Malawi

```
## [1] "Census Females"
```

```
## # A tibble: 18 x 7
##    aggr.age  `1966`  `1977`  `1987`  `1998`   `2008`   `2018`
##  *    <dbl>   <dbl>   <dbl>   <dbl>   <dbl>    <dbl>    <dbl>
##  1        0 382092  552376. 705831. 836765  1200064  1286435
##  2        5 301988  416036. 628805. 725975  1009091. 1310090.
##  3       10 250885. 313031. 507772. 629430.  833912. 1234316.
##  4       15 209466  273147. 414540. 570030.  707975. 1055605
##  5       20 183540. 255764. 363053. 511617.  648740.  856427
##  6       25 164044. 220751. 304369. 409797.  560306   689452.
##  7       30 142858  175355. 247344. 310164.  423114   582199.
##  8       35 121689. 140220. 206141. 242568.  308002.  488692.
##  9       40 102922  119257. 165333. 193342.  230240.  371947.
## 10       45  83121. 104342. 132676. 158048.  179338.  271520.
## 11       50  66045   85701. 109865. 122280.  149304.  205954.
## 12       55  49106   67465.  91077.  92530   127931.  163065
## 13       60  33155   54358.  78096.  80162   103183.  137428.
## 14       65  79545   40983.  63269.  70226.   80198   118340.
## 15       70     NA   28902.  43679.  53119.   65409.   91932.
## 16       75     NA   20259.  27237.  36136    53774    66692
## 17       80     NA   13773.  17827.  24320.   38230    46553.
## 18       85     NA   24390.  23505.  25681    47351.   47742
```

```
## [1] "Census Males"
```

```
## # A tibble: 18 x 7
##    aggr.age  `1966`  `1977`  `1987`  `1998`   `2008`   `2018`
##  *    <dbl>   <dbl>   <dbl>   <dbl>   <dbl>    <dbl>    <dbl>
##  1        0 366133  529521. 688936. 823625  1169947  1265971
##  2        5 295618  410674. 619764. 717432.  985159. 1277777.
##  3       10 238983. 314866. 501357. 618896.  812531. 1199542.
##  4       15 189232  253035. 383120. 526828.  658051. 1008587.
##  5       20 153666. 213954. 313076. 448014.  566341.  785700
##  6       25 128427. 187227. 268166. 381511   508151   614954.
##  7       30 109493. 156681. 225210. 309779   422236   521016
##  8       35  95656. 125964. 189002. 240333.  320858.  455013
##  9       40  84395  106763. 154703. 191409.  232005   369070.
## 10       45  71344.  92944. 124405. 158219   169974.  275767.
## 11       50  59436.  75529. 100319. 124138.  135864.  198649.
## 12       55  47722   61111.  81417.  93066.  114754.  146078
## 13       60  33228   50887.  68001.  75016.   92168.  116899.
## 14       65  81935   39100.  55630.  62218.   69391.   96862.
## 15       70     NA   28168.  40343.  47106.   52751.   71780.
## 16       75     NA   19497.  25655.  32527.   40108    47783.
## 17       80     NA   11498.  16190.  21170.   26643.   30152.
## 18       85     NA   23975.  20595.  21884.   28983    27737.
```

Thiele log-Normal Hump RW

```
## Warning in fit_tmb(input.thiele.loghump.oag.vec.RW, inner_verbose = FALSE, : convergence error: false c
```

```
##    user  system elapsed
##   85.75    1.09   89.12
```

```
## [1] "false convergence (8)"
```

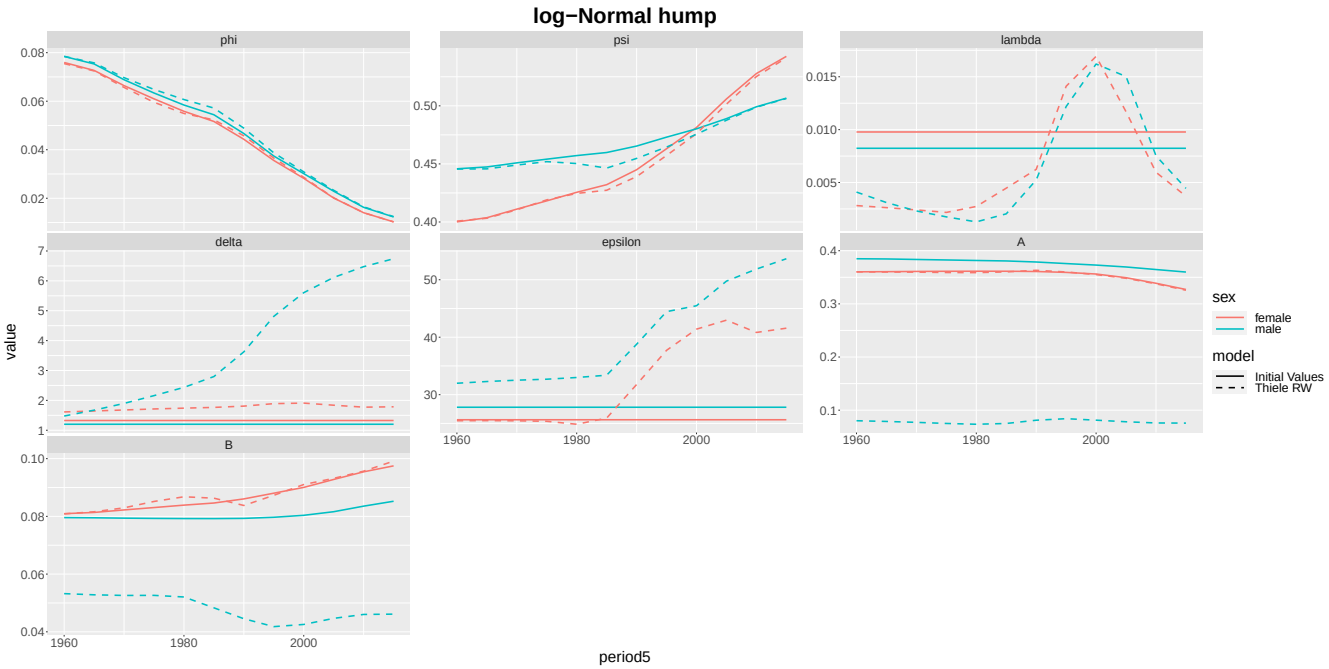

Figure 1: Estimated parameters

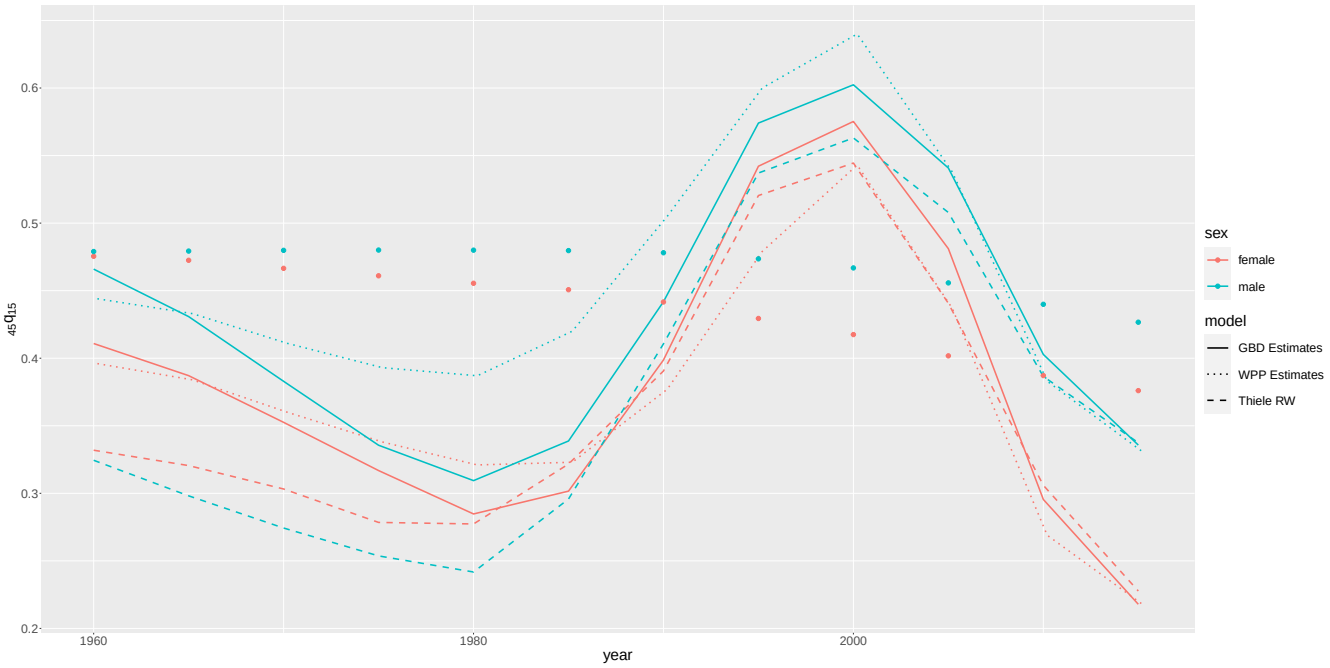

Figure 2: Estimated ${}_{45}q_{15}$

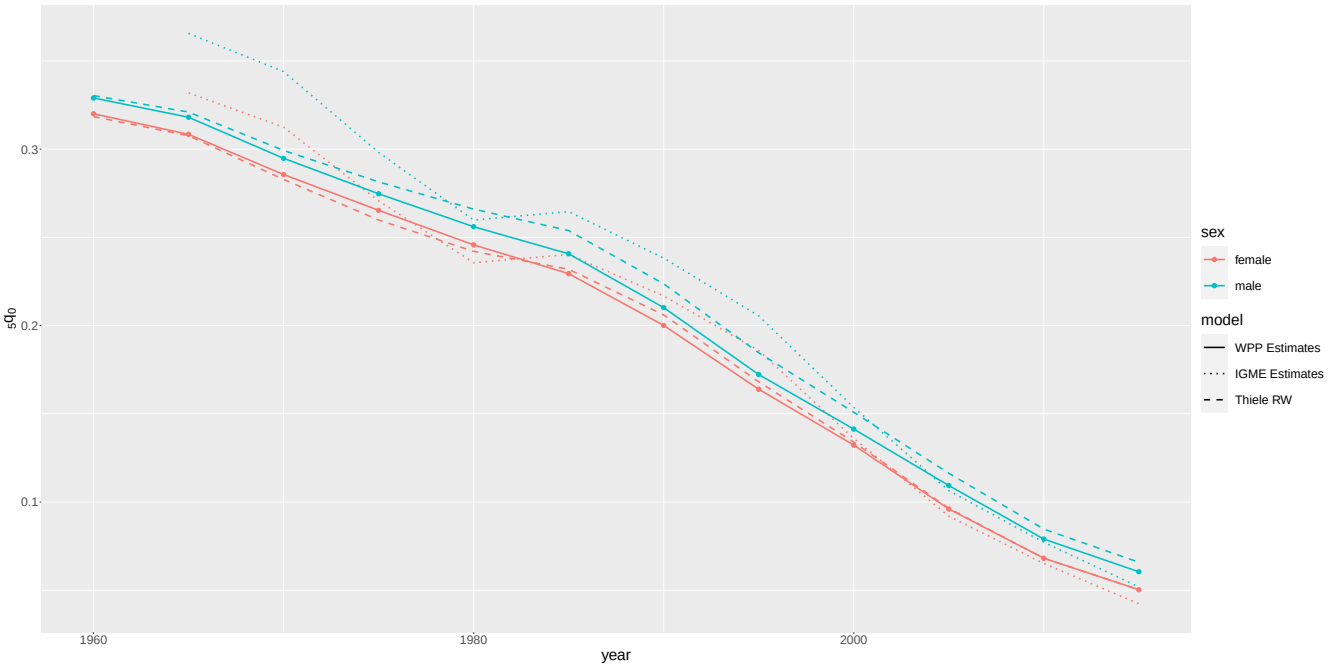

Figure 3: Estimated ${}_{5}q_{0}$

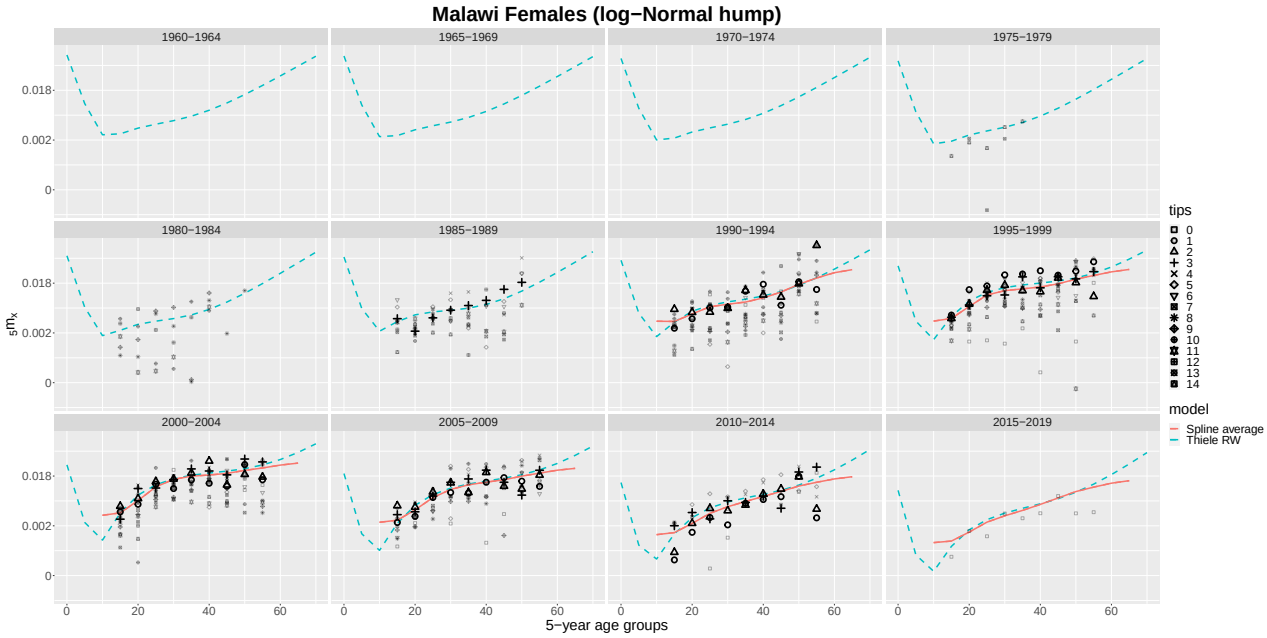

Figure 4: Mortality Schedules

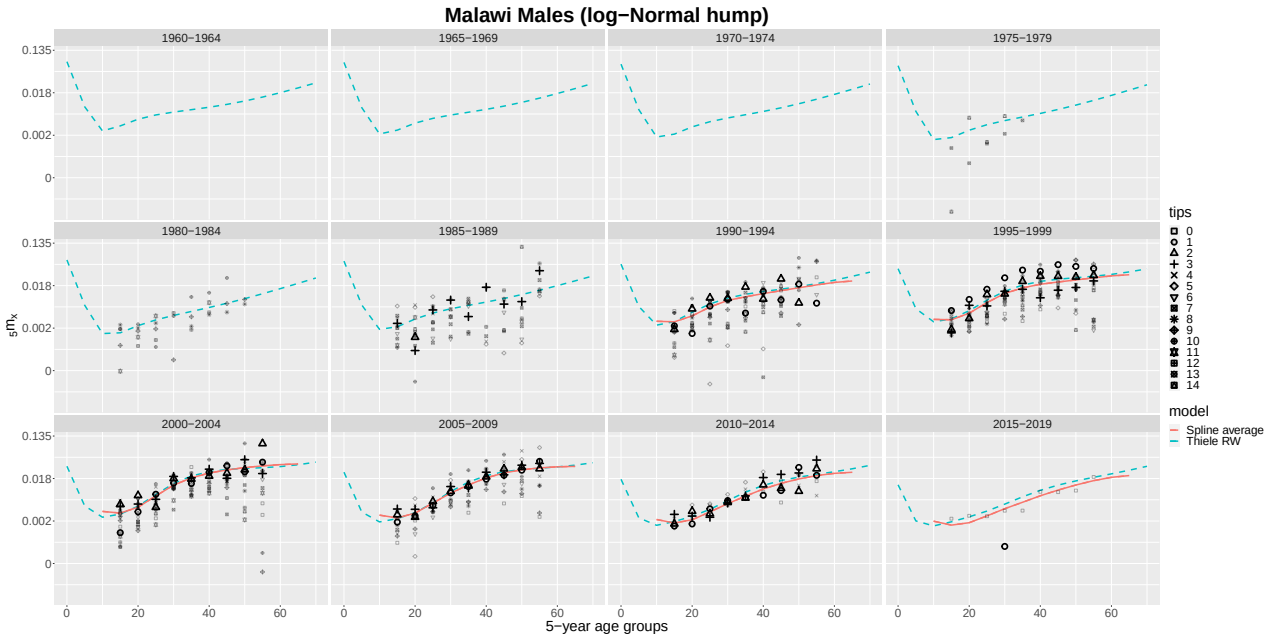

Figure 5: Mortality Schedules

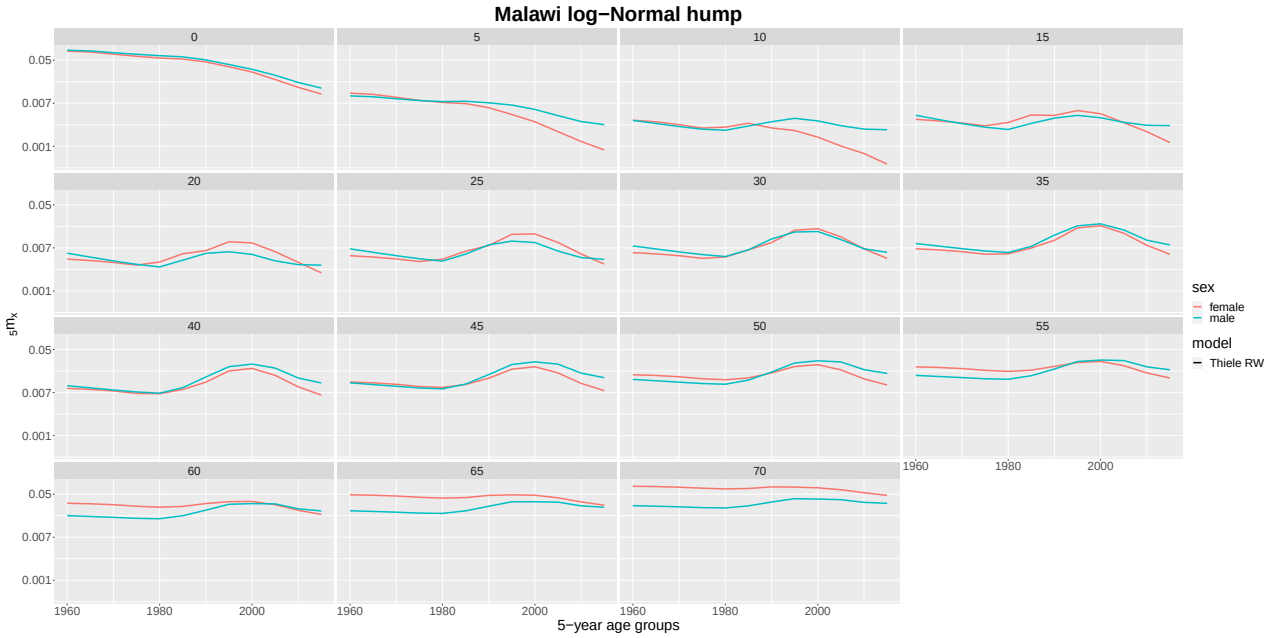

Figure 6: Mortality Schedules

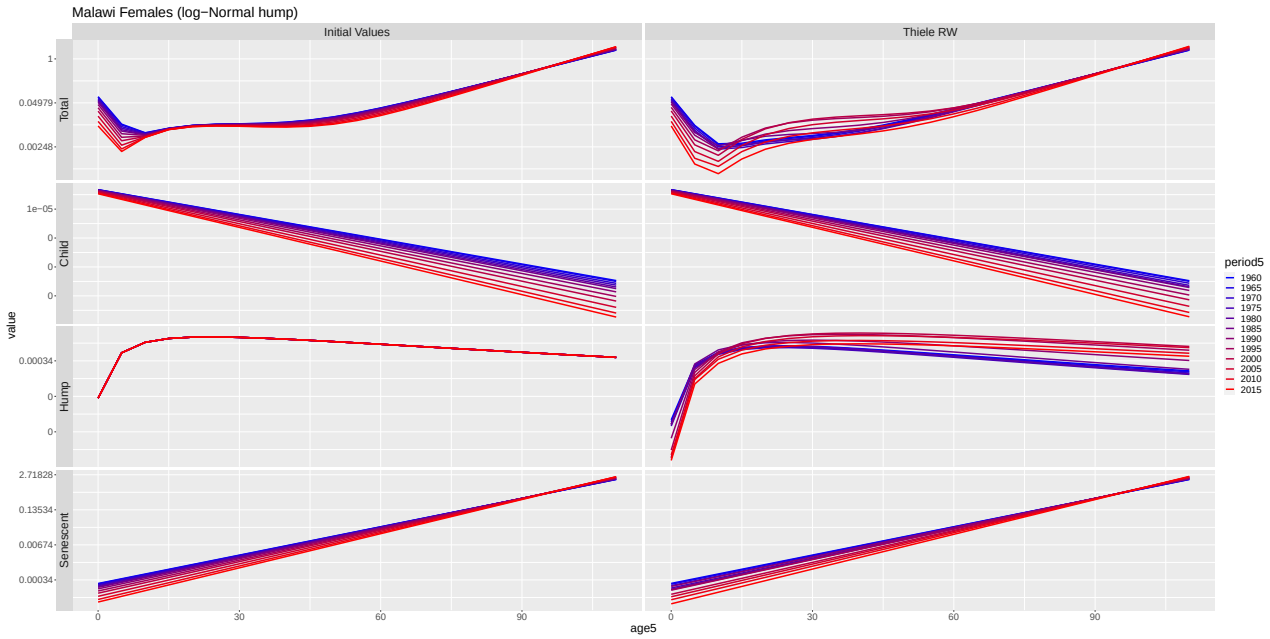

Figure 7: Thiele Decomposed

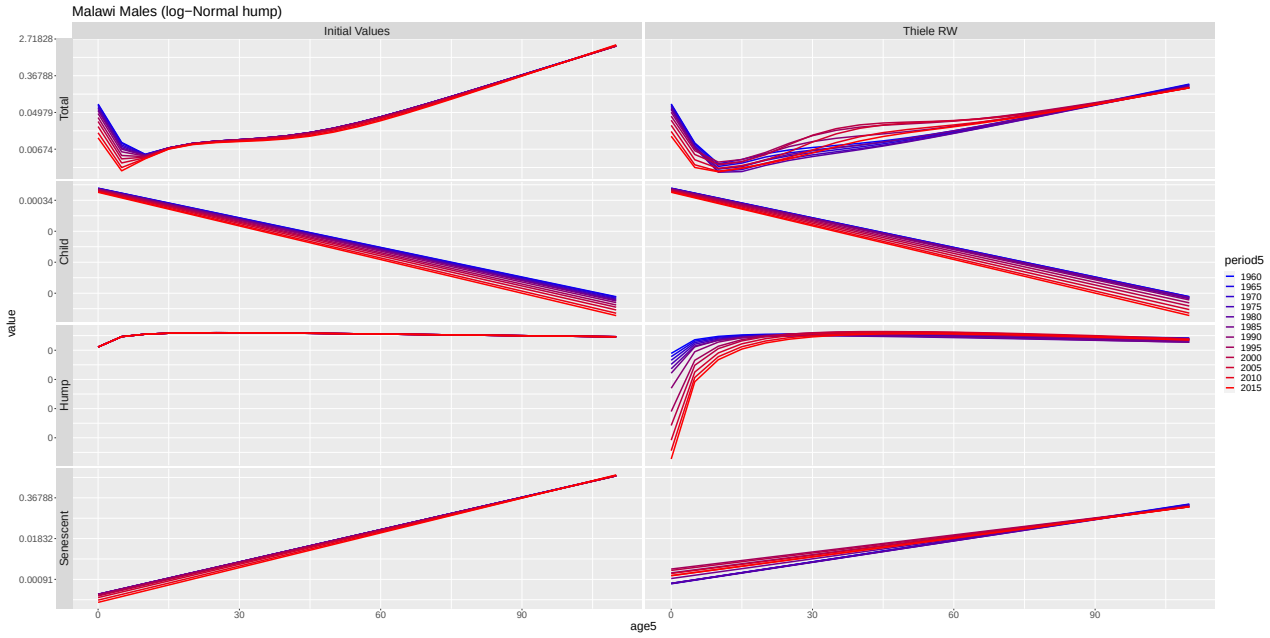

Figure 8: Thiele Decomposed

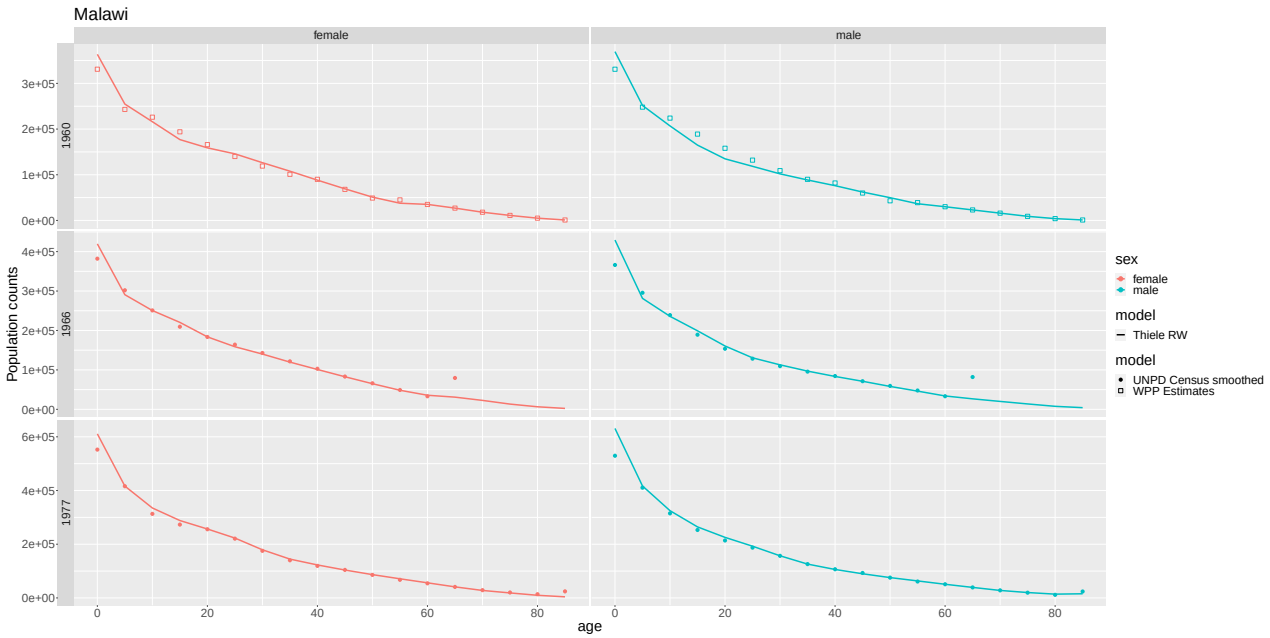

Figure 9: Population

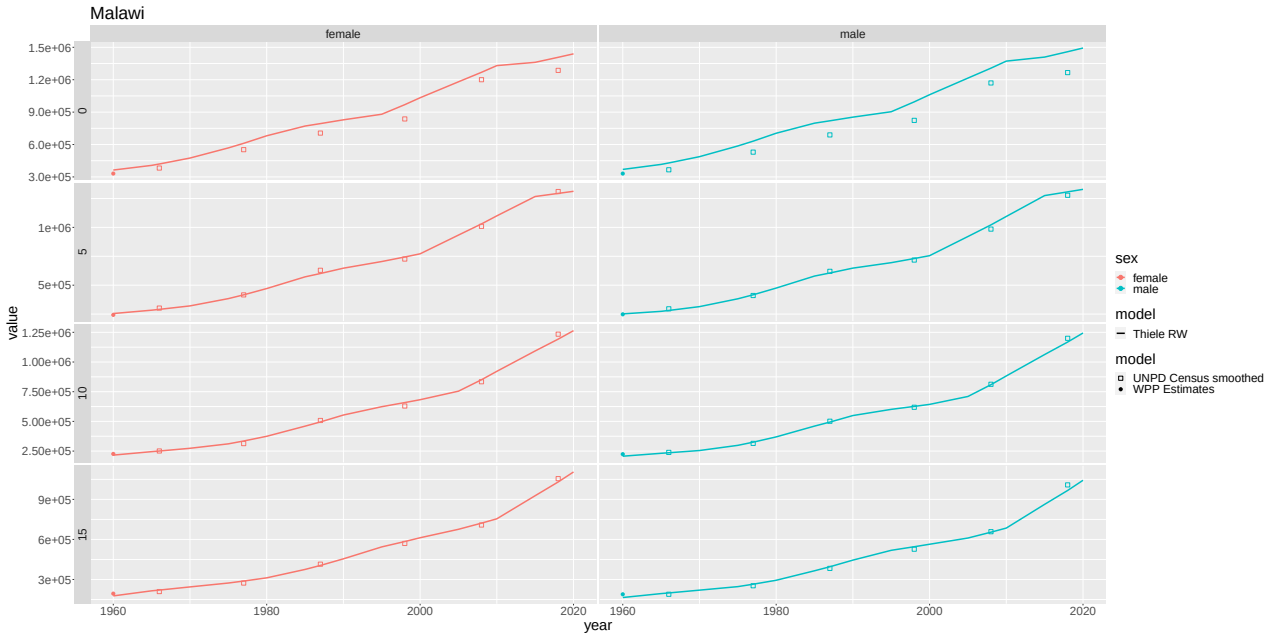

Figure 10: Population

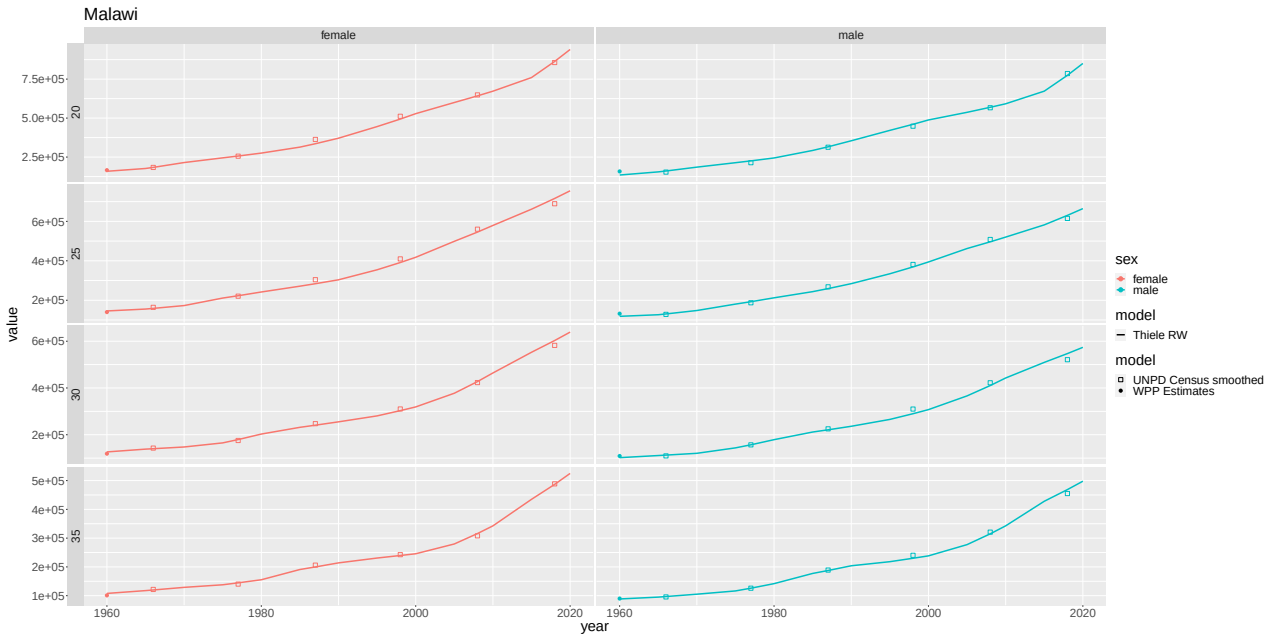

Figure 11: Population

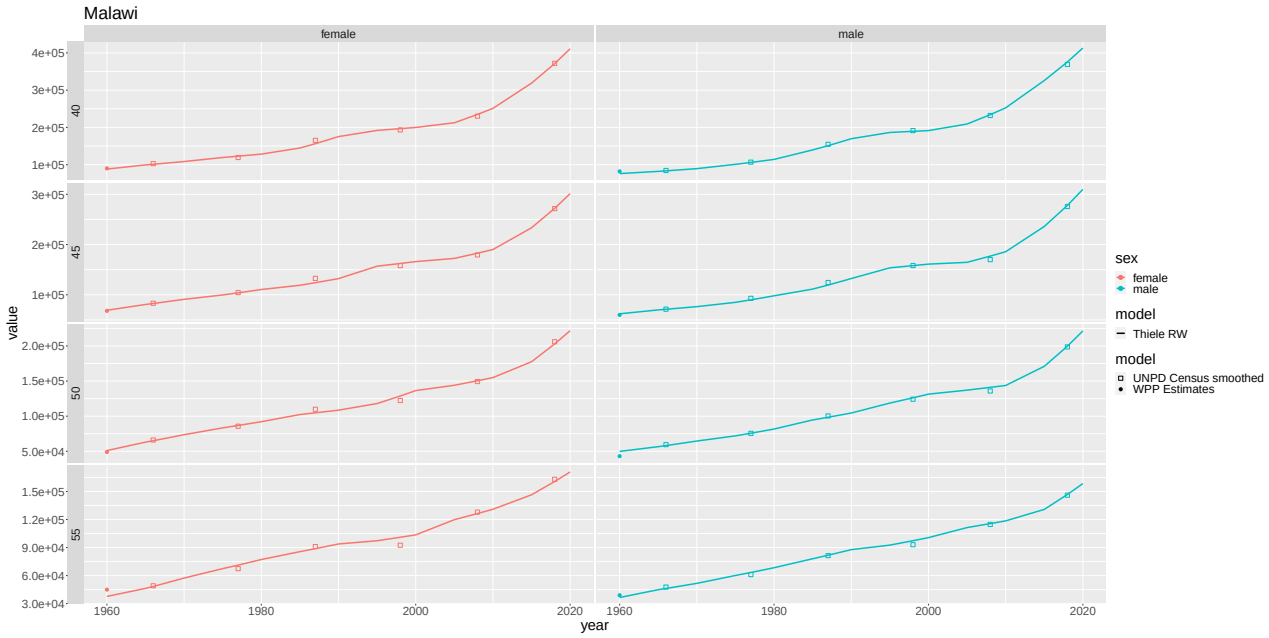

Figure 12: Population

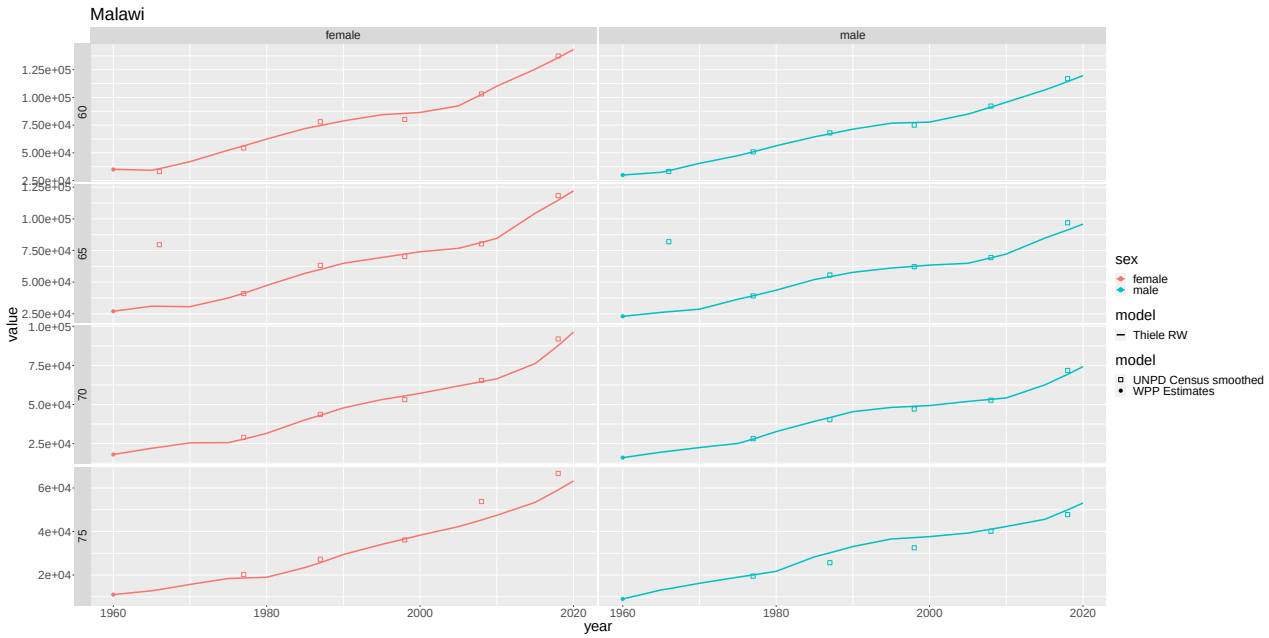

Figure 13: Population

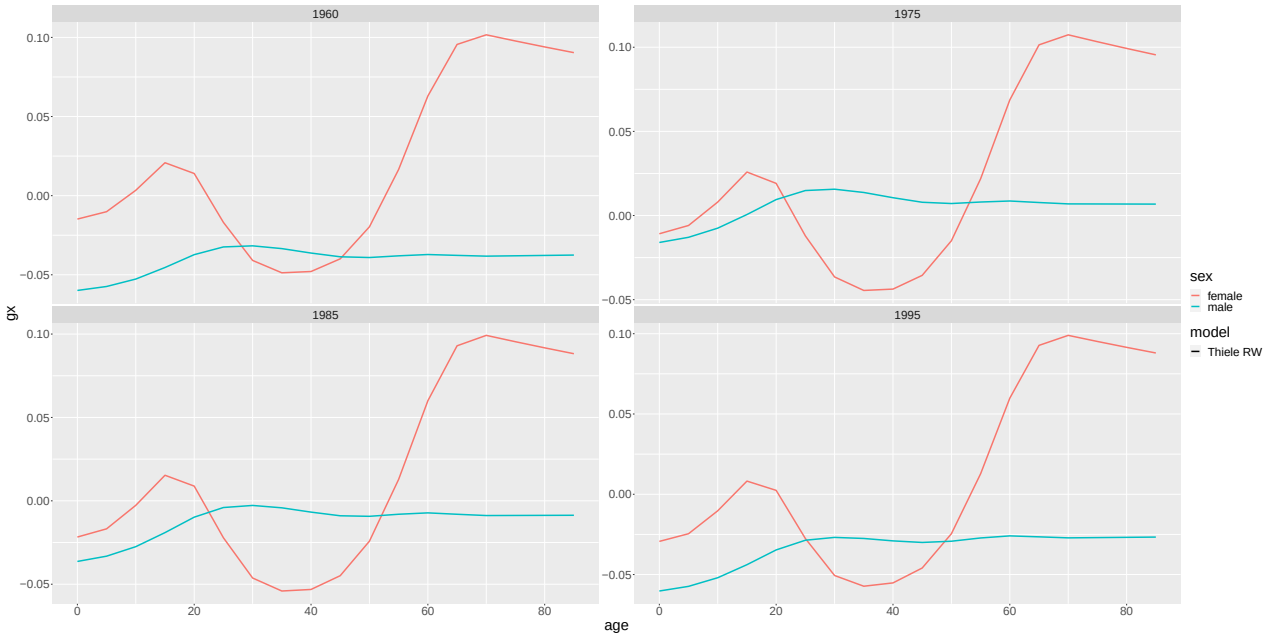

Figure 14: Migration

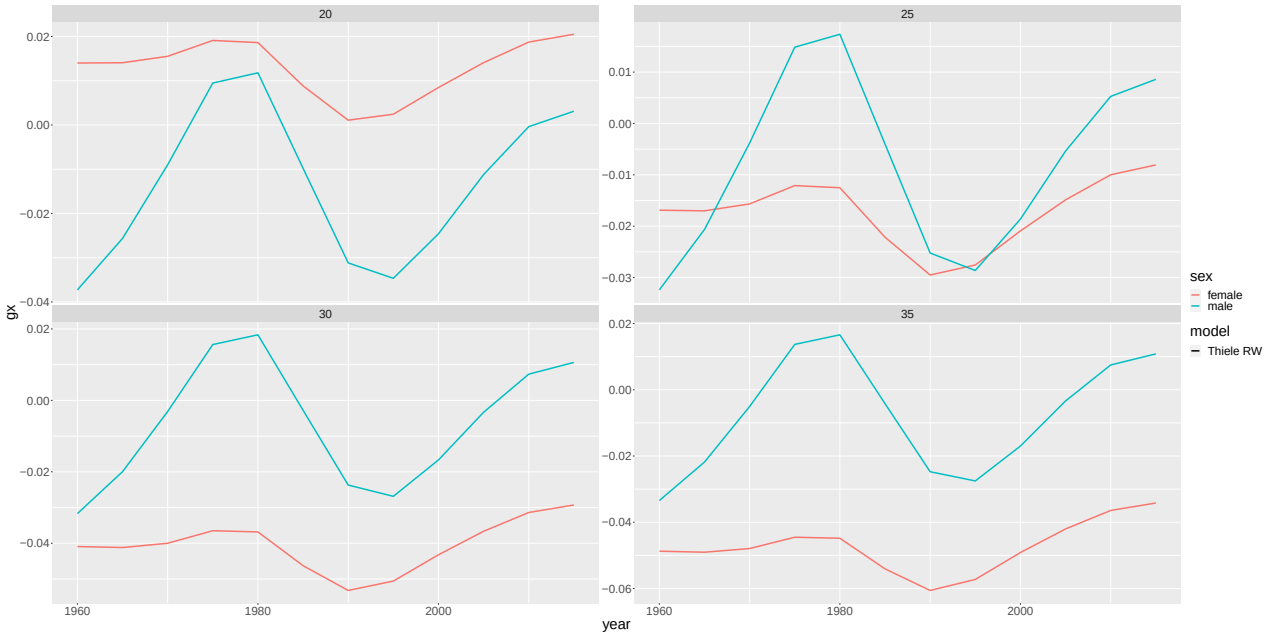

Figure 15: Migration

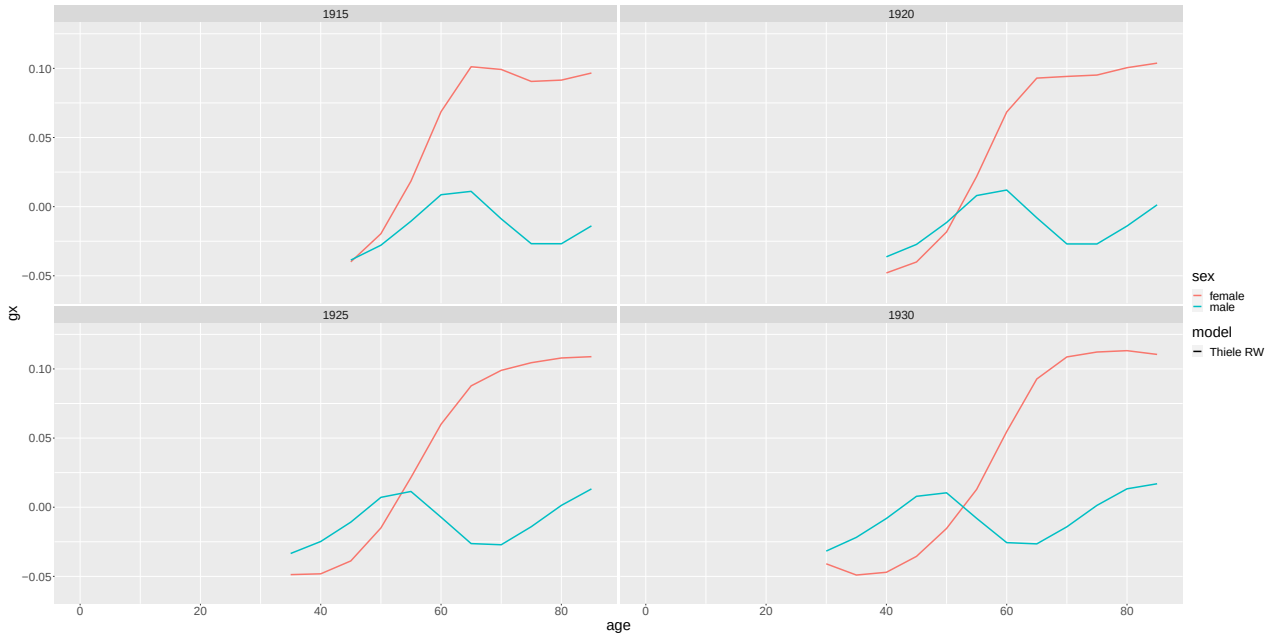

Figure 16: Migration

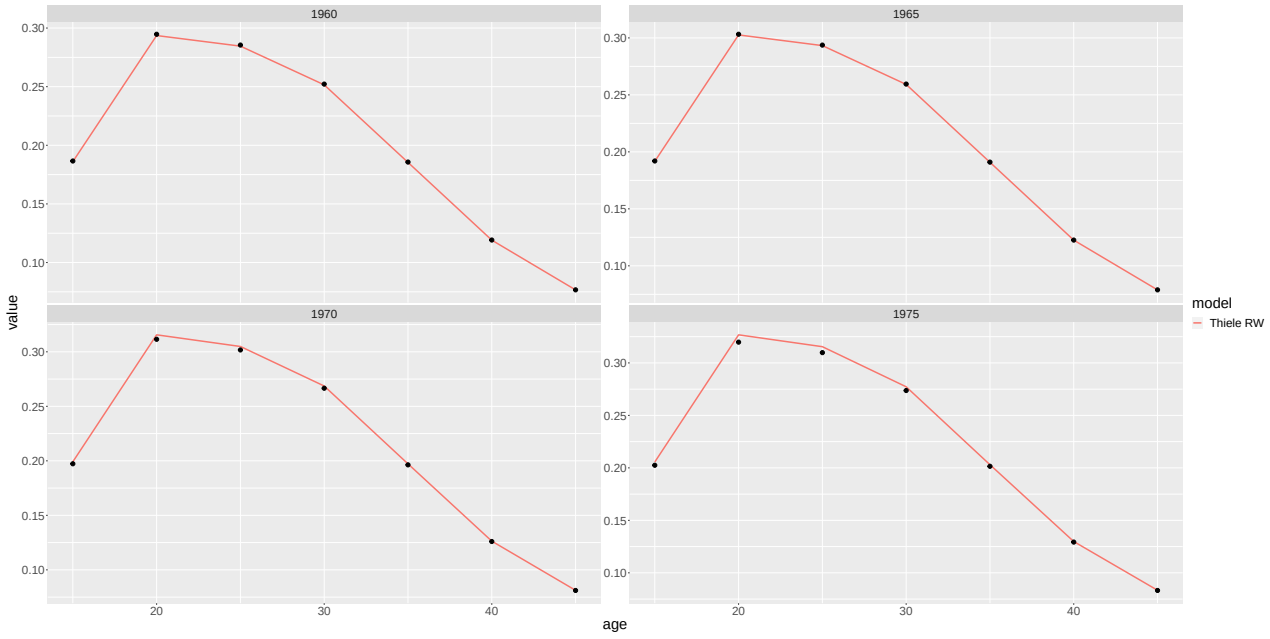

Figure 17: Fertility

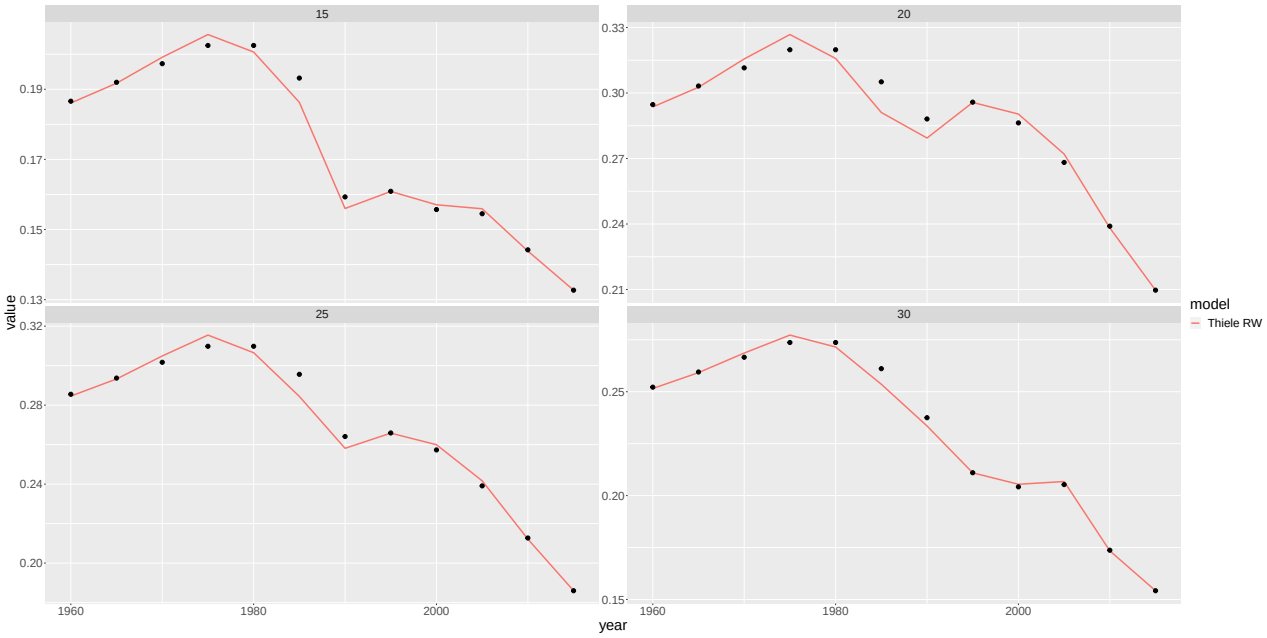

Figure 18: Fertility