##          k'    edf  k-index p-value
## te(period,age) 99.0 57.7     0.92    0.16

```

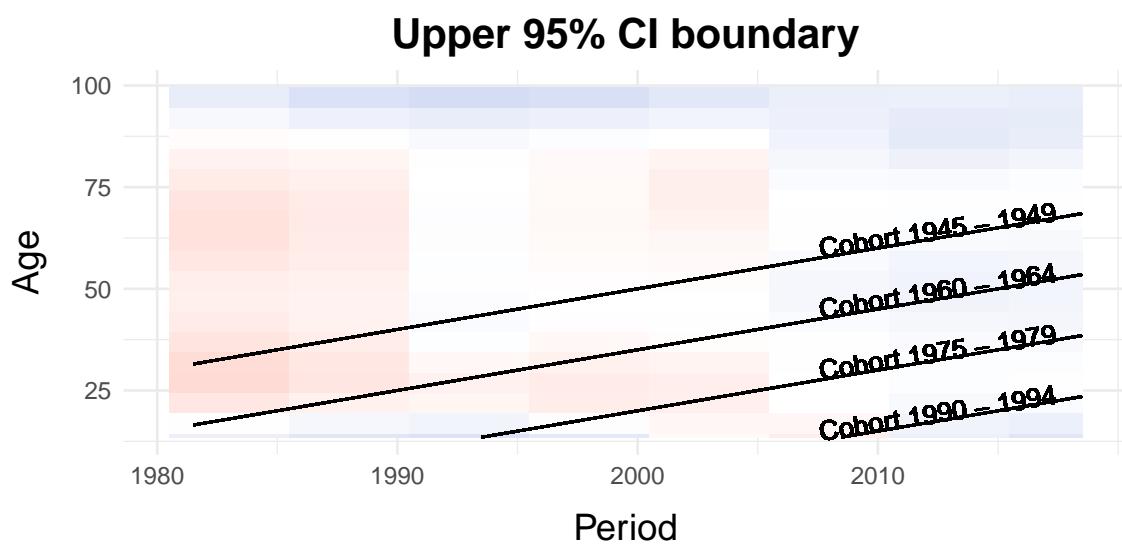
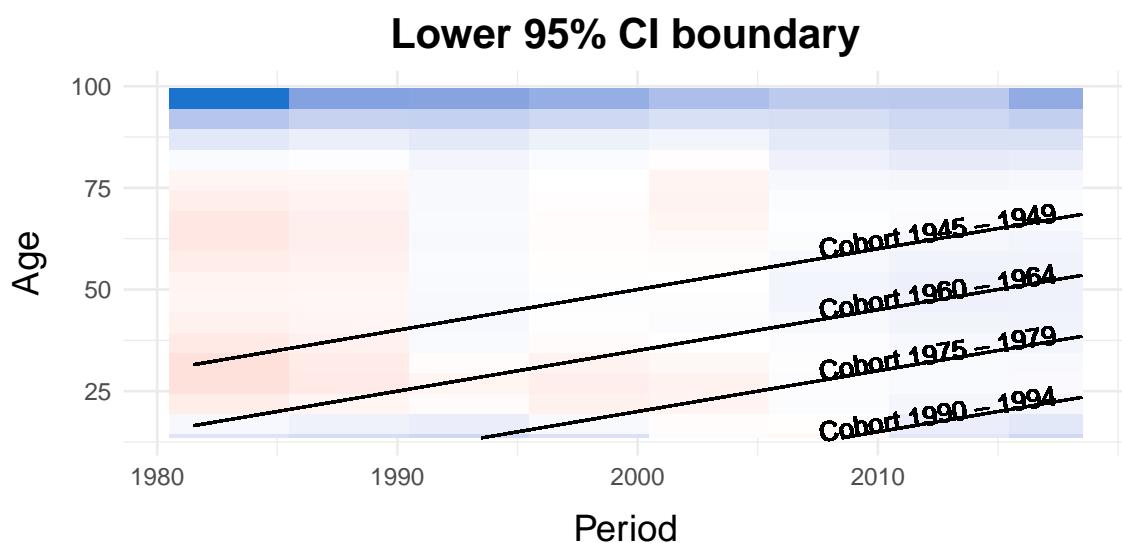
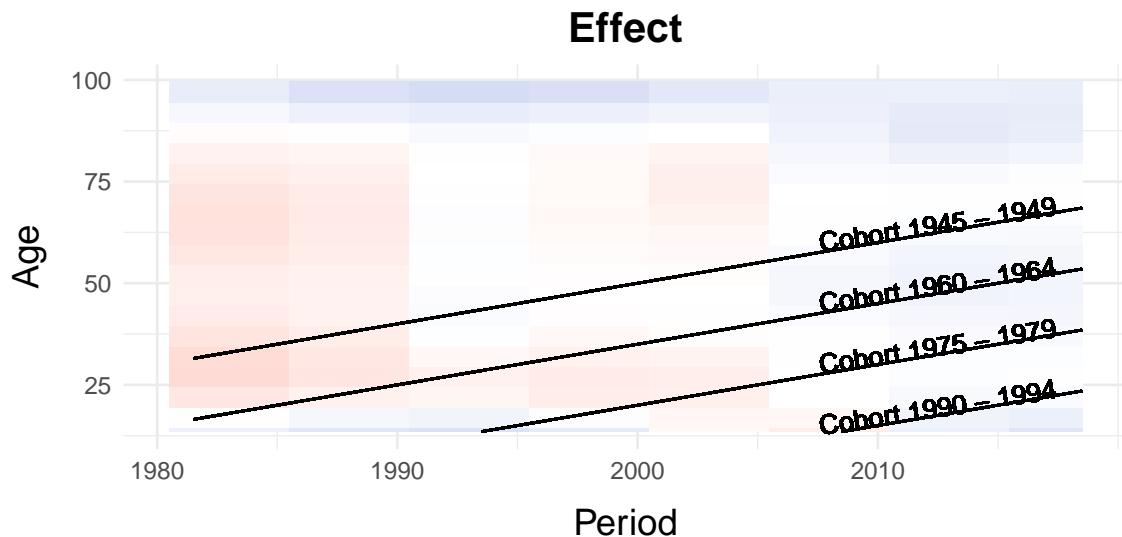
Heatmap:

```

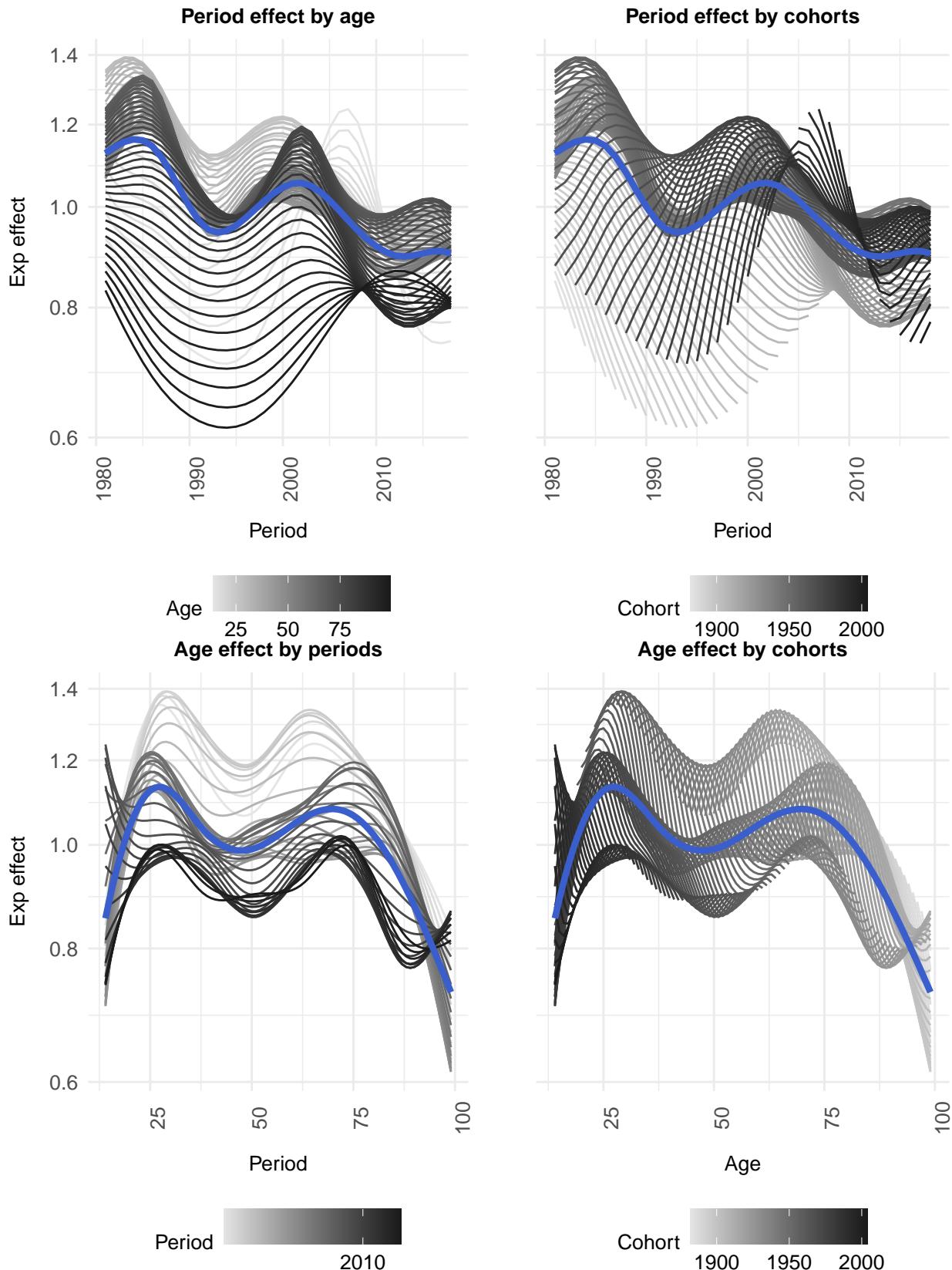
## `summarise()` has grouped output by 'age_cat'. You can override using the '.groups' argument.

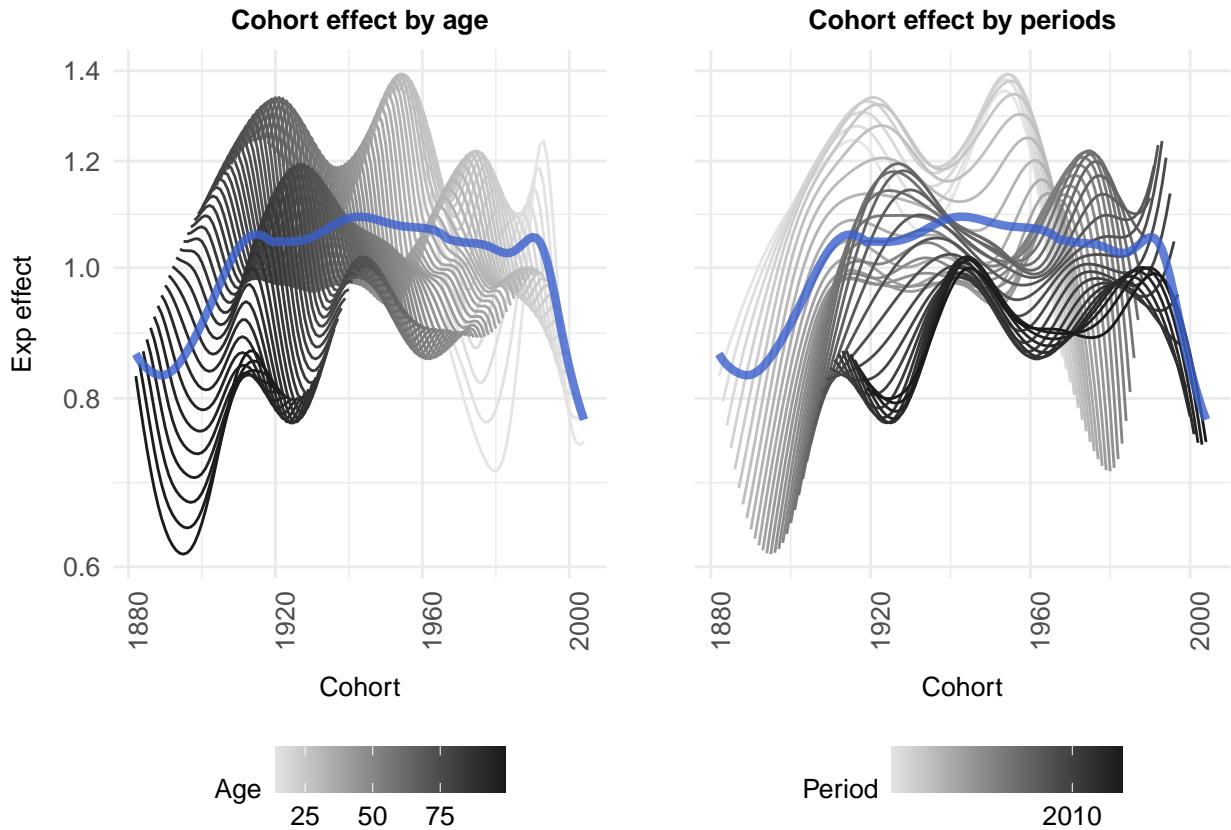
## Joining, by = c("age_cat", "period_cat")

```



APC plots:





Covariates

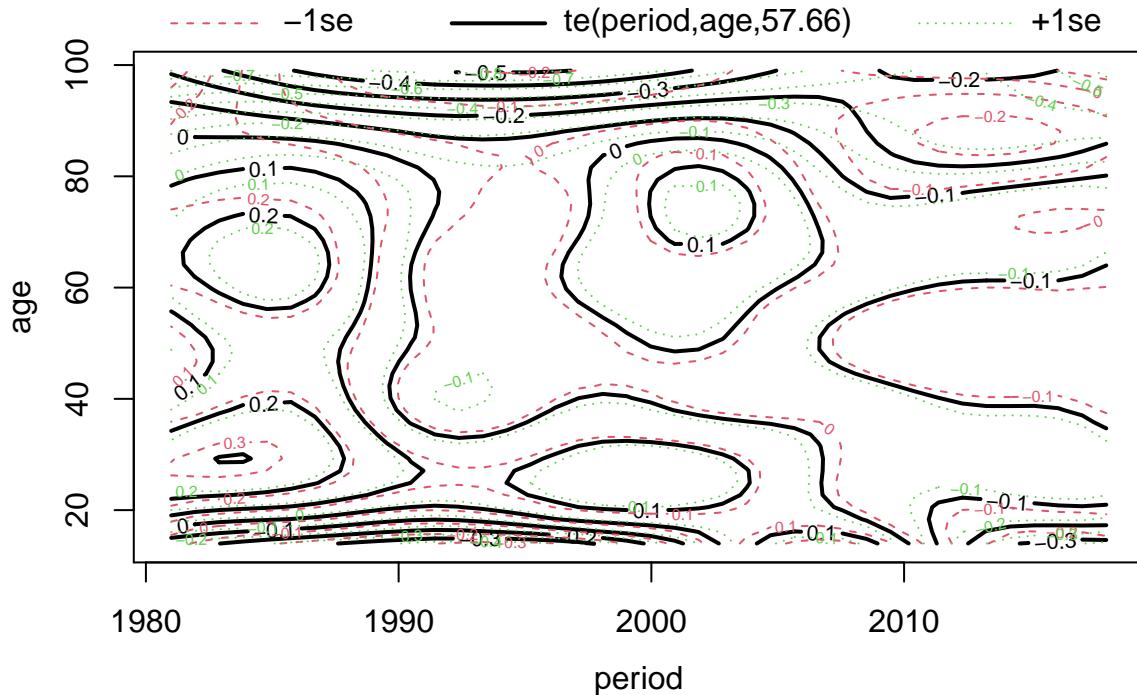
Model:

```
## Estimate model JS_Gesamt_Ausgaben_AnteilEinkHH...
## 
## Family: Gamma
## Link function: log
## 
## Formula:
## y ~ te(period, age, k = c(10, 10), bs = "ps") + s(S_Einkommen_HH,
##           bs = "ps", k = 10) + JS_HUR_Reisedauer + S_Haushaltsgroesse
## 
## Parametric coefficients:
##                               Estimate Std. Error t value Pr(>|t|)
## (Intercept)                -3.639488  0.011417 -318.785 < 2e-16
## JS_HUR_Reisedauer6 bis 8 Tage  0.334340  0.011417   29.285 < 2e-16
## JS_HUR_Reisedauer9 bis 12 Tage  0.639709  0.011493   55.659 < 2e-16
## JS_HUR_Reisedauer13 bis 15 Tage  0.906619  0.011110   81.602 < 2e-16
## JS_HUR_Reisedauer16 bis 19 Tage  1.026303  0.012964   79.169 < 2e-16
## JS_HUR_Reisedauer20 bis 22 Tage  1.114529  0.011662   95.572 < 2e-16
## JS_HUR_Reisedauer23 bis 26 Tage  1.193637  0.016702   71.466 < 2e-16
## JS_HUR_Reisedauer27 bis 29 Tage  1.267502  0.014695   86.252 < 2e-16
## JS_HUR_Reisedauer30 Tage und mehr 1.386447  0.013747  100.854 < 2e-16
```

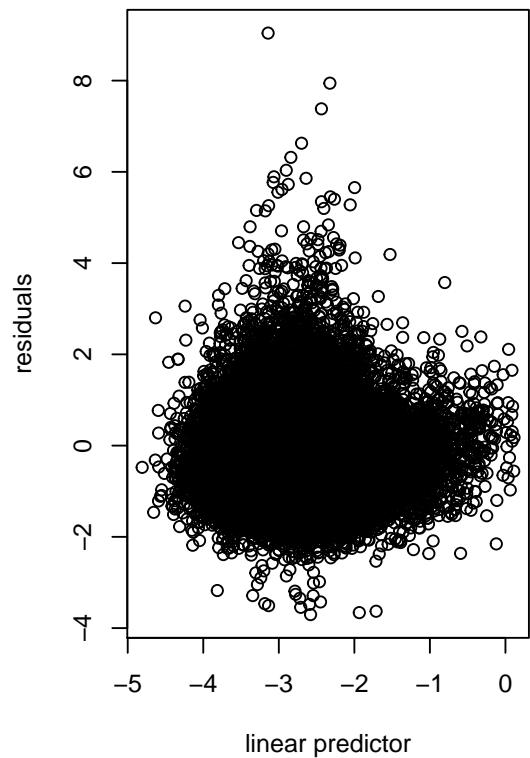
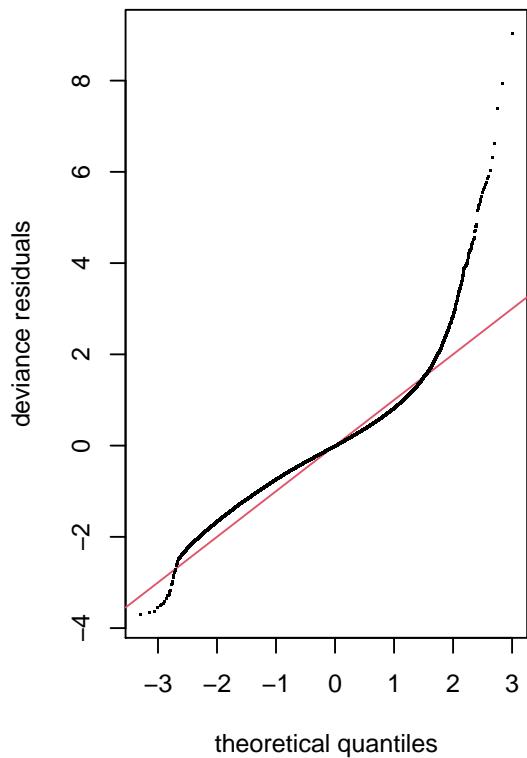
```

## S_Haushaltsgroesse2 Personen          0.123710  0.004804 25.754 < 2e-16
## S_Haushaltsgroesse3 Personen          0.063825  0.005930 10.763 < 2e-16
## S_Haushaltsgroesse4 Personen          0.094243  0.006399 14.727 < 2e-16
## S_Haushaltsgroesse5 Personen und mehr 0.039721  0.008983 4.422 9.8e-06
##
## (Intercept)                         ***
## JS_HUR_Reisedauer6 bis 8 Tage       ***
## JS_HUR_Reisedauer9 bis 12 Tage      ***
## JS_HUR_Reisedauer13 bis 15 Tage     ***
## JS_HUR_Reisedauer16 bis 19 Tage     ***
## JS_HUR_Reisedauer20 bis 22 Tage     ***
## JS_HUR_Reisedauer23 bis 26 Tage     ***
## JS_HUR_Reisedauer27 bis 29 Tage     ***
## JS_HUR_Reisedauer30 Tage und mehr   ***
## S_Haushaltsgroesse2 Personen         ***
## S_Haushaltsgroesse3 Personen         ***
## S_Haushaltsgroesse4 Personen         ***
## S_Haushaltsgroesse5 Personen und mehr ***
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Approximate significance of smooth terms:
##             edf Ref.df    F p-value
## te(period,age) 57.877 66.229 33.74 <2e-16 ***
## s(S_Einkommen_HH) 8.948 8.998 3315.03 <2e-16 ***
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## R-sq.(adj) = 0.342 Deviance explained = 35.8%
## fREML = 1.9037e+05 Scale est. = 0.47375 n = 181917

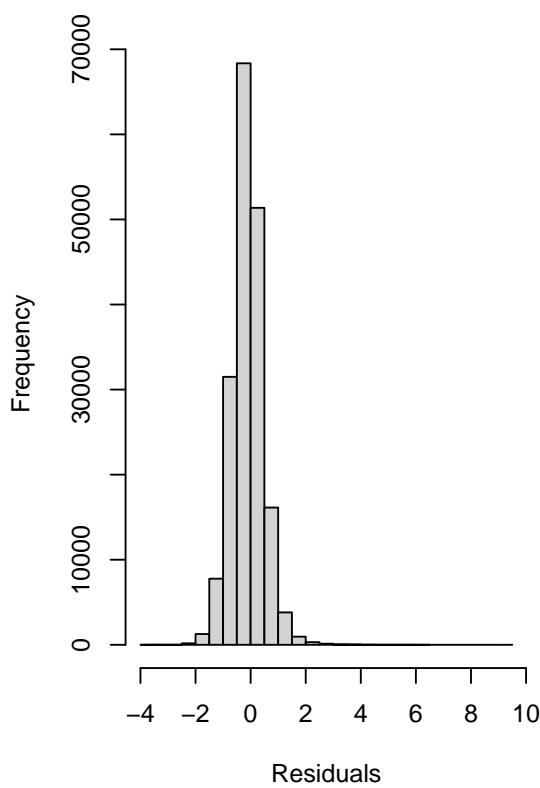
```



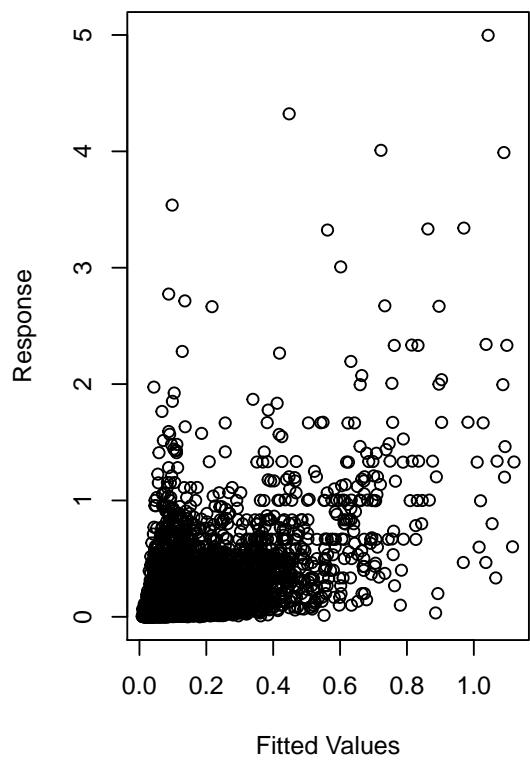
Resids vs. linear pred.



Histogram of residuals



Response vs. Fitted Values



```

## 
## Method: fREML   Optimizer: perf newton
## full convergence after 7 iterations.
## Gradient range [-1.965949e-06,1.937618e-06]
## (score 190369.8 & scale 0.4737523).
## Hessian positive definite, eigenvalue range [3.958369,90950].
## Model rank = 121 / 121
##
## Basis dimension (k) checking results. Low p-value (k-index<1) may
## indicate that k is too low, especially if edf is close to k'.
##
##          k'    edf k-index p-value
## te(period,age) 99.00 57.88    0.97    0.93
## s(S_Einkommen_HH) 9.00  8.95    0.96    0.56

```

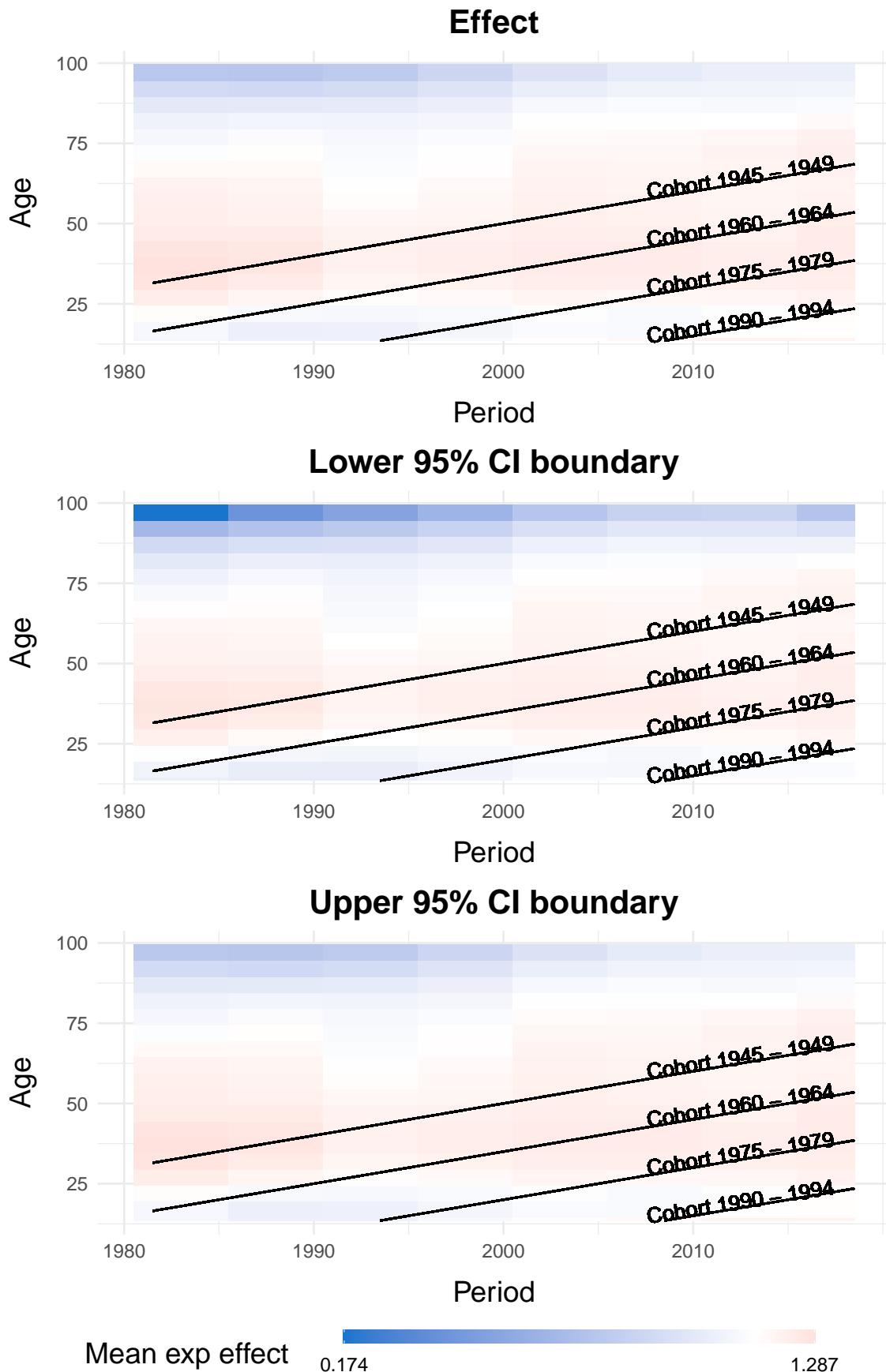
Heatmap:

```

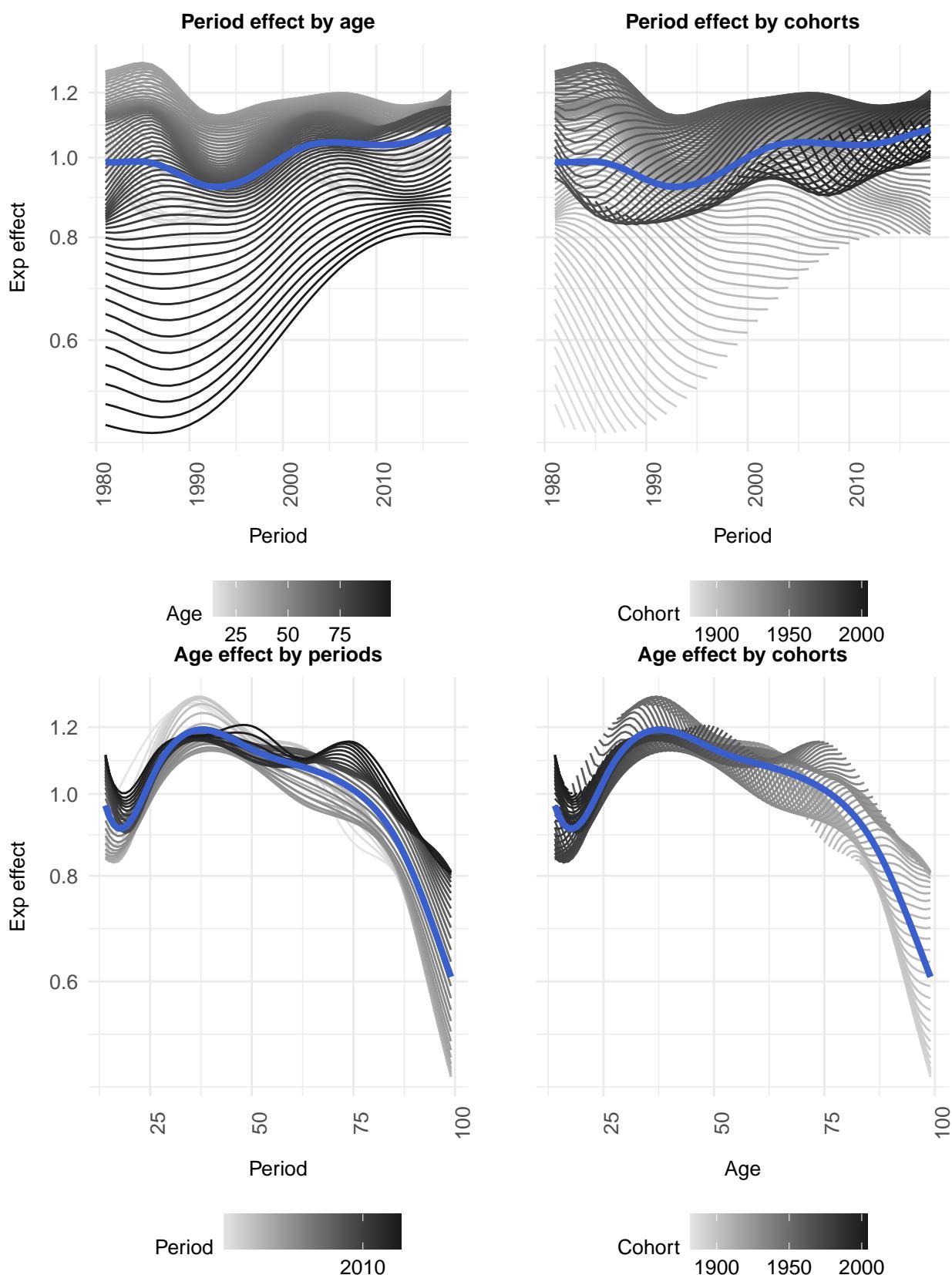
## `summarise()` has grouped output by 'age_cat'. You can override using the `.groups` argument.

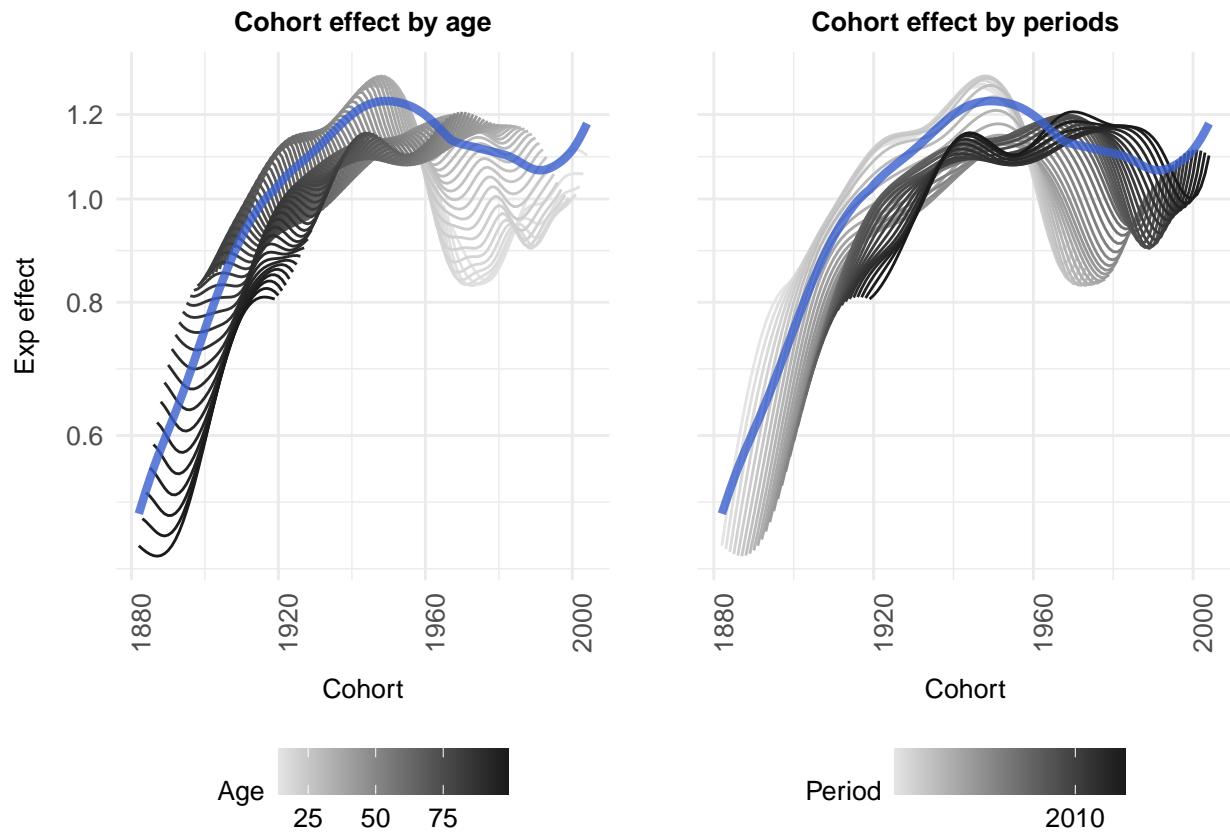
## Joining, by = c("age_cat", "period_cat")

```

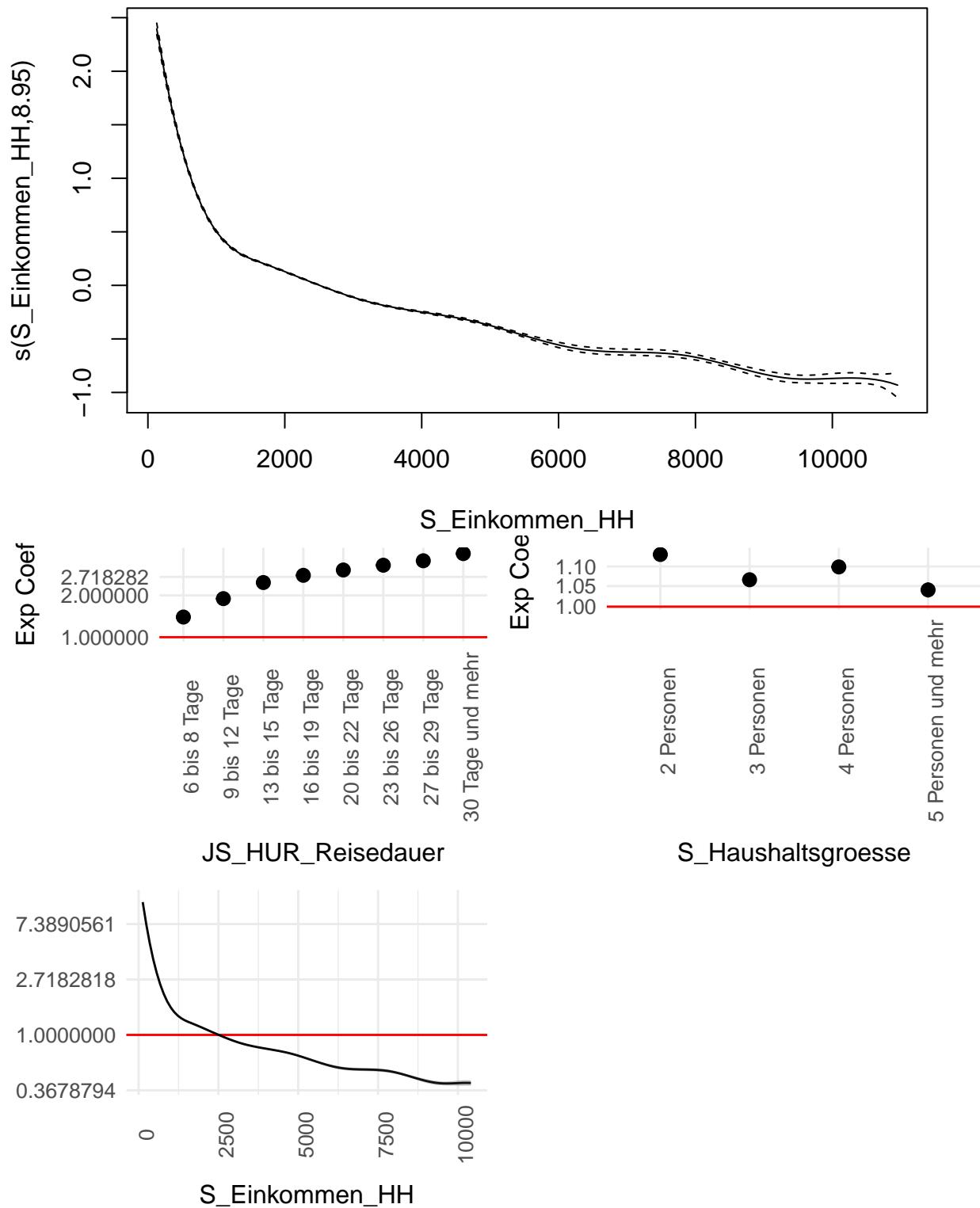


APC plots:





Covariates plots:



Comparison of marginal effects between pure and covariate APC models:

