Senegal

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

```
## # A tibble: 18 x 4
##    aggr.age  `1988`  `2002`  `2013`
##  *    <dbl>   <dbl>   <dbl>   <dbl>
##  1        0 657095  716100  926833.
##  2        5 573472  703724  884205.
##  3       10 459759. 655283. 781084.
##  4       15 379988. 582415. 677577.
##  5       20 318340  485829. 603110.
##  6       25 267352. 394499  529743.
##  7       30 219594. 323248. 439545.
##  8       35 173881. 263528  353976.
##  9       40 136773  212686. 288352.
## 10       45 109514  168203. 238373.
## 11       50  88982. 130956  197784.
## 12       55  72673  101096  157200.
## 13       60  49944   81280. 119593.
## 14       65  46281   64682.  87223.
## 15       70  70069   48960.  63212.
## 16       75     NA   32440.  43530.
## 17       80     NA   17741.  26791.
## 18       85     NA   19638.  27137.
```

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

```
## # A tibble: 18 x 4
##    aggr.age  `1988`  `2002`  `2013`
##  *    <dbl>   <dbl>   <dbl>   <dbl>
##  1        0 662816  728605  969977.
##  2        5 554176  719472  950470.
##  3       10 439450. 657396. 839277.
##  4       15 349782. 559460  695107.
##  5       20 281996  455336. 578308.
##  6       25 231692  361872  488217.
##  7       30 190505. 286483. 406325.
##  8       35 154484. 231792. 328661.
##  9       40 125626  194048. 262459.
## 10       45 103543. 161778  214857.
## 11       50  87788. 129020  183726.
## 12       55  75121.  99418. 153017.
## 13       60  58463   79959. 118028.
## 14       65  51690   64899.  84264.
## 15       70  70302   49766.  59469.
## 16       75     NA   33960.  40615.
## 17       80     NA   18956.  24673.
## 18       85     NA   15910.  22853.
```

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
##    7.94    0.11    8.10
```

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

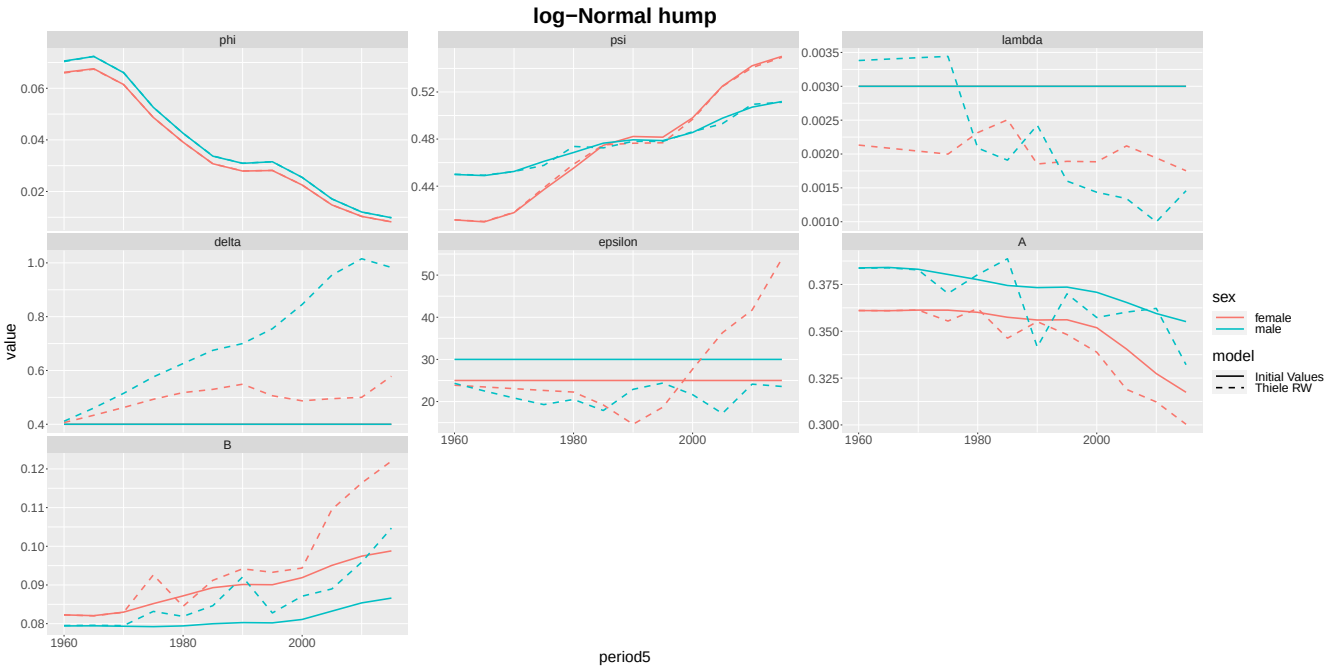

Figure 1: Estimated parameters

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

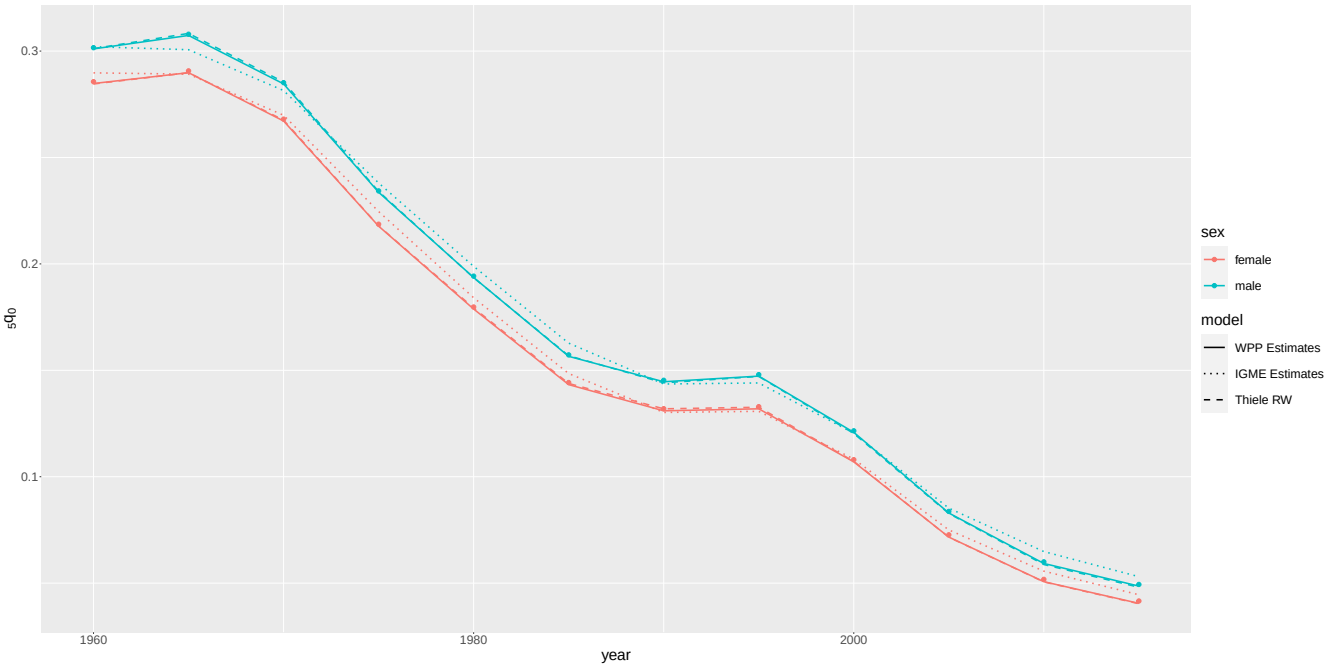

Figure 3: Estimated ${}_{5}q_{0}$

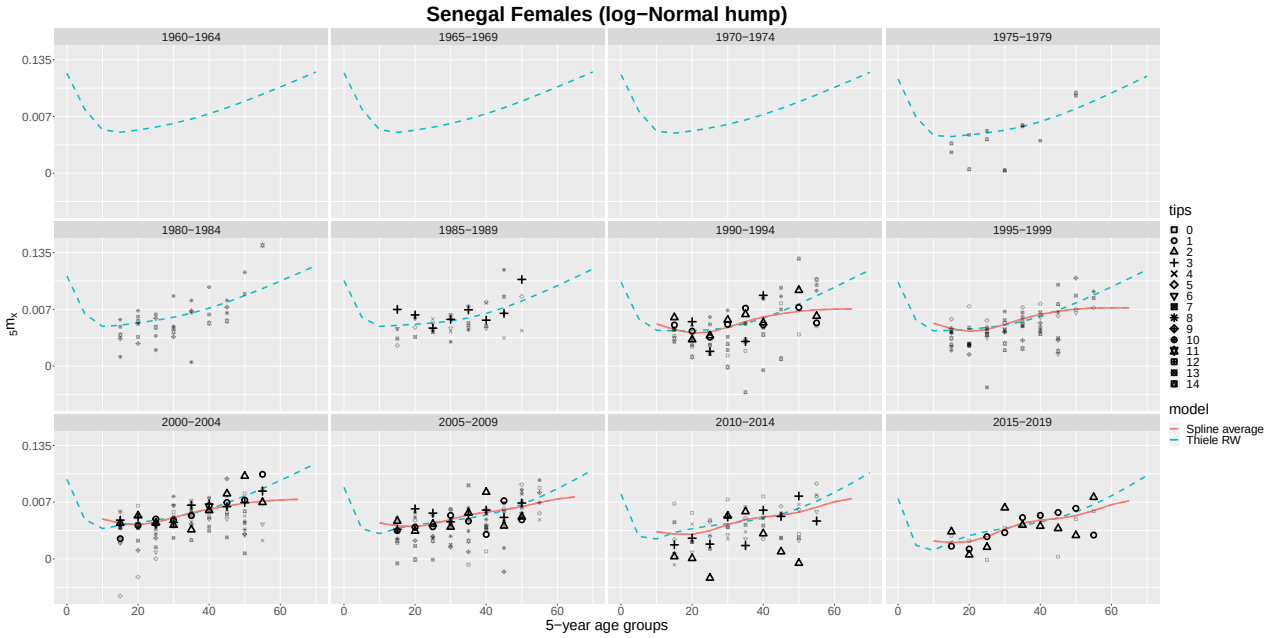

Figure 4: Mortality Schedules

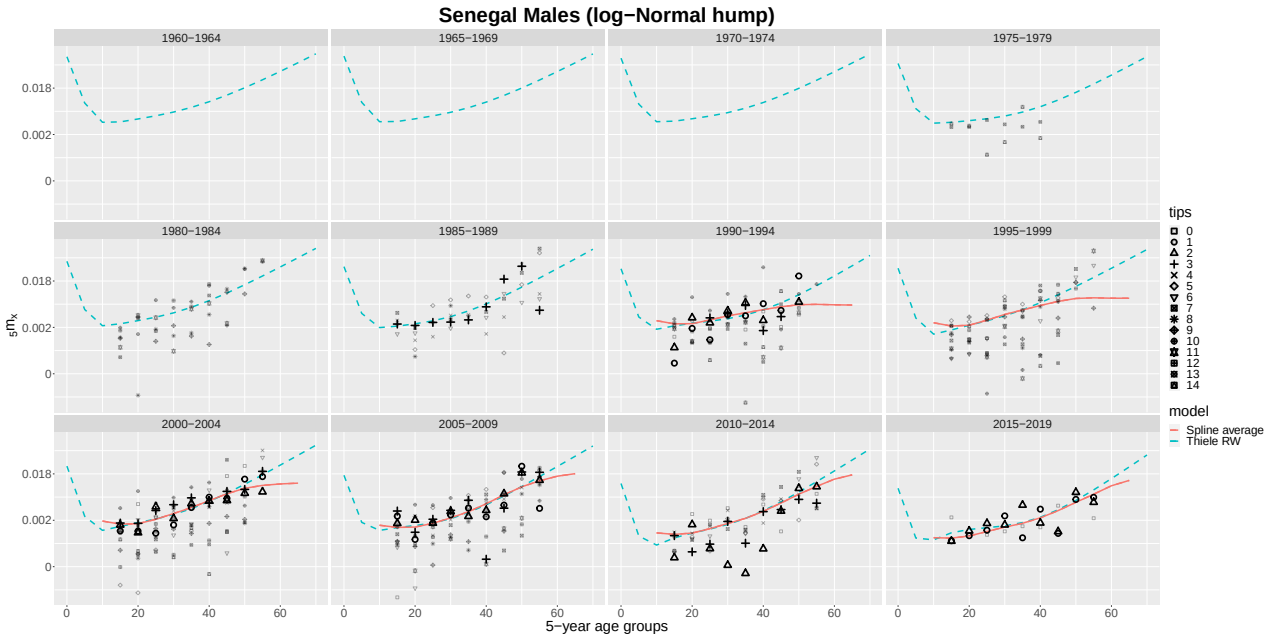

Figure 5: Mortality Schedules

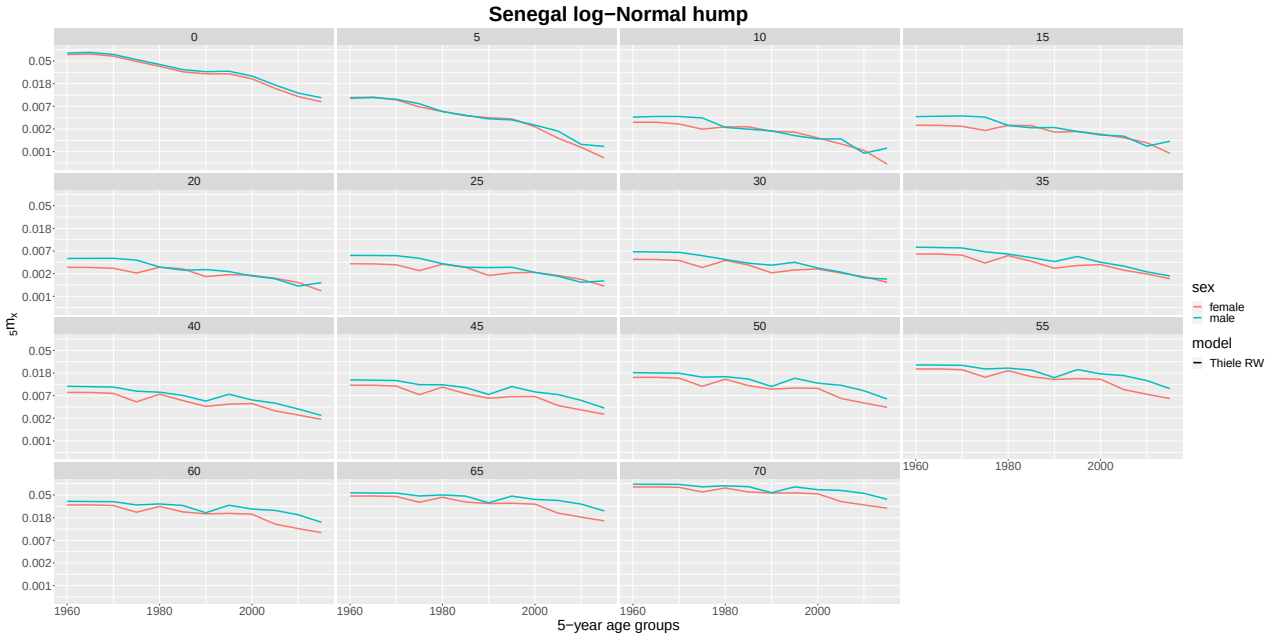

Figure 6: Mortality Schedules

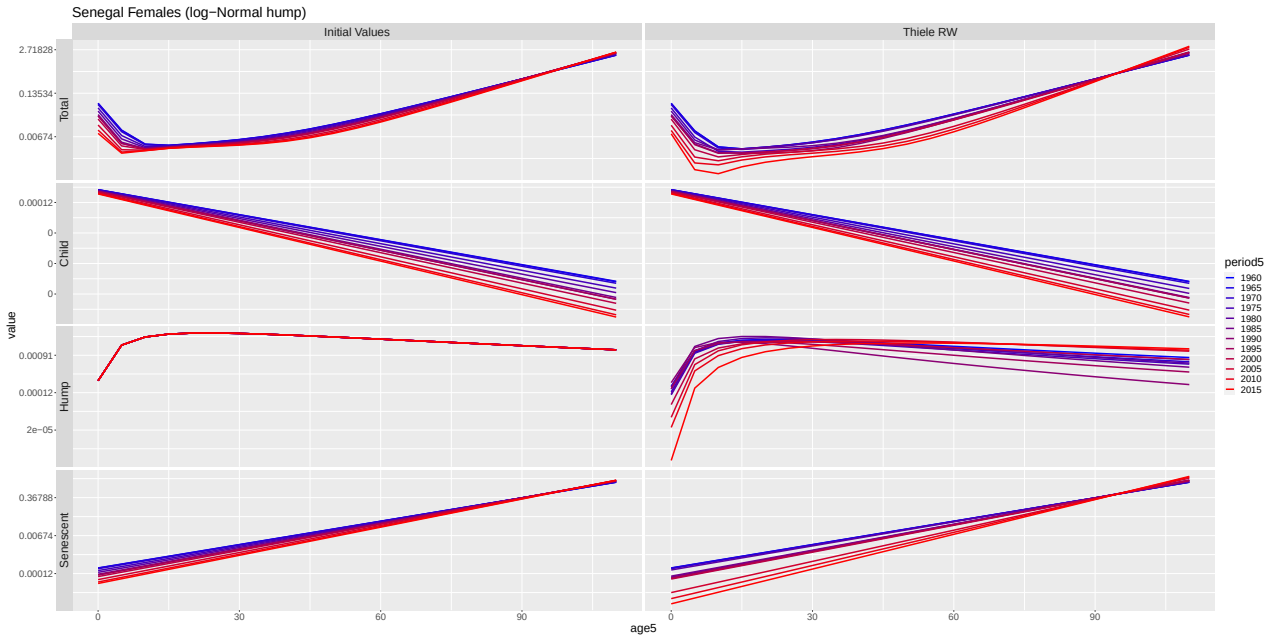

Figure 7: Thiele Decomposed

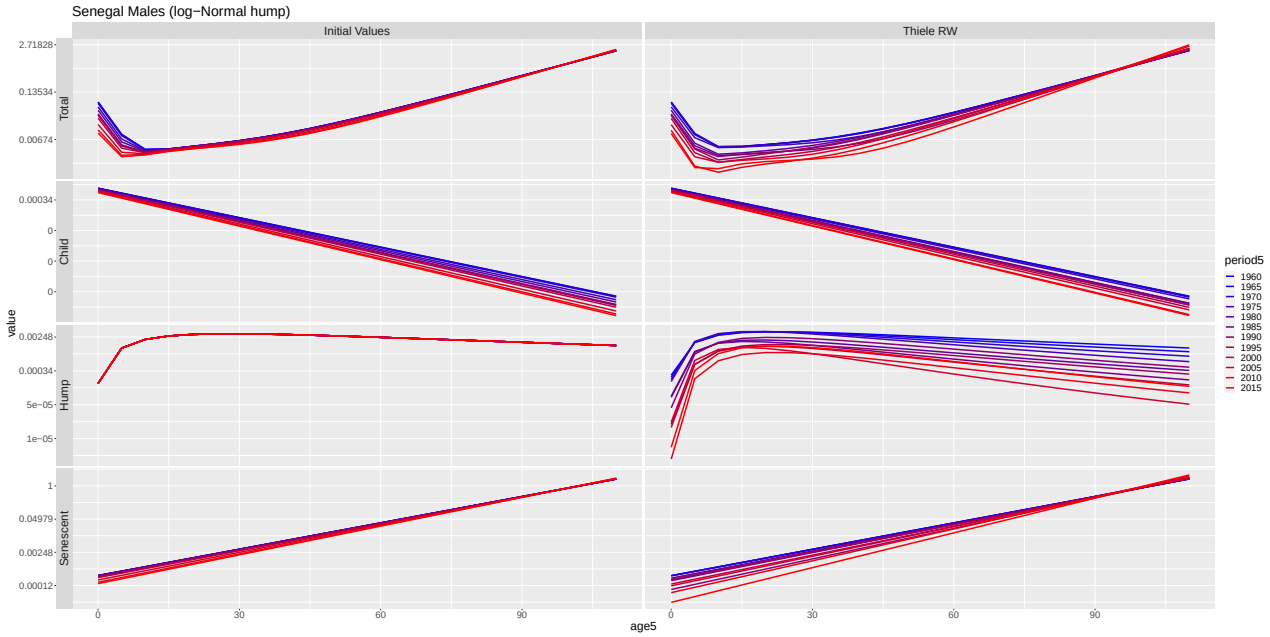

Figure 8: Thiele Decomposed

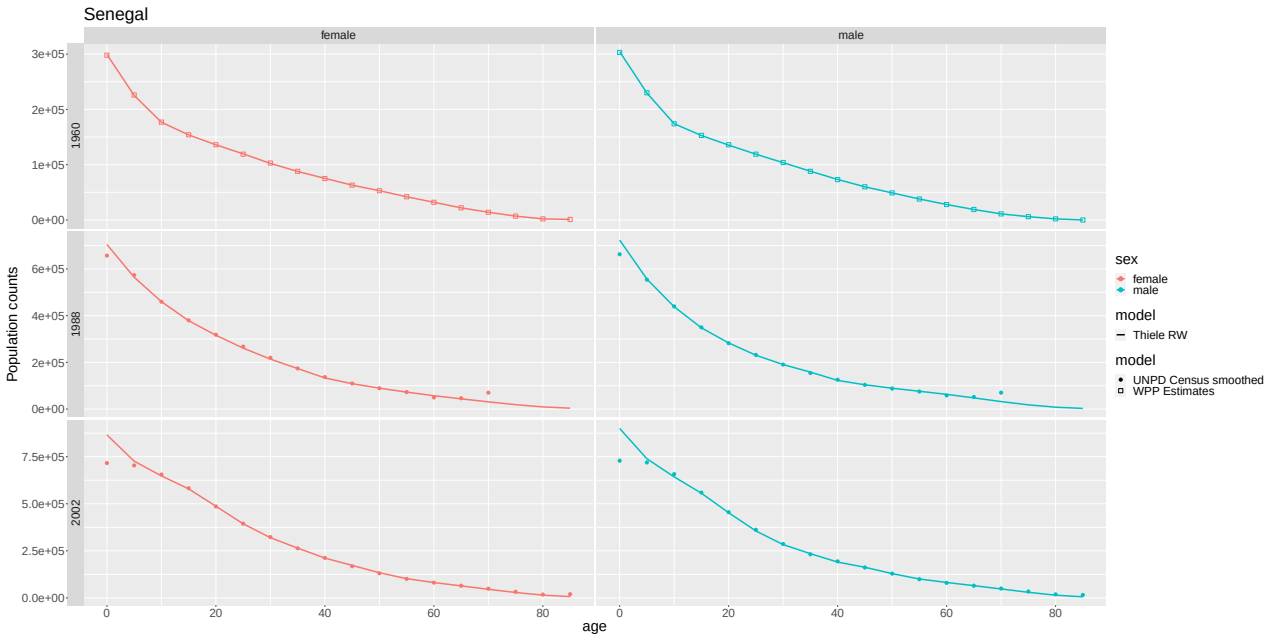

Figure 9: Population

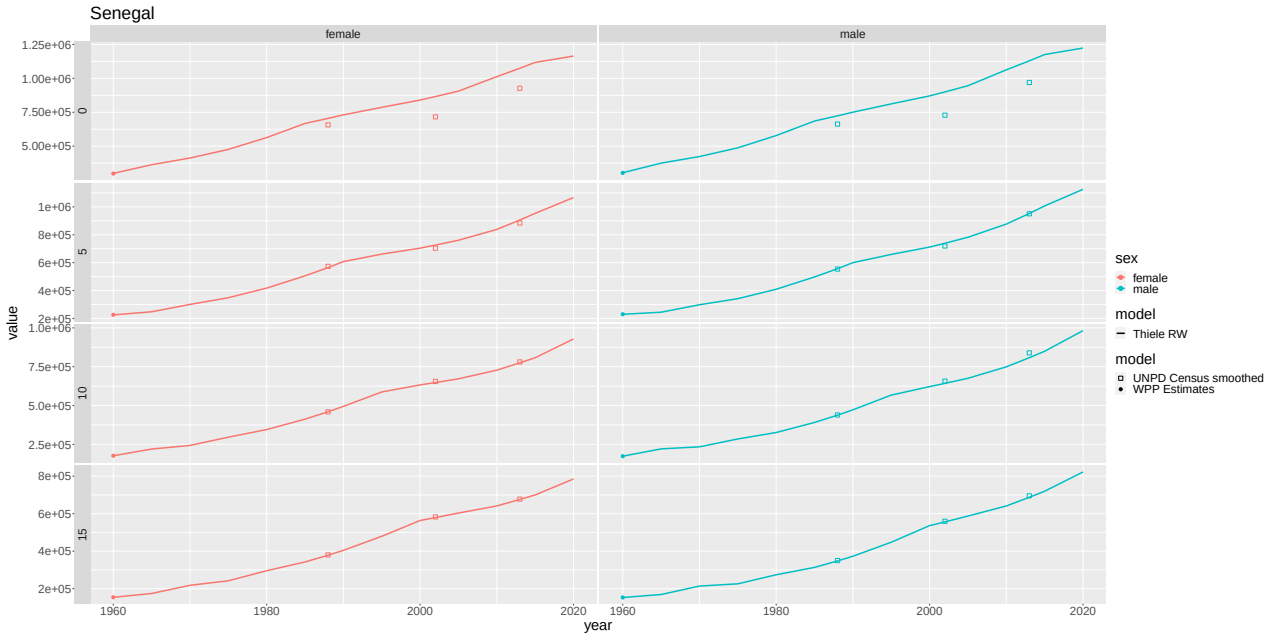

Figure 10: Population

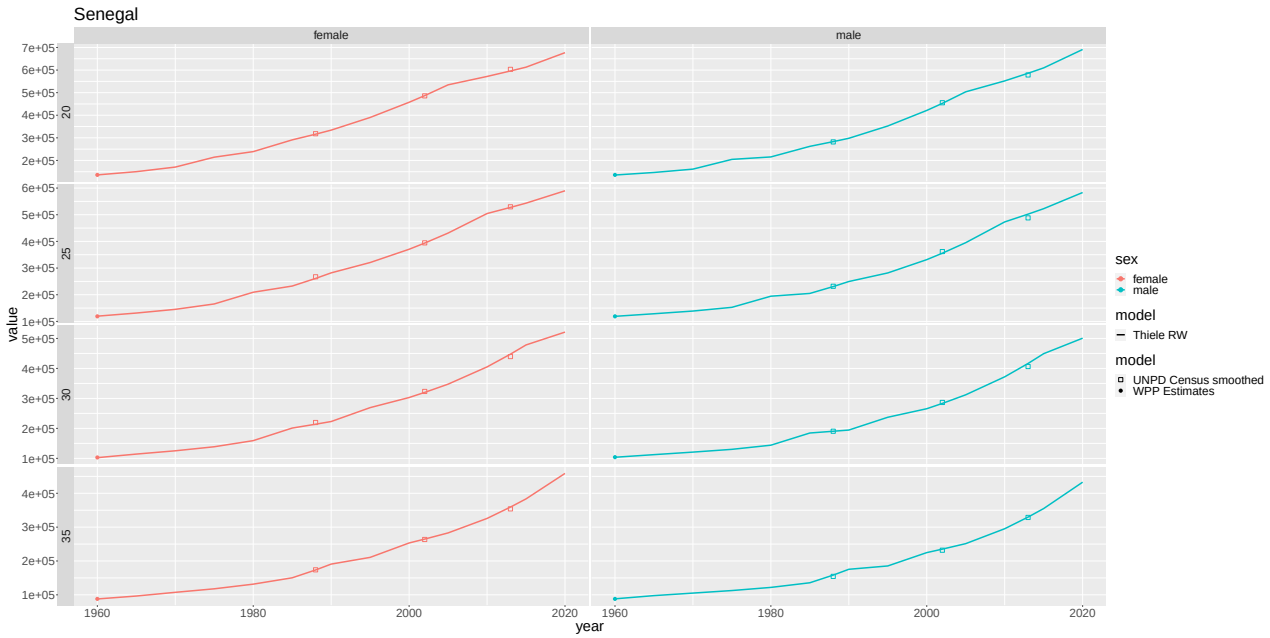

Figure 11: Population

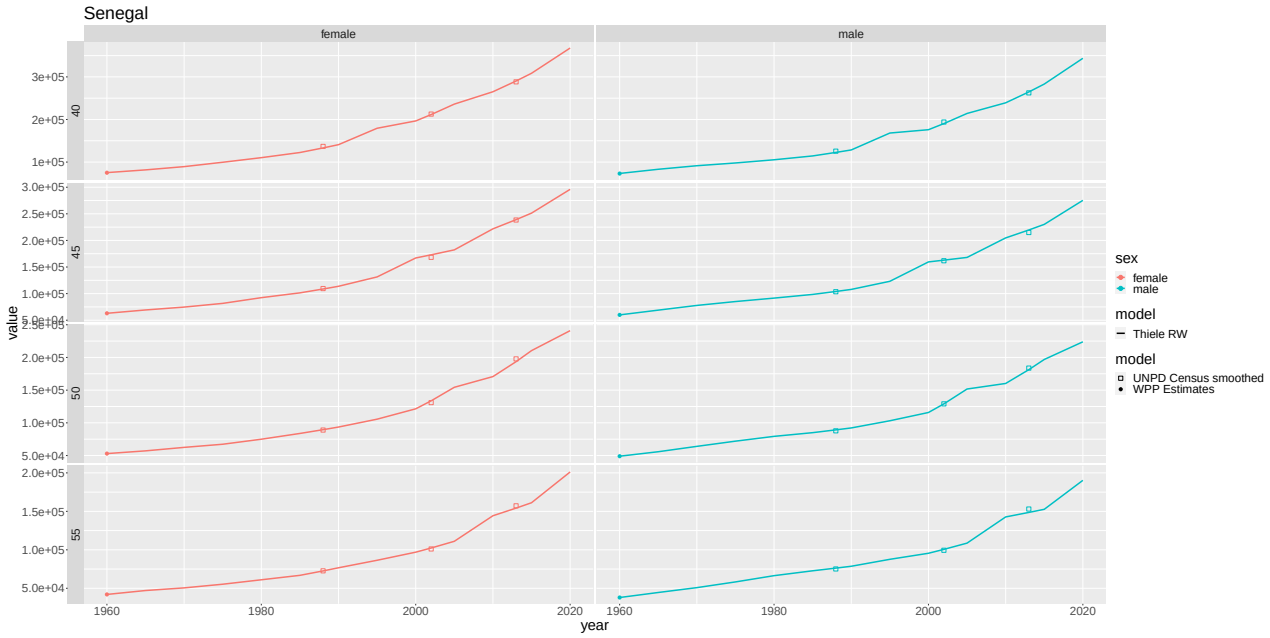

Figure 12: Population

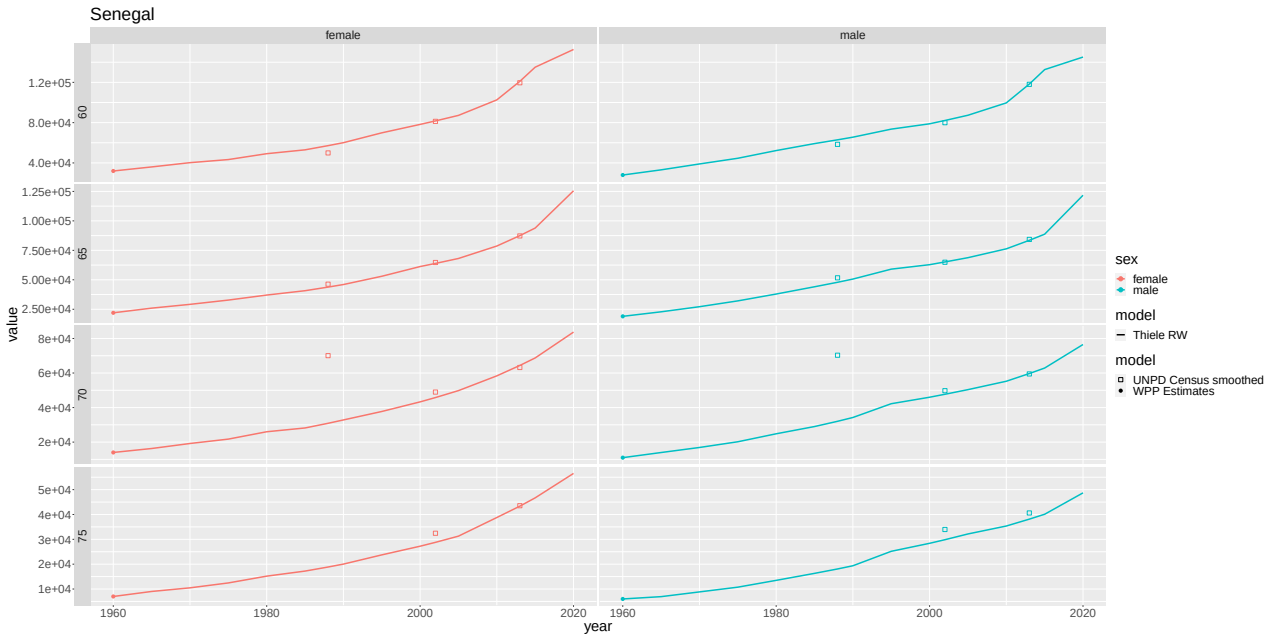

Figure 13: Population

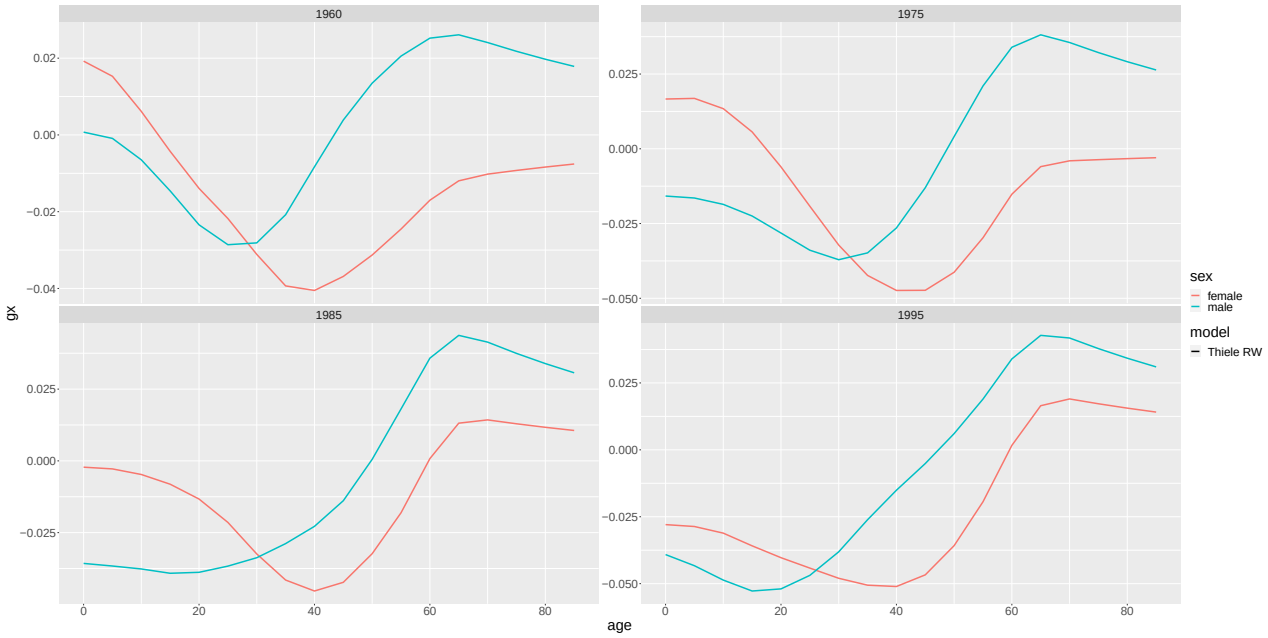

Figure 14: Migration

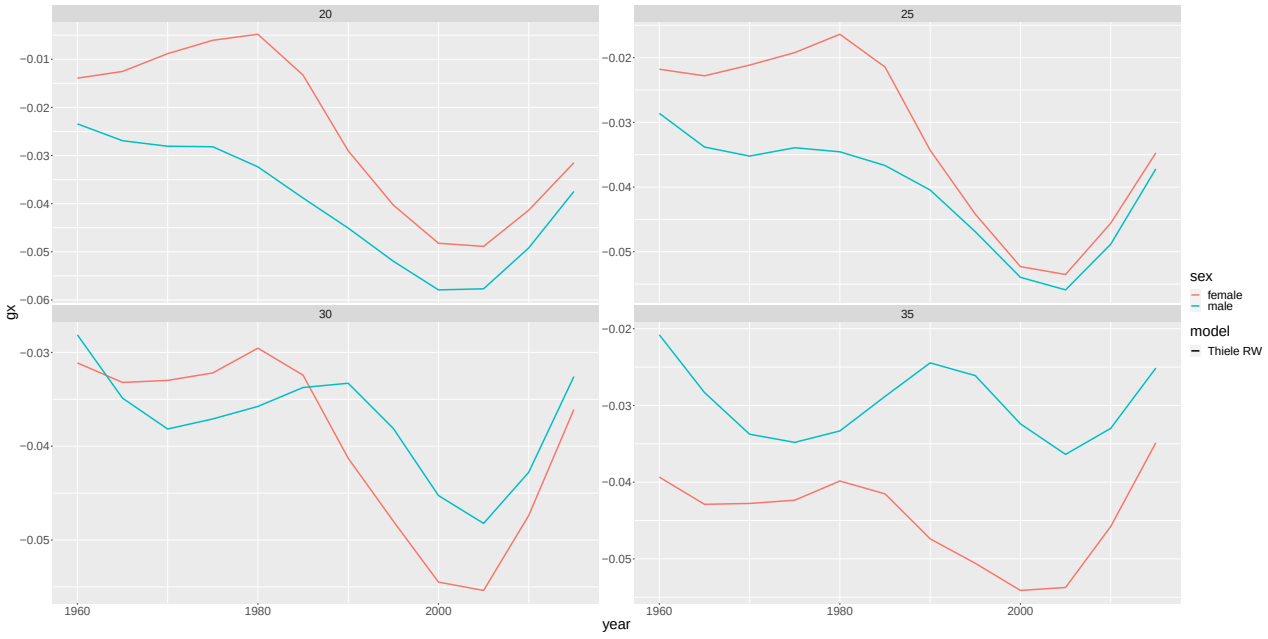

Figure 15: Migration

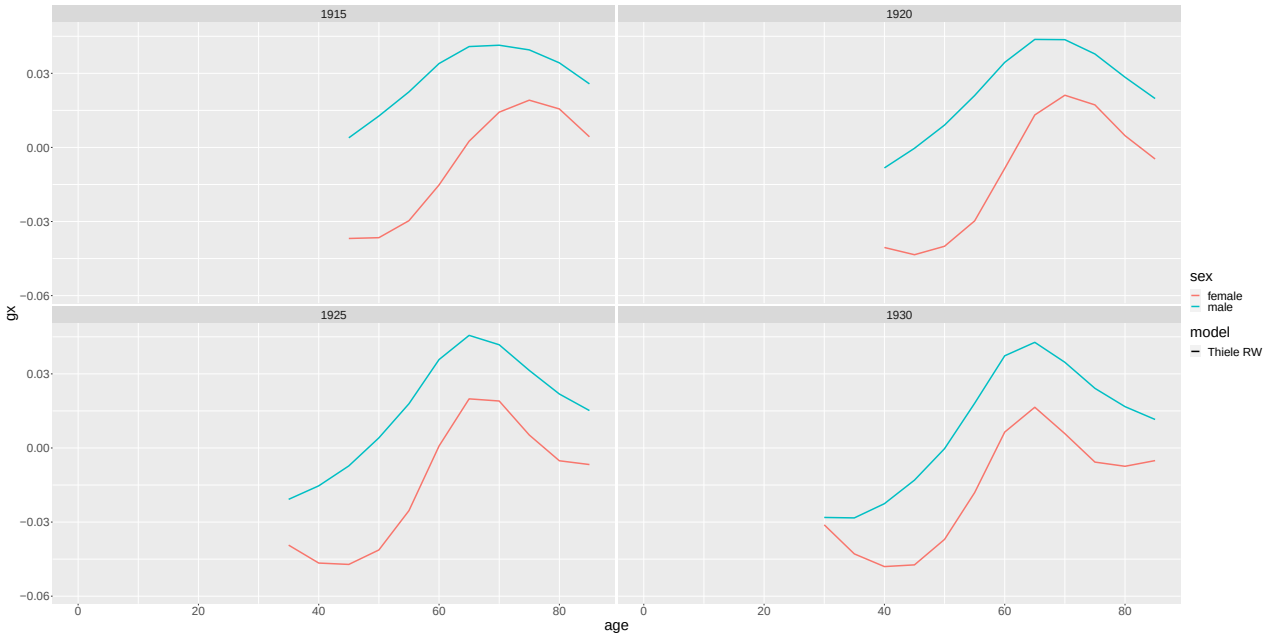

Figure 16: Migration

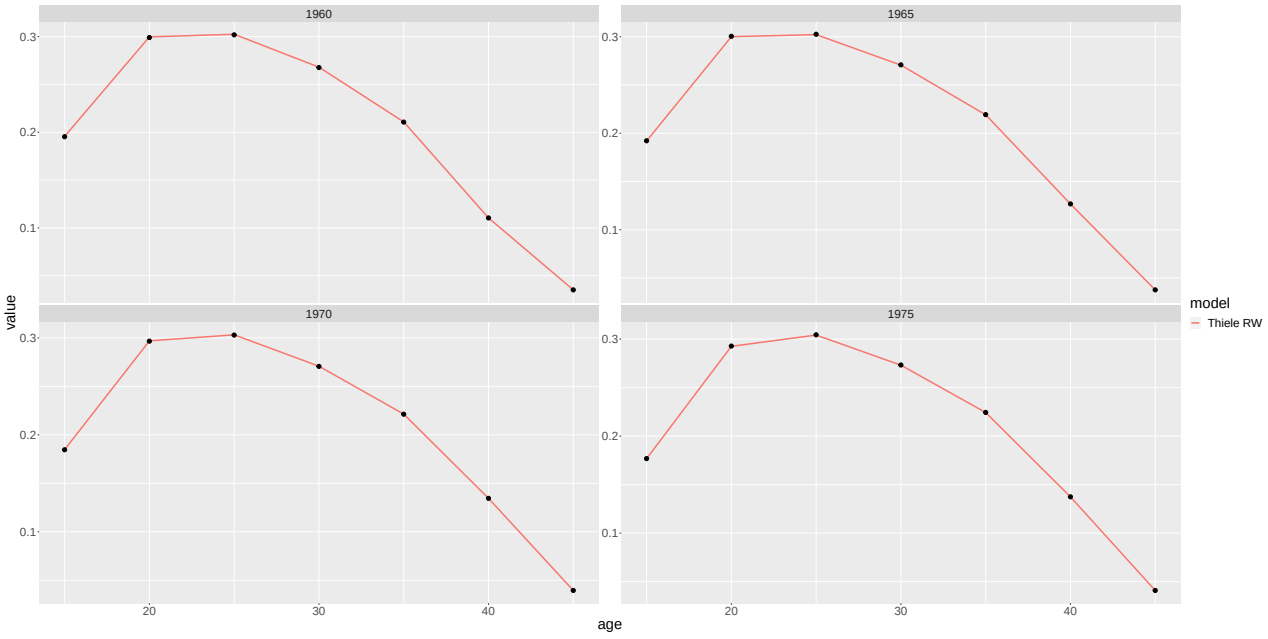

Figure 17: Fertility

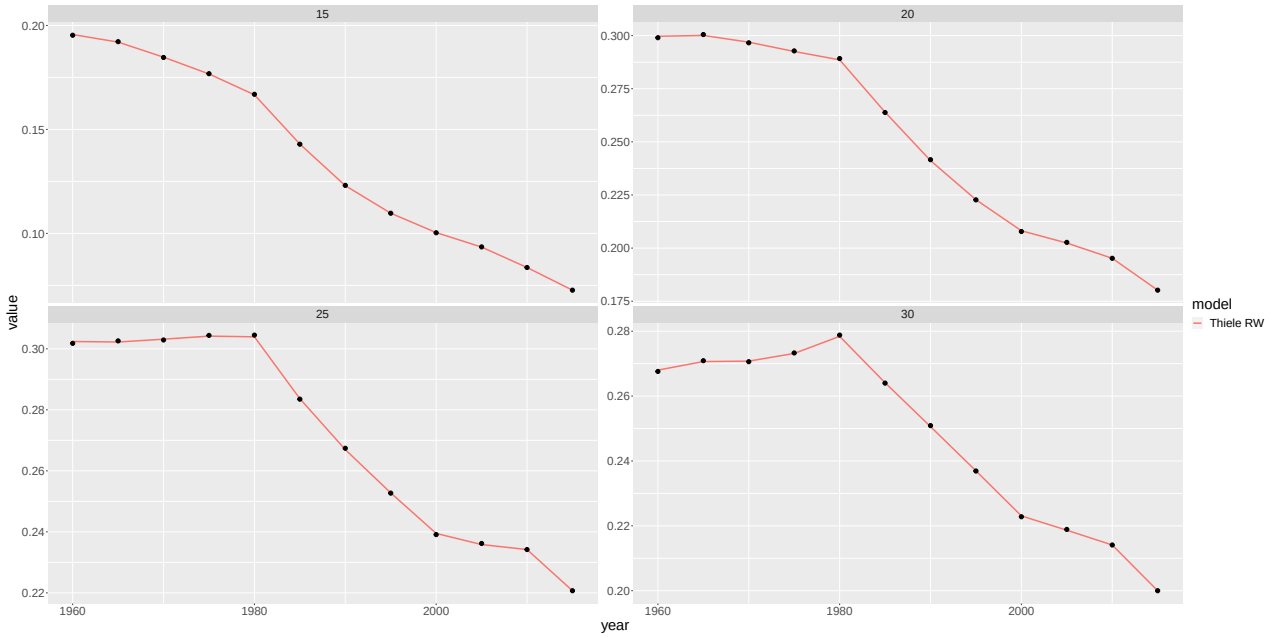

Figure 18: Fertility