Lesotho

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

```
## # A tibble: 18 x 7
##    aggr.age `1966` `1976`  `1986`  `1996`  `2006`  `2016`
##  *    <dbl>  <dbl>  <dbl>   <dbl>   <dbl>   <dbl>   <dbl>
##  1        0 61790. 86137. 111810. 102516. 100598   99362
##  2        5 62869. 80165. 109553. 117963. 105316. 107586.
##  3       10 55535. 75752. 100753. 123895. 110040. 107761.
##  4       15 48562. 67350.  87571. 114216. 111254. 103920.
##  5       20 40932. 55461.  74997.  92603. 102152   99418.
##  6       25 34107. 44109.  62020.  71754.  82608.  91978.
##  7       30 28874. 35611.  49448.  59416.  62339   79414.
##  8       35 25754. 31921.  39635.  50726.  49704   63272.
##  9       40 23274. 29893.  32901.  41871.  43442.  48964.
## 10       45 20512. 25268.  29931.  34156.  38776.  40782
## 11       50 18189. 21805.  27462.  28055.  33541   37417
## 12       55 16204. 20177.  22000.  24845.  27296.  33785.
## 13       60 13836. 16357.  18039.  22459.  21883   28252.
## 14       65 11212. 12186.  16038.  17256.  20130.  22834
## 15       70  8802. 10347.  12161.  12968.  18733.  18834
## 16       75  6078.  8706.   8324.  10184.  13276   15850.
## 17       80  3646.  4372.   5725.   5257.   7928.  11826.
## 18       85  5207.  4445.   7621.   6397.   7309   10006.
```

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

```
## # A tibble: 18 x 7
##    aggr.age `1966` `1976`  `1986`  `1996`  `2006`  `2016`
##  *    <dbl>  <dbl>  <dbl>   <dbl>   <dbl>   <dbl>   <dbl>
##  1        0 60656. 85931. 113851. 104230. 101397  100793
##  2        5 63464. 80153. 110687. 120469. 106391. 107144.
##  3       10 50819. 73397.  99977. 125098. 110763. 107981.
##  4       15 39157. 61668.  82770. 111192. 110441. 104784.
##  5       20 27256. 50032.  67354.  86836.  99943   99918.
##  6       25 18271. 41339.  55999.  66645.  81474   94347.
##  7       30 14614. 34579.  47098.  55028.  62015.  84490
##  8       35 14565. 31374.  39678.  47007.  47748.  68028.
##  9       40 14724. 29008.  33697.  40089.  39735.  50500.
## 10       45 14038. 24309.  30380.  33831.  34131.  38325
## 11       50 12961. 20635.  26824.  27505.  28693.  31438.
## 12       55 11384. 18142.  20728.  22931.  22974.  26018.
## 13       60  9231. 13537.  16158.  18947.  17510.  20652.
## 14       65  7017.  9024.  13203.  13353.  14210.  15852.
## 15       70  5115.  6620.   8928.   9035.  11614   11953
## 16       75  3240.  4774.   5150.   6303.   7321.   8594.
## 17       80  1778.  1927.   2695.   2627.   3709    5297
## 18       85  2130.  1854.   3103.   2588.   2608.   3425
```

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
##   98.42    1.53  100.33
```

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

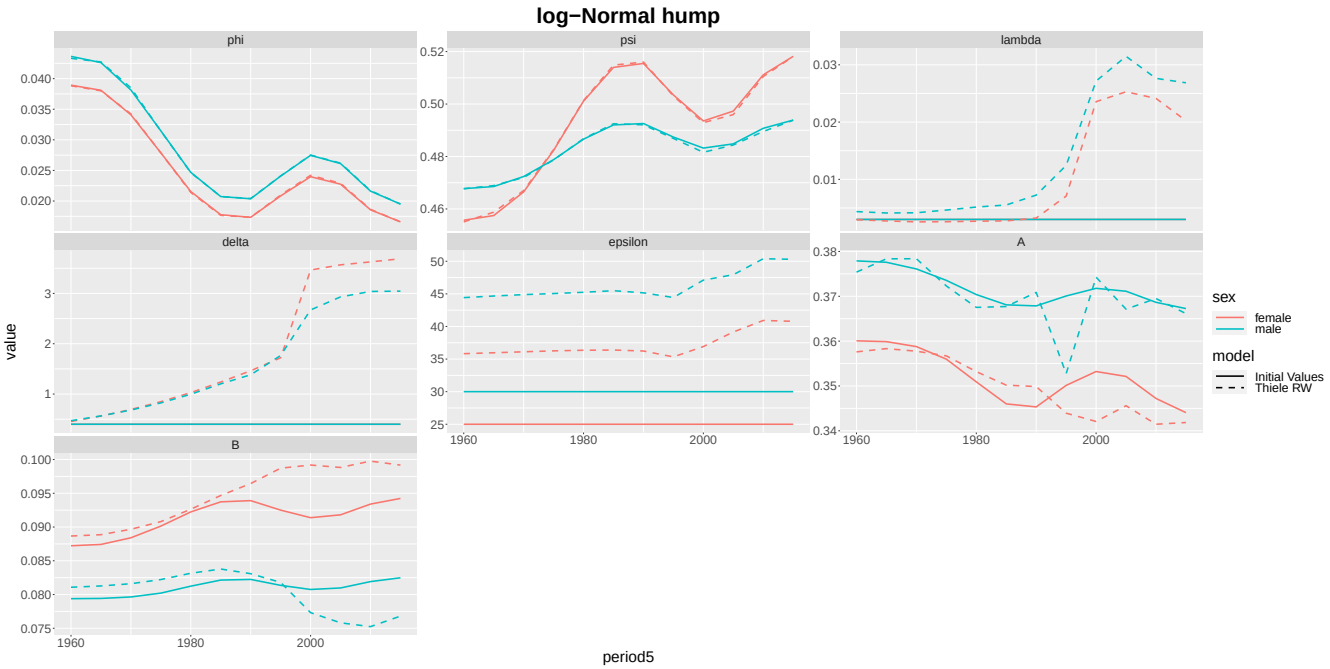

Figure 1: Estimated parameters

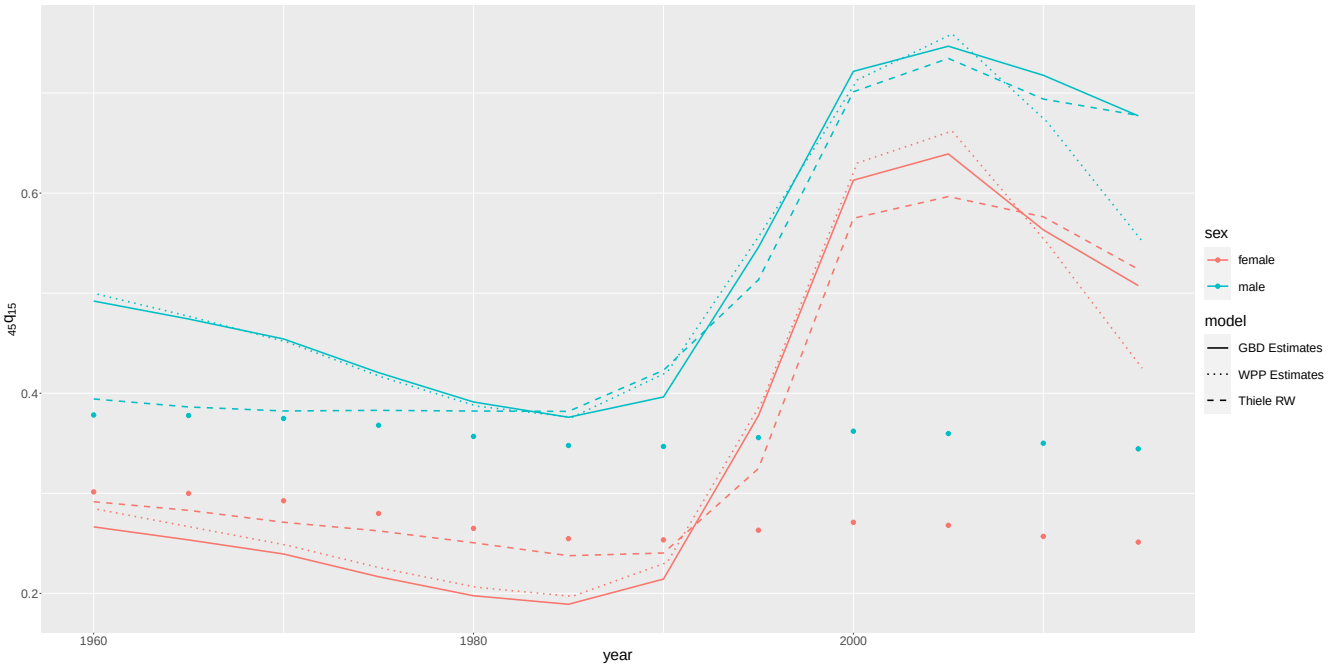

Figure 2: Estimated ${}_{45}q_{15}$

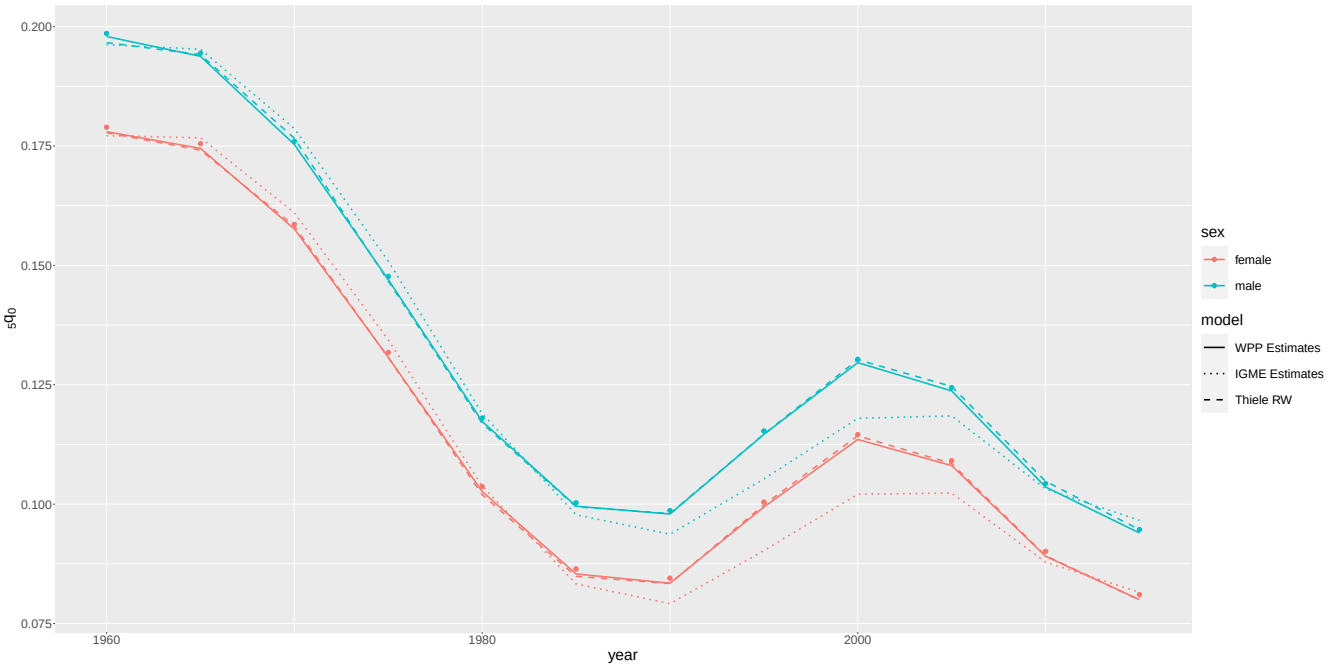

Figure 3: Estimated ${}_{5}q_{0}$

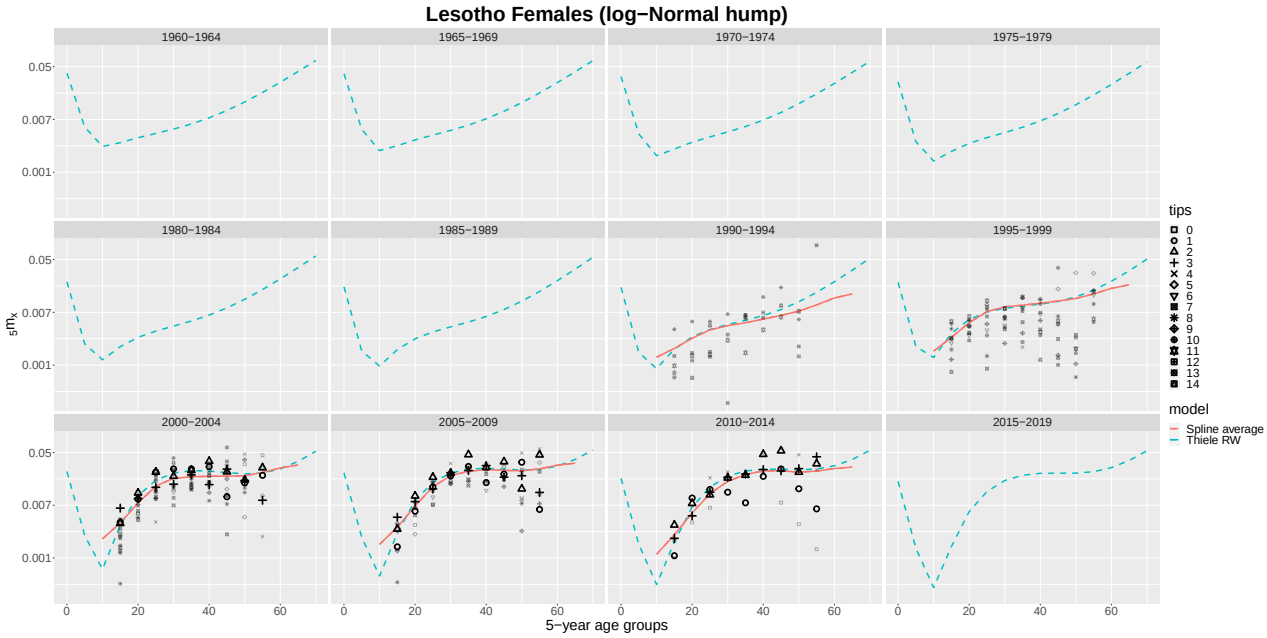

Figure 4: Mortality Schedules

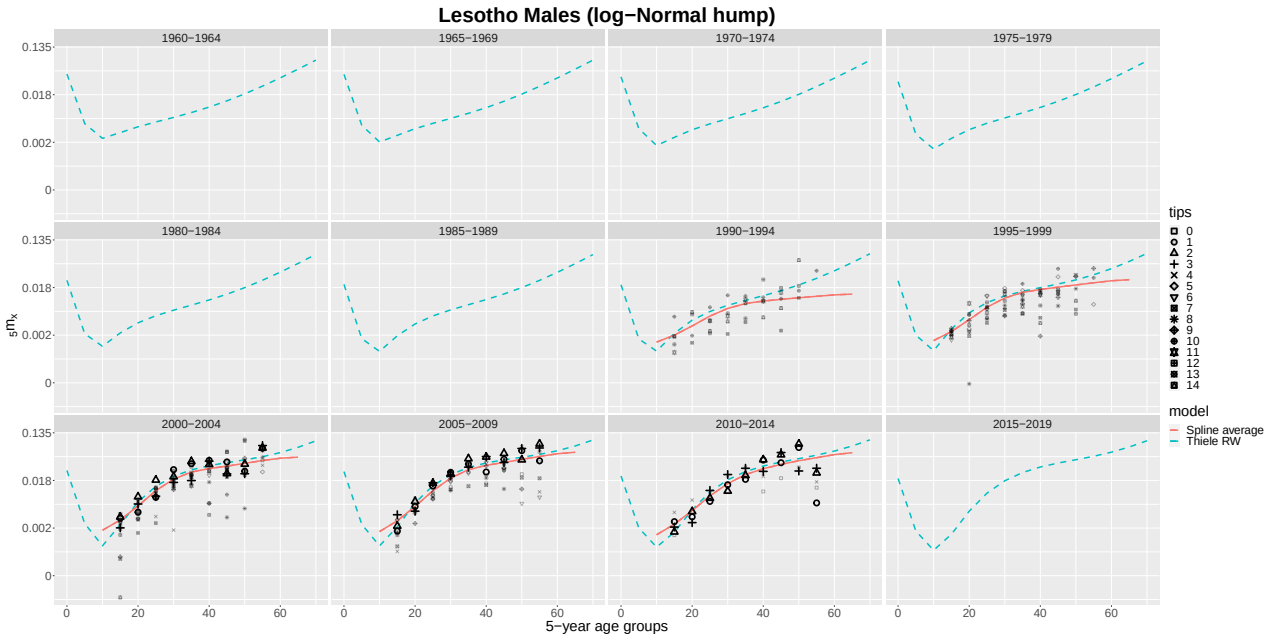

Figure 5: Mortality Schedules

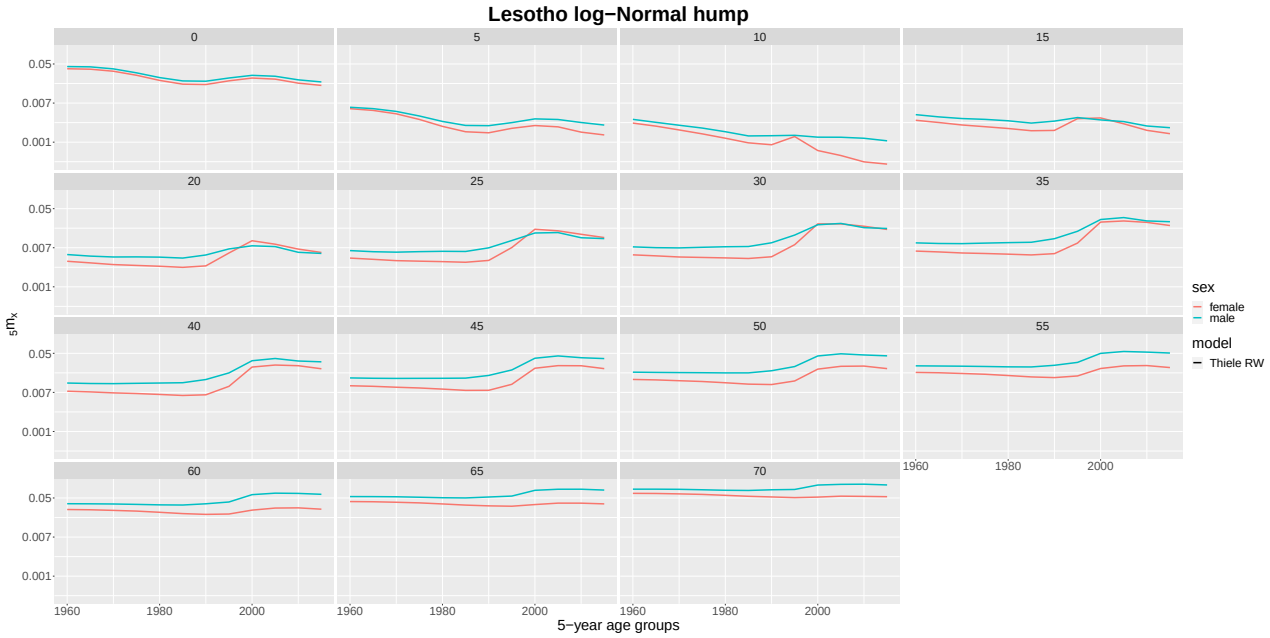

Figure 6: Mortality Schedules

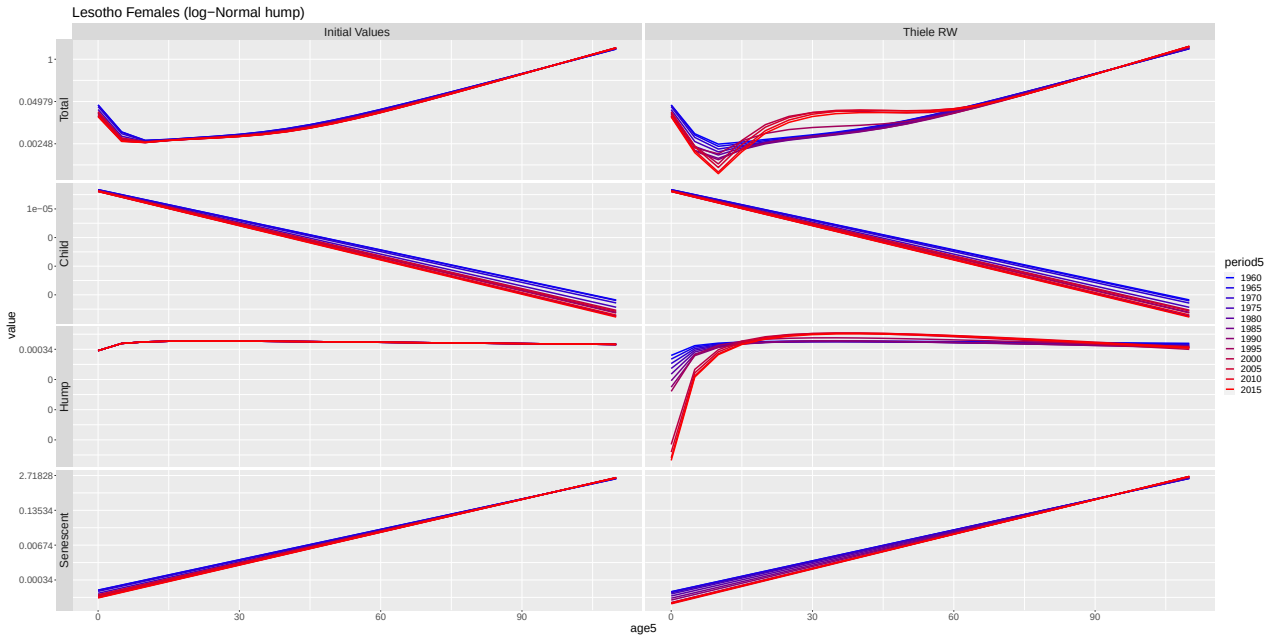

Figure 7: Thiele Decomposed

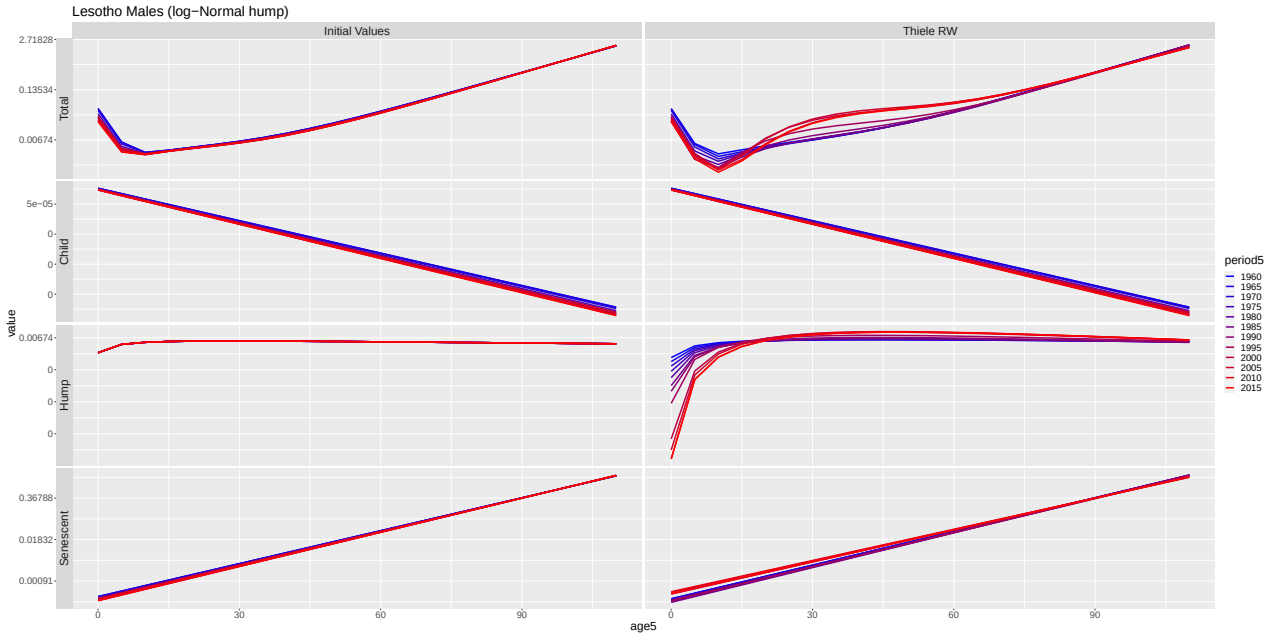

Figure 8: Thiele Decomposed

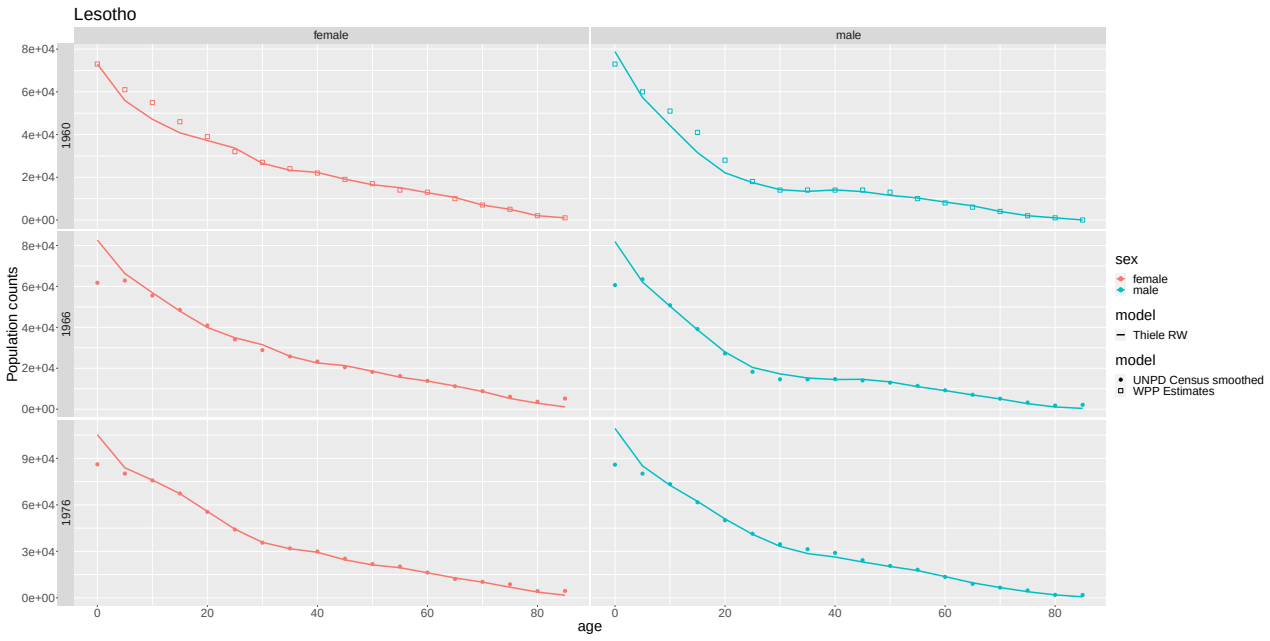

Figure 9: Population

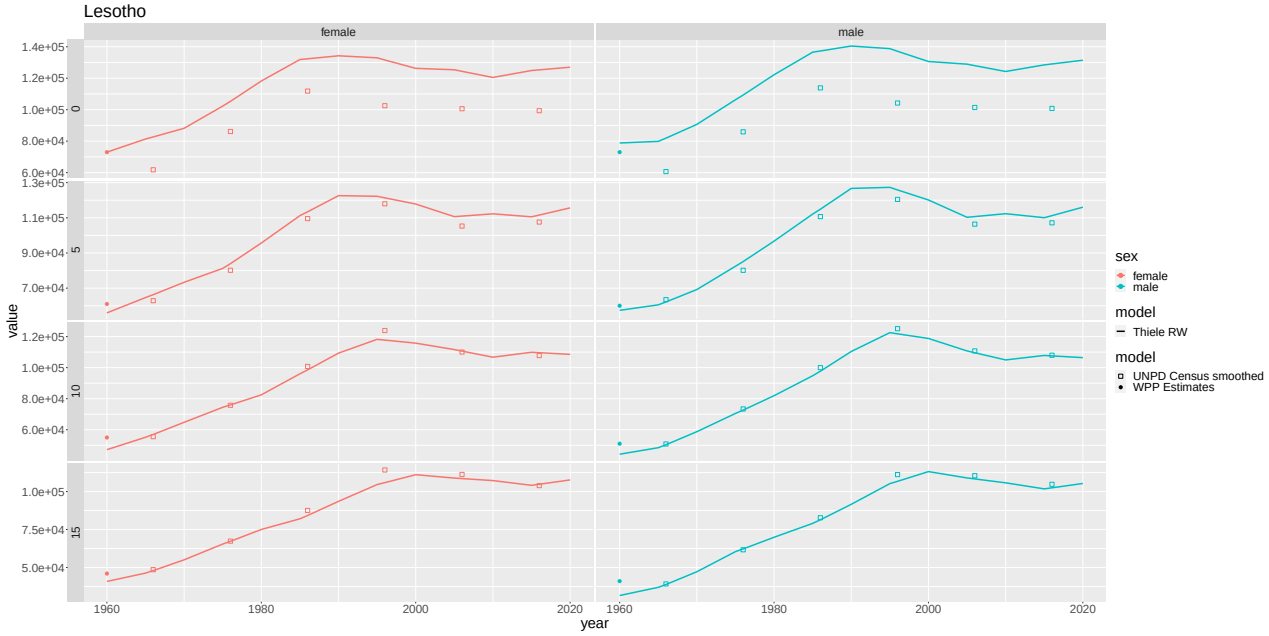

Figure 10: Population

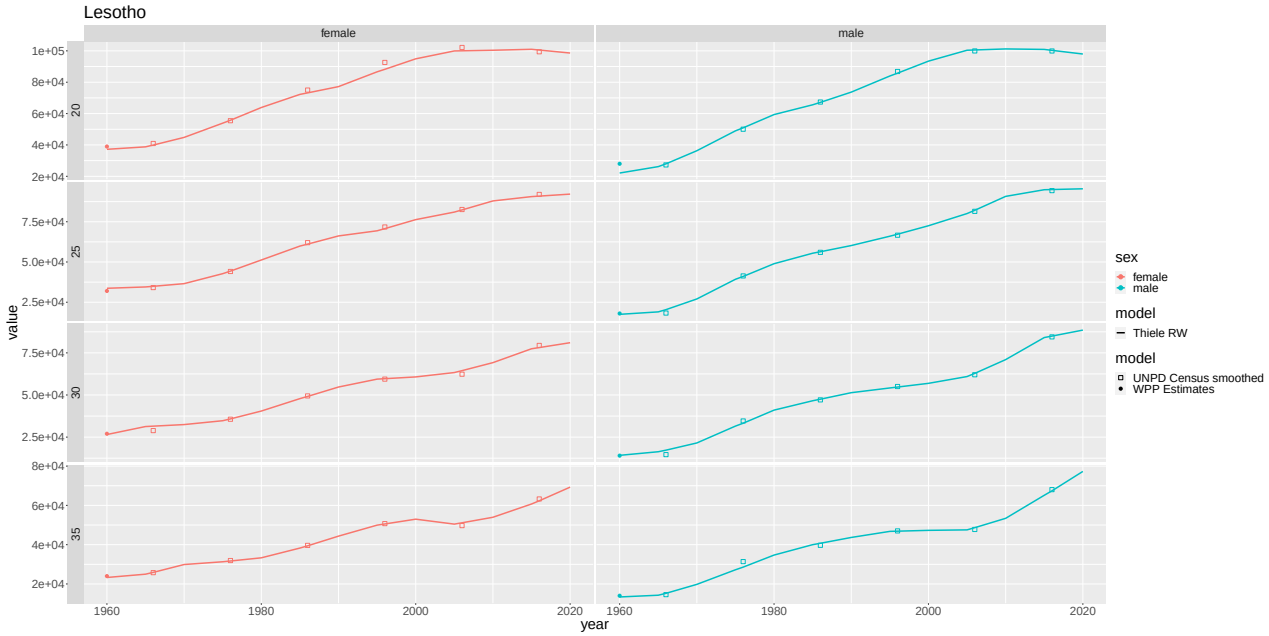

Figure 11: Population

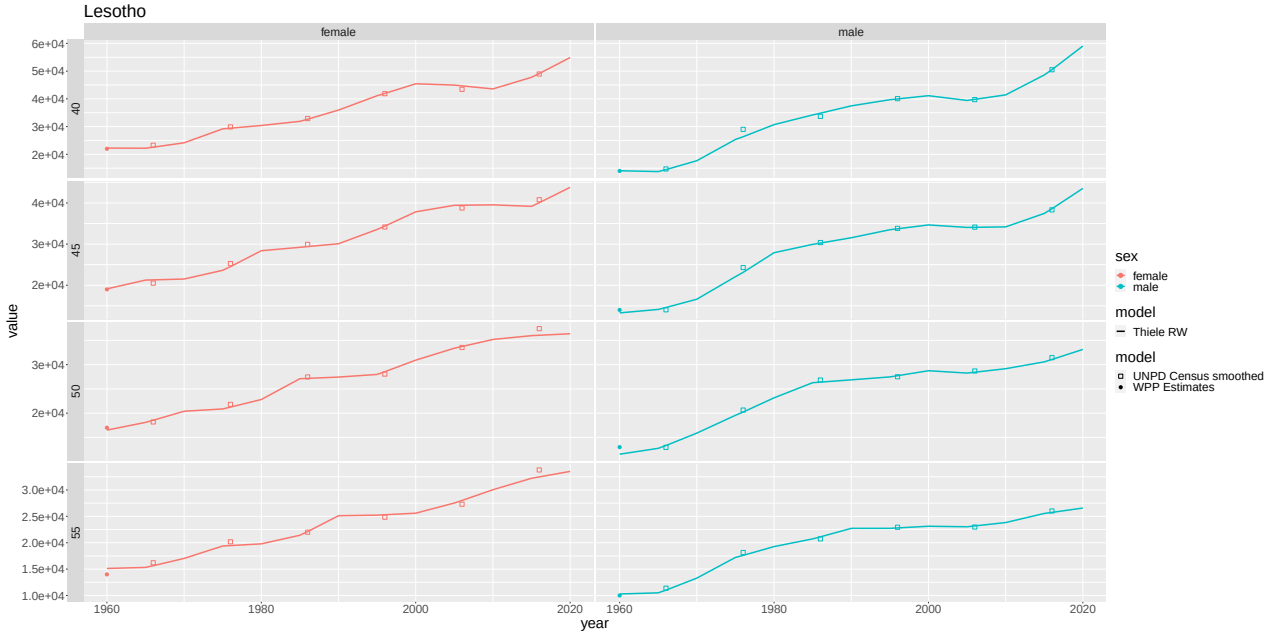

Figure 12: Population

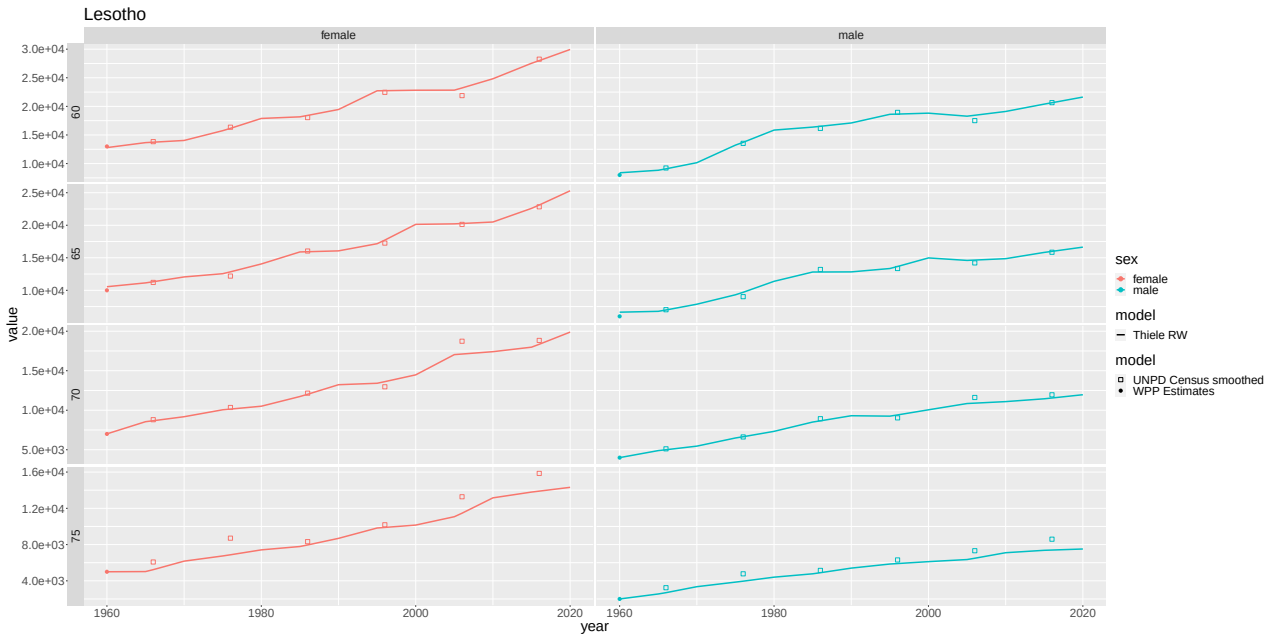

Figure 13: Population

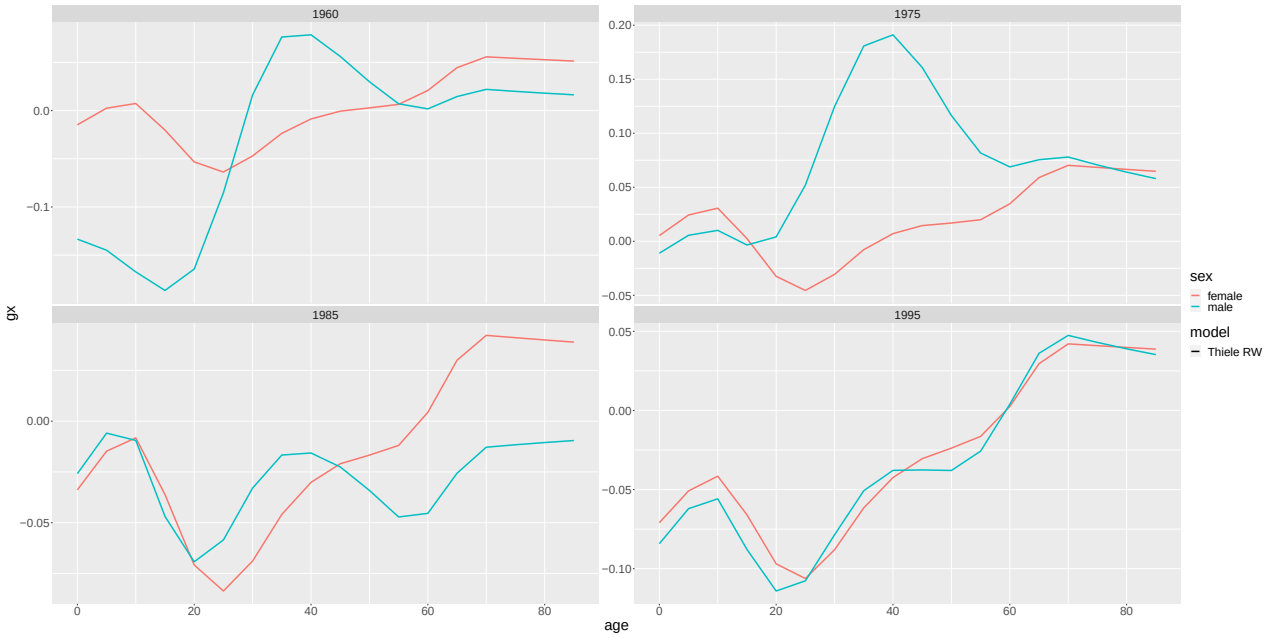

Figure 14: Migration

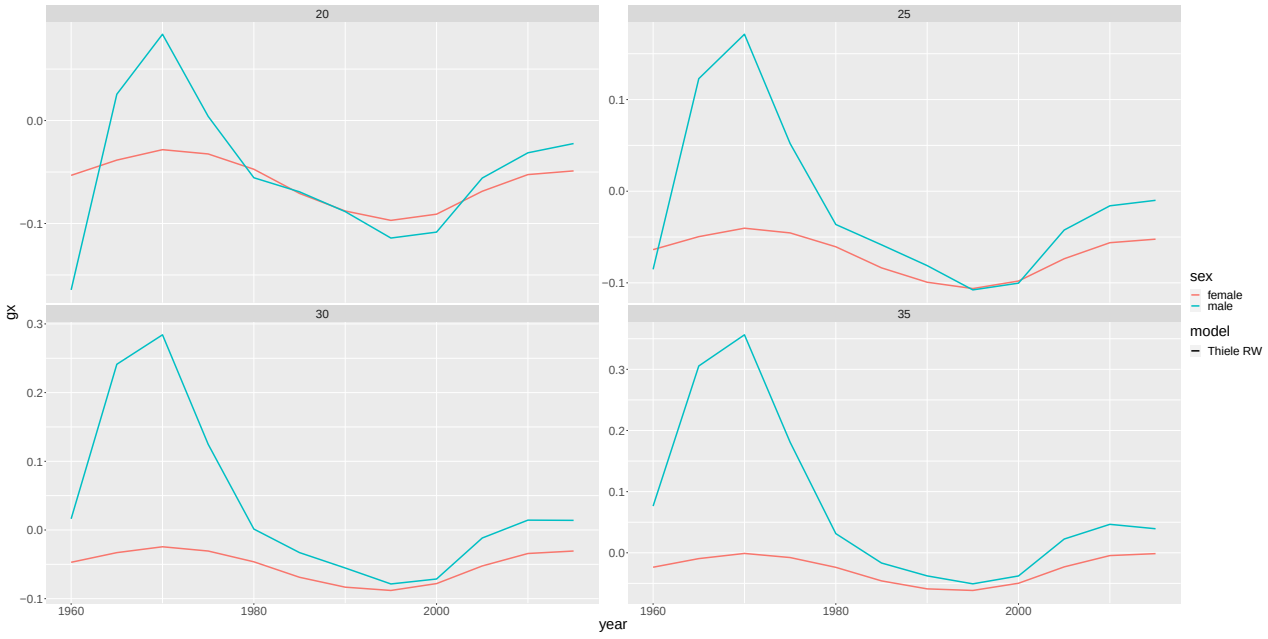

Figure 15: Migration

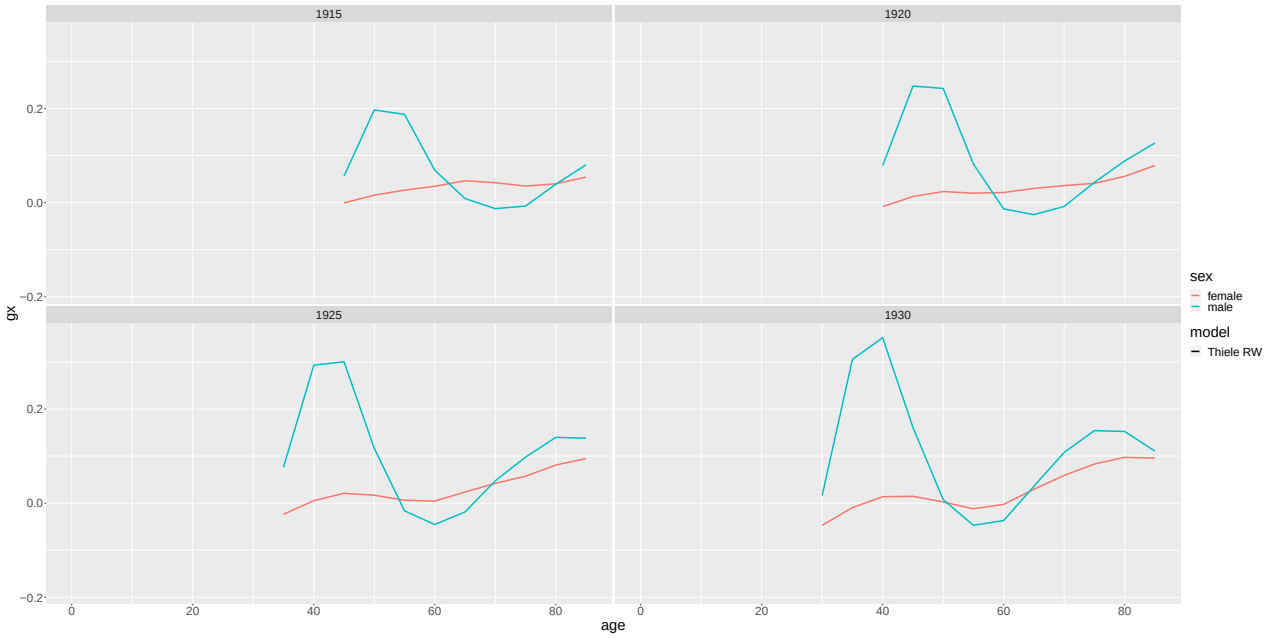

Figure 16: Migration

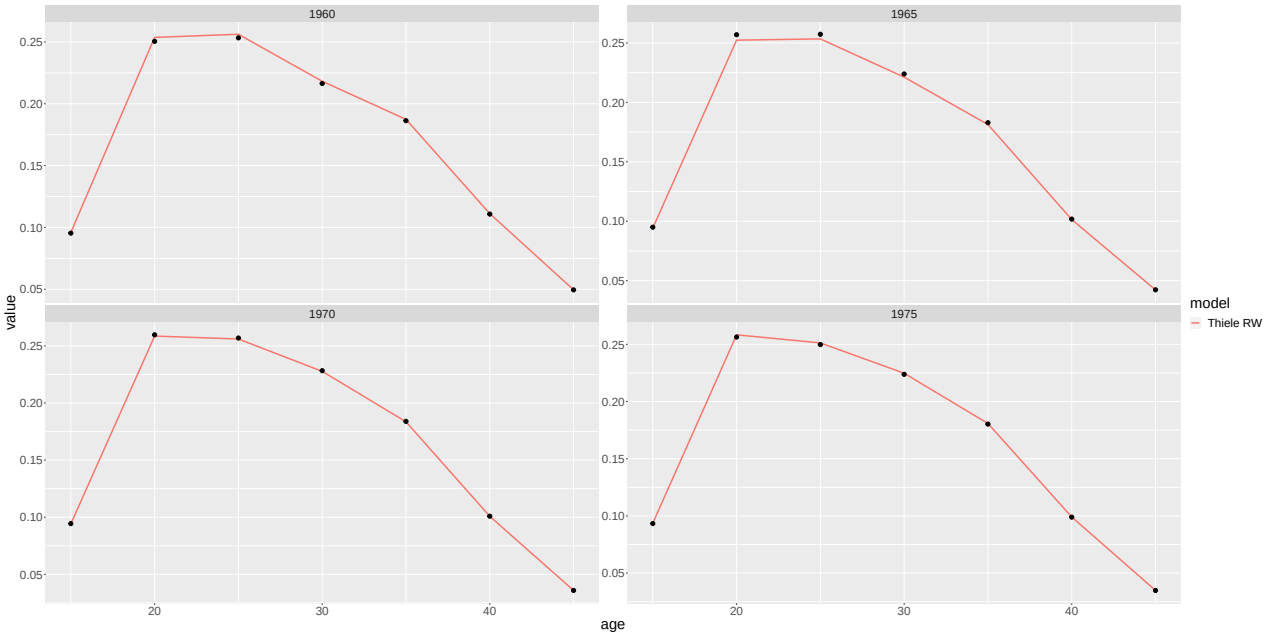

Figure 17: Fertility

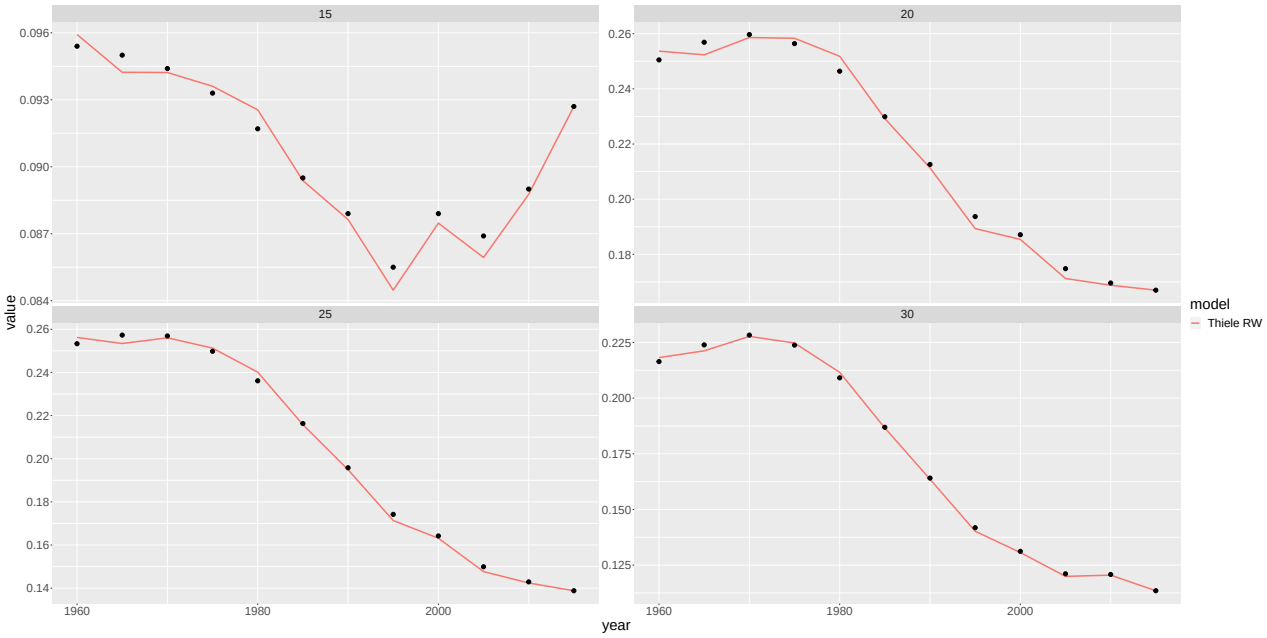

Figure 18: Fertility