Complete results

2024-08-21

Italian Data from WHO. 5-years ages classes from 0 to 80+.

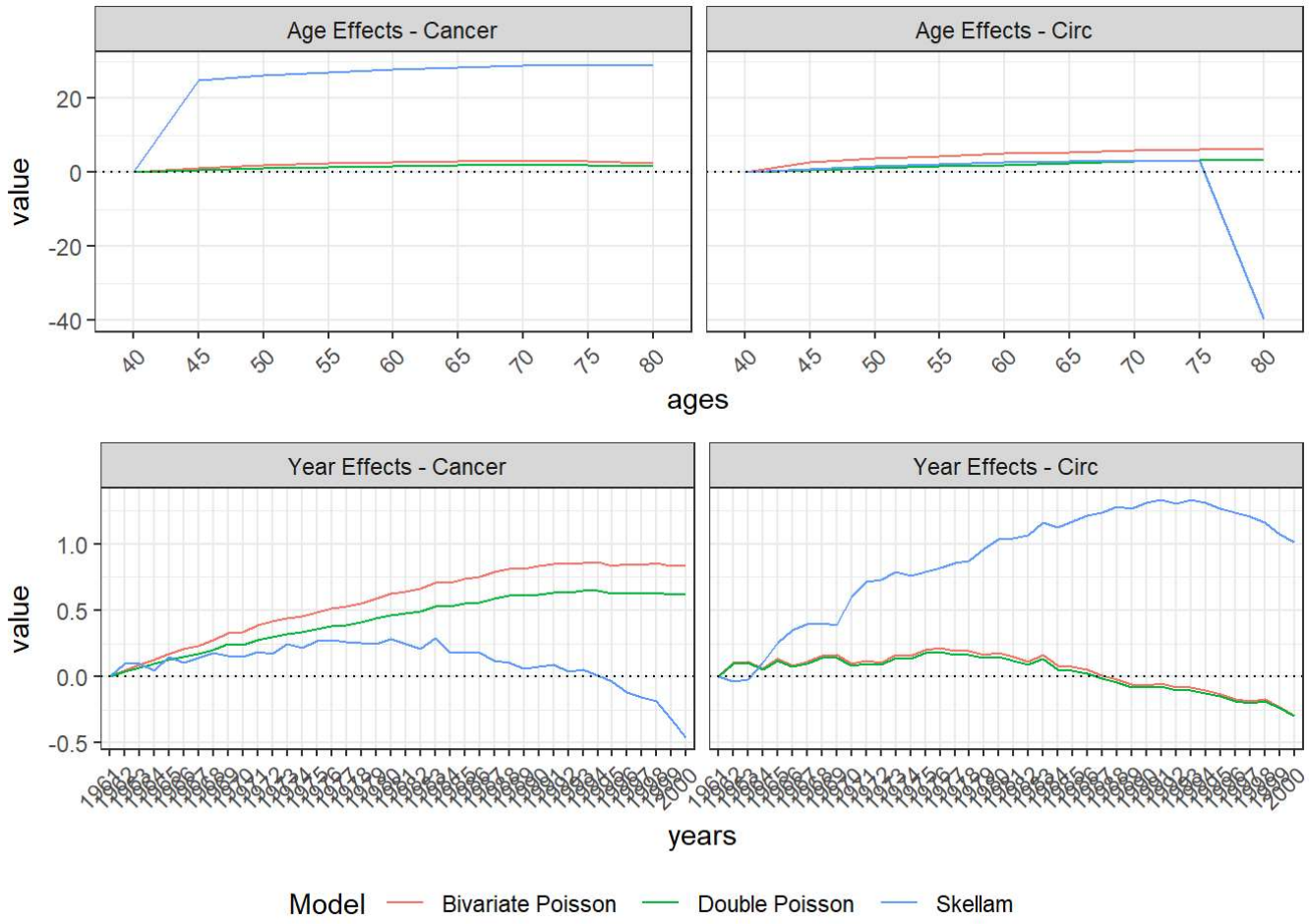
3 baseline period: 1961-2000 (40 years) 1971-2000 (30 years) 1981-2000 (20 years)

15 years of forecasting window: 2001-2015

Analysis for Adult-ages (40+):

PERIOD 1: Baseline 1961-2000, forecasting 2001-2015

Visualization estimated Age-Period Effects



Goodness-of-fit:

```
##                          BIC        AIC       AICc
## Skellam             9452.074   9079.008   9149.822
## Double Poisson    258270.669 257897.604 257968.417
## Bivariate Poisson 229753.765 229309.577 229382.142
```

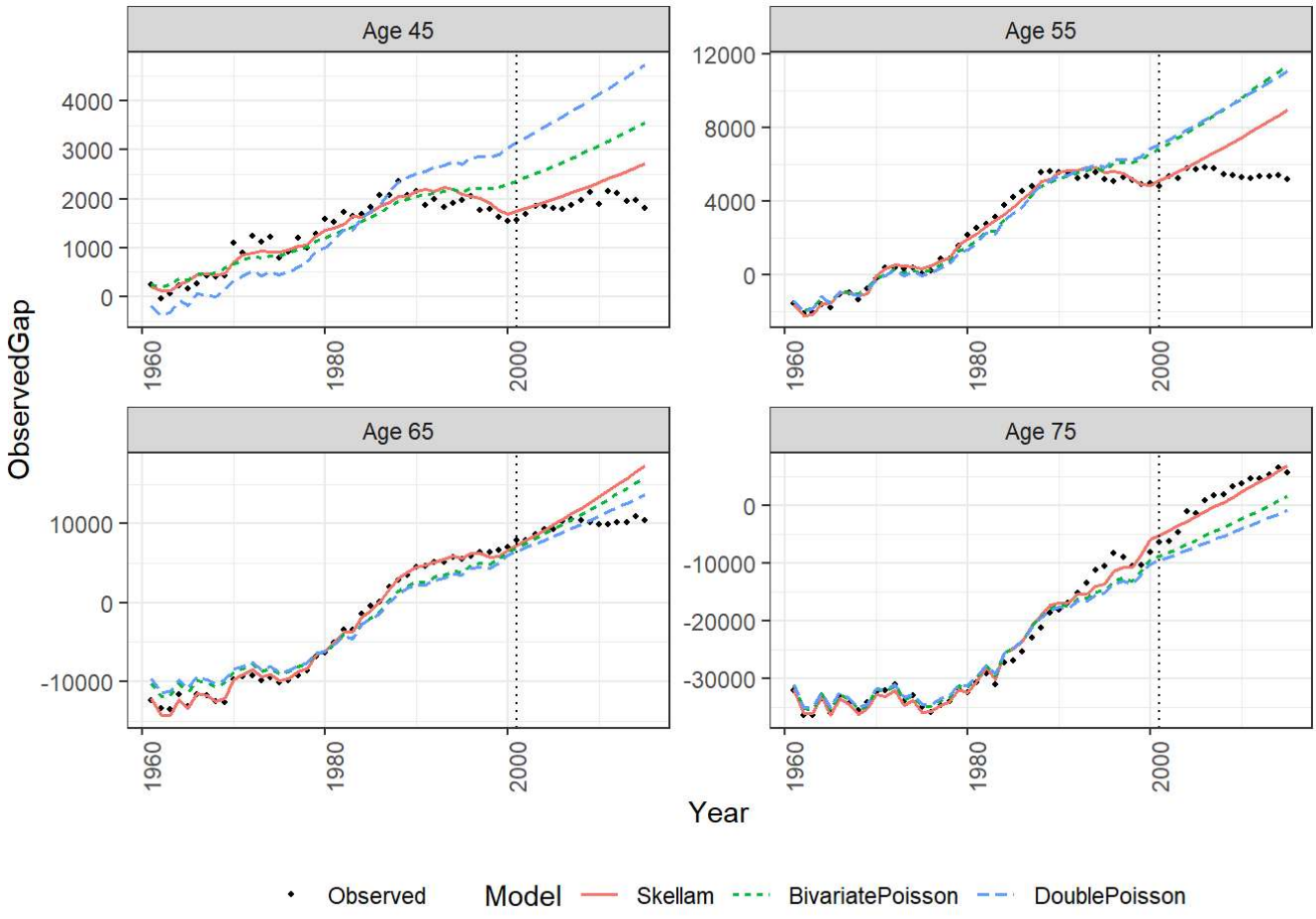
Accuracy in-sample fitting:

```
##                          RMSE       MAE      MAPE
## Skellam              601.1184  372.3591 0.1790524
## Double Poisson      2085.5022 1379.9481 0.5727929
## Bivariate Poisson   1952.4122 1186.0621 0.3988497
```

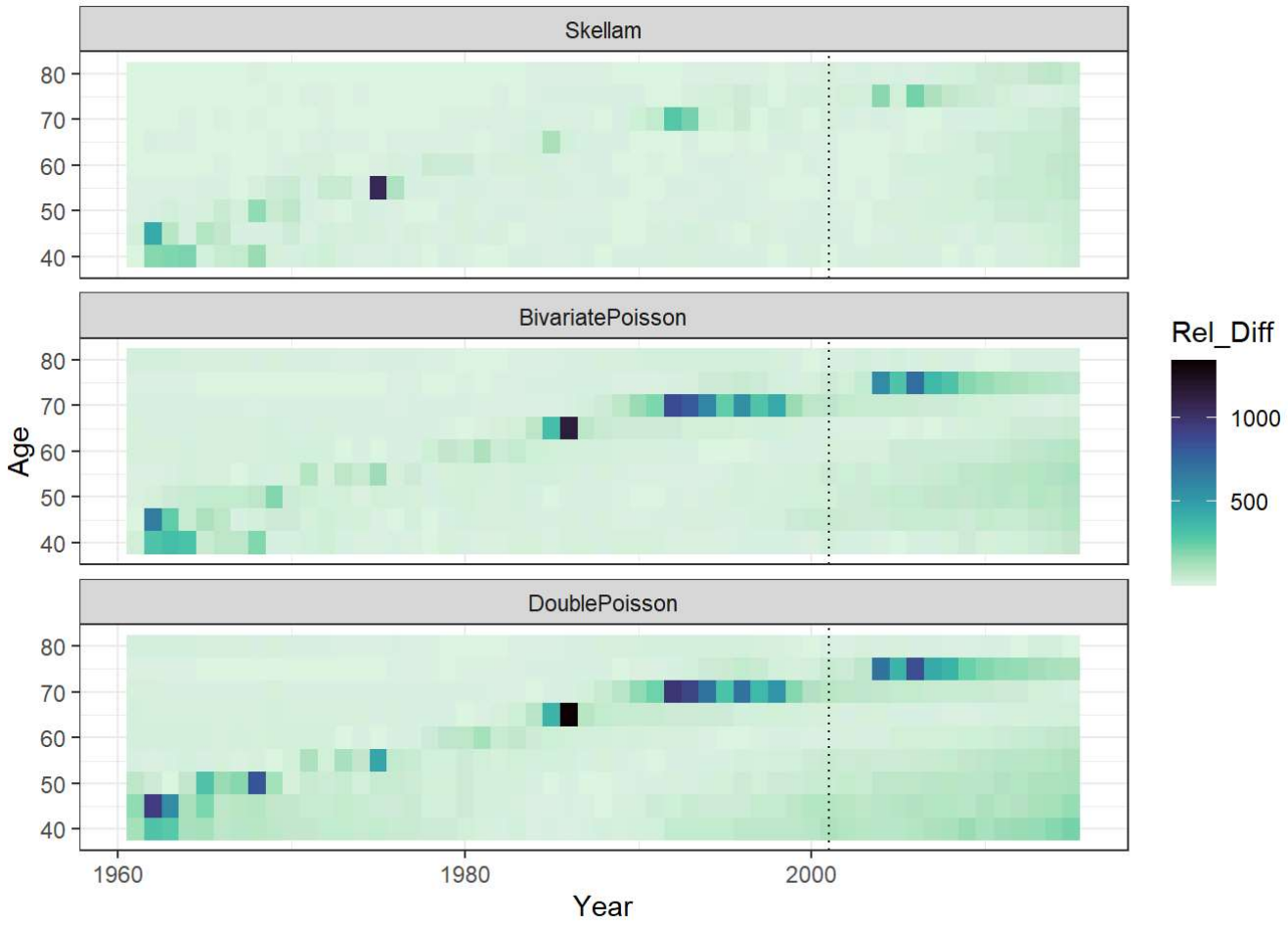
Accuracy out-of-sample fitting:

```
##                          RMSE      MAE      MAPE
## Skellam              2391.843 1561.407 0.2684340
## Double Poisson       3534.513 2950.762 0.8703805
## Bivariate Poisson    3109.655 2474.848 0.6075608
```

Plot of fitting and forecasting in-sample (till 2000) and out-of-sample (years>2000)

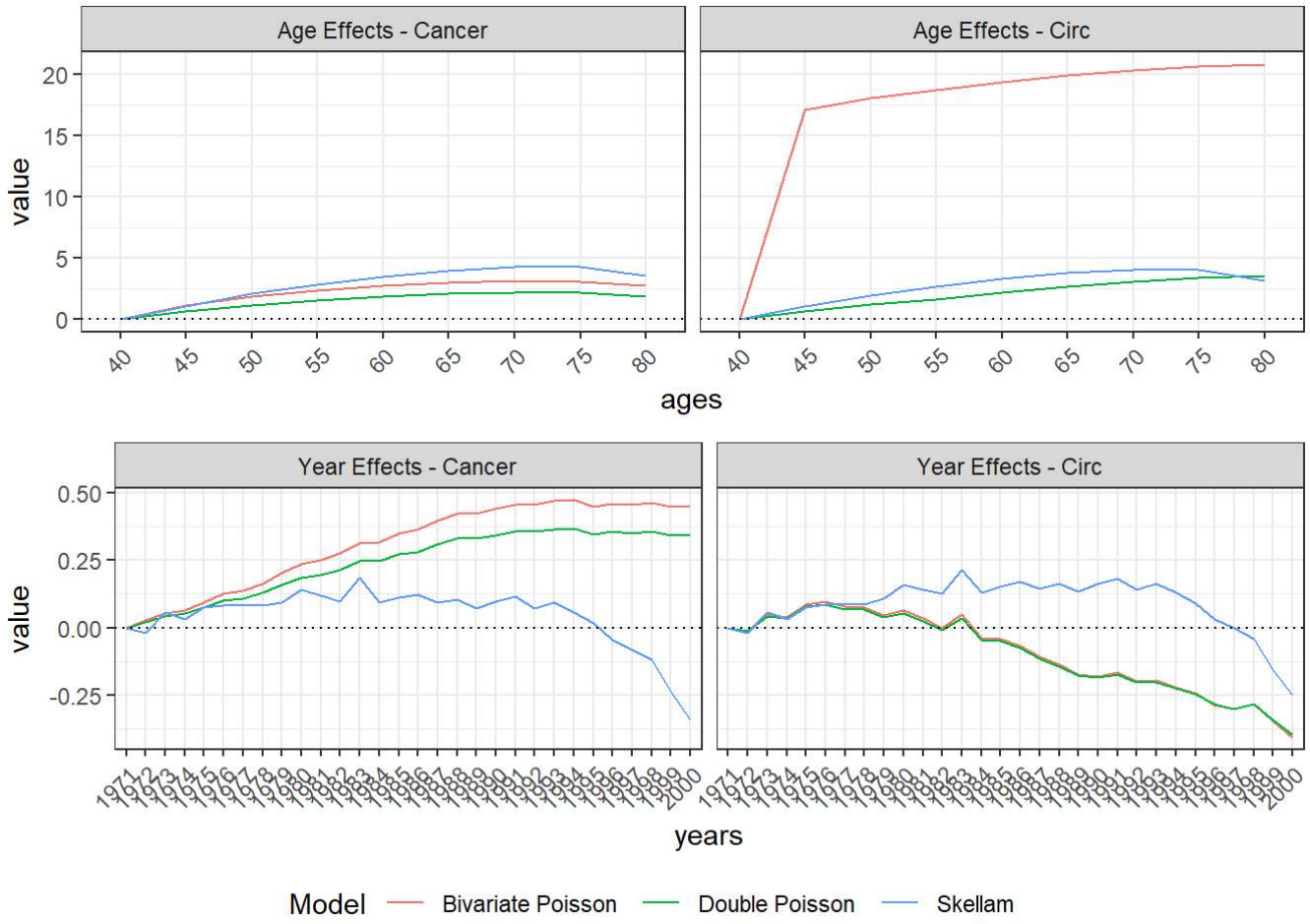


Heat map of absolute relative differences:



PERIOD 2: Baseline 1971-2000, forecasting 2001-2015

Visualization estimated Age-Period Effects:



Goodness-of-fit:

```
##                            BIC        AIC       AICc
## Skellam               4439.308   4165.828   4226.471
## Double Poisson      169287.451 169013.971 169074.613
## Bivariate Poisson   156421.767 156091.316 156153.879
```

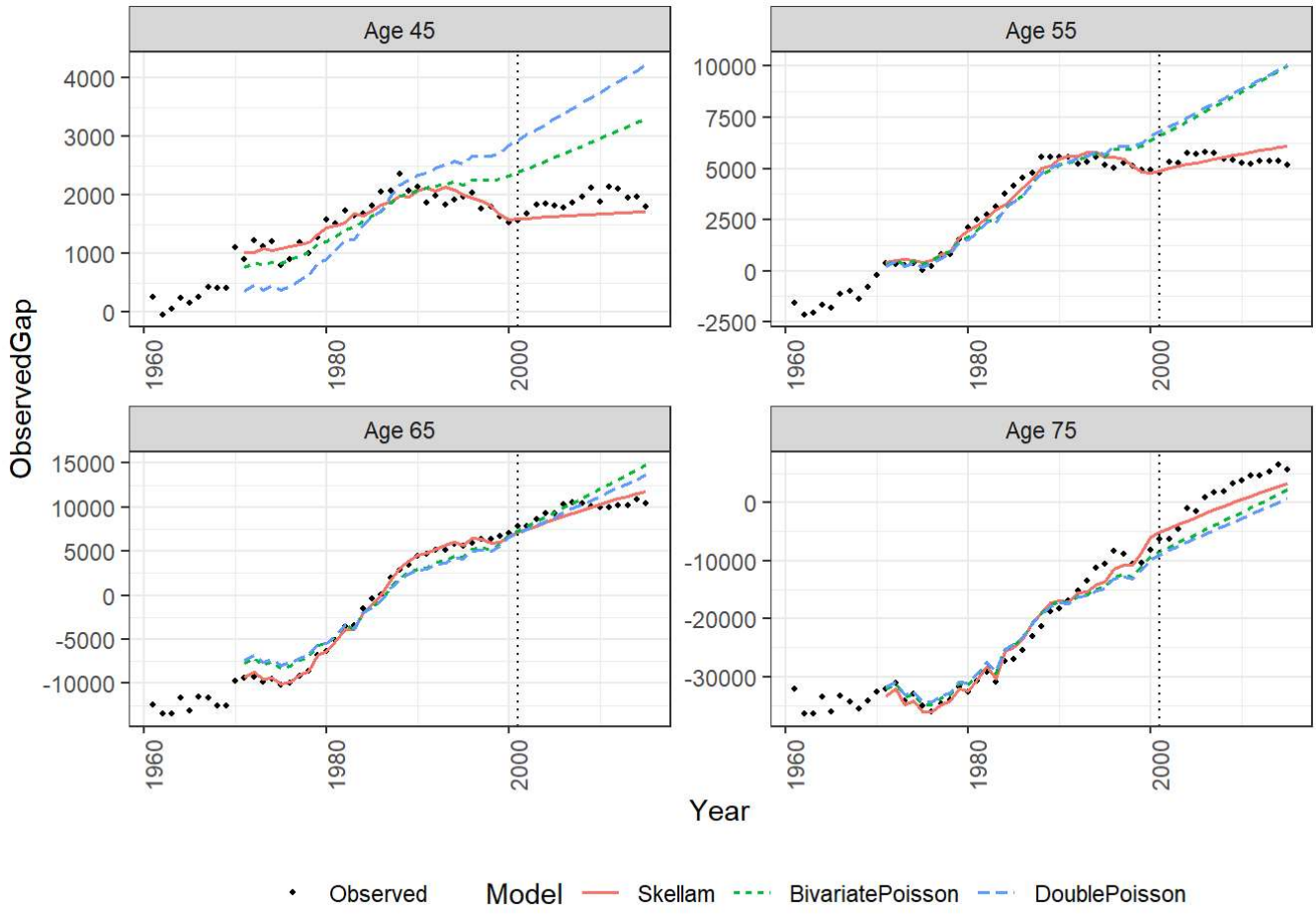
Accuracy in-sample fitting:

```
##                          RMSE       MAE      MAPE
## Skellam              633.5188  380.1427 0.1705004
## Double Poisson      1864.2598 1280.8410 0.4180866
## Bivariate Poisson   1783.4724 1126.5290 0.3445522
```

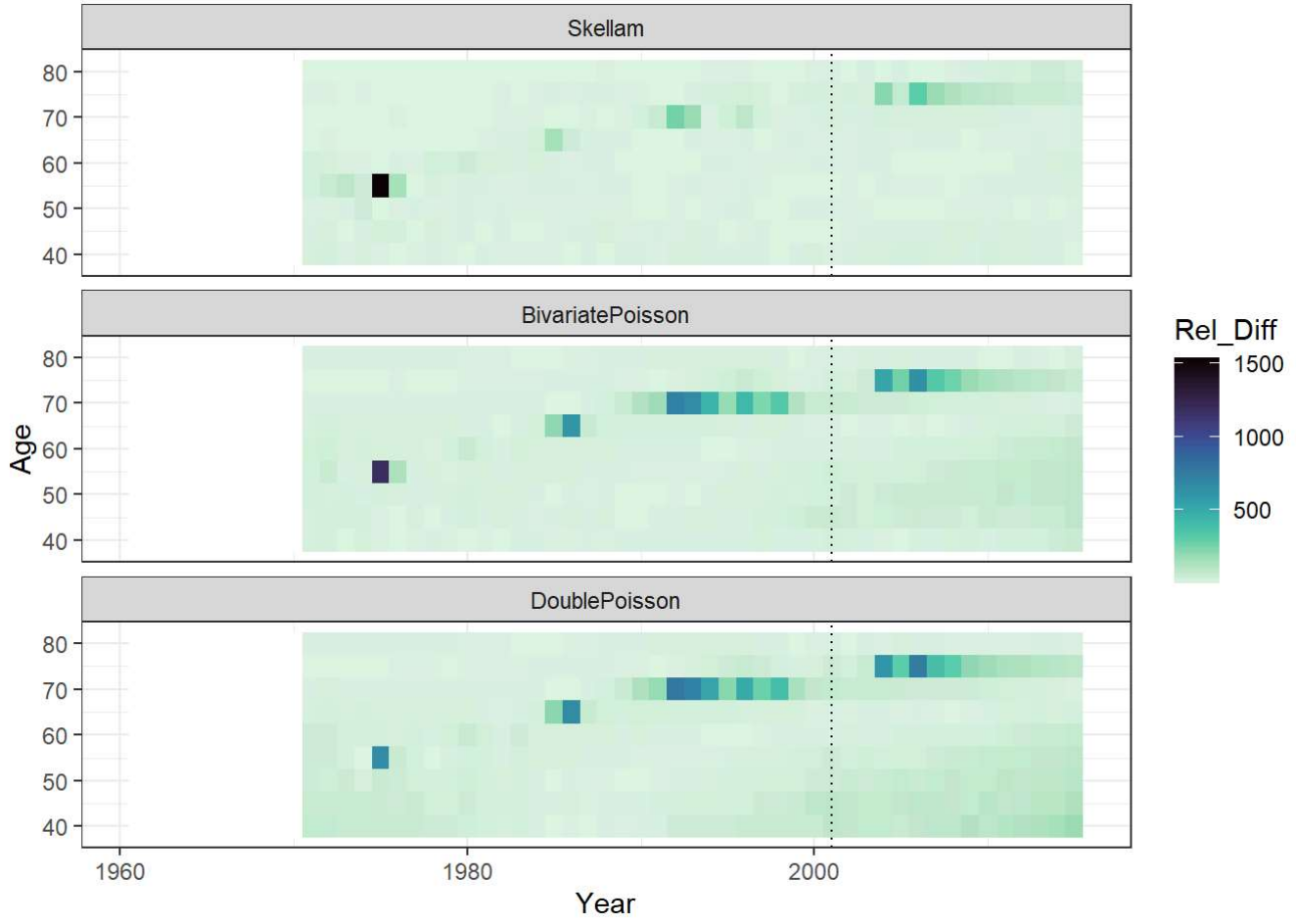
Accuracy out-of-sample fitting:

```
##                          RMSE       MAE      MAPE
## Skellam             1350.222  890.3481 0.2028456
## Double Poisson      2956.406 2469.6500 0.7226544
## Bivariate Poisson   2634.367 2114.5079 0.5254489
```

Plot of fitting and forecasting in-sample (till 2000) and out-of-sample (years>2000):

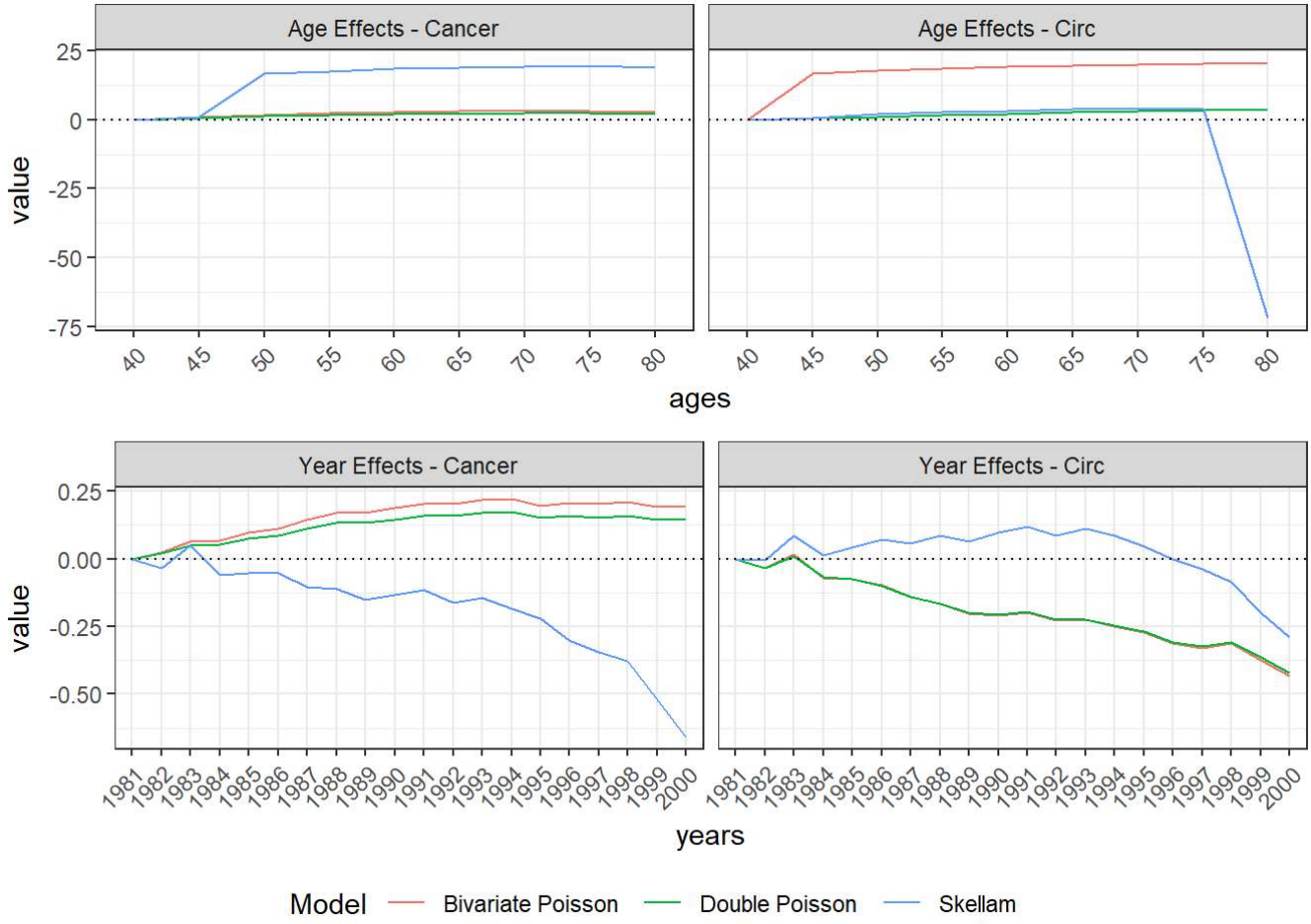


Heat map of absolute relative differences:



PERIOD 3: Baseline 1981-2000, forecasting 2001-2015

Visualization estimated Age-Period Effects:



Goodness-of-fit:

```
##                          BIC       AIC      AICc
## Skellam             4089.249  3910.444  3962.346
## Double Poisson     85926.793 85747.987 85799.890
## Bivariate Poisson 81892.526 81671.018 81725.215
```

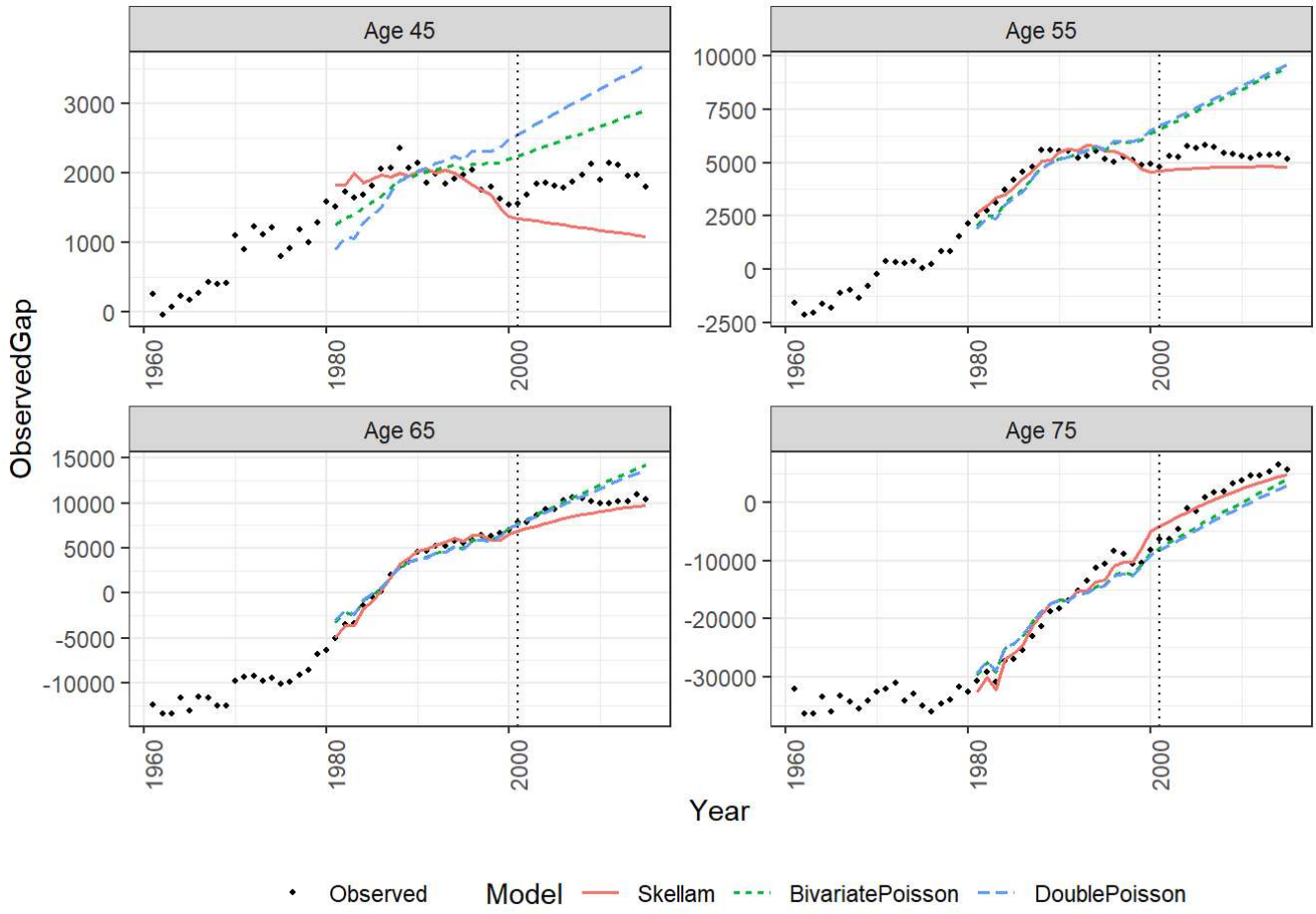
Accuracy in-sample fitting:

```
##                          RMSE       MAE      MAPE
## Skellam              677.454  408.0372 0.1228116
## Double Poisson      1529.940 1050.0590 0.3018239
## Bivariate Poisson 1485.706  964.0545 0.2502995
```

Accuracy out-of-sample fitting:

```
##                          RMSE       MAE      MAPE
## Skellam             1156.488  931.8049 0.2065263
## Double Poisson      2327.939 1973.1835 0.5412349
## Bivariate Poisson 2183.590 1771.9045 0.4121274
```

Plot of fitting and forecasting in-sample (till 2000) and out-of-sample (years>2000):



Heat map of absolute relative differences: