Zimbabwe

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

```
## # A tibble: 87 x 6
##      age `1969`  `1982`  `1992`  `2002`  `2012`
##    <dbl>  <dbl>   <dbl>   <dbl>   <dbl>   <dbl>
##  1     0   215. 137199. 169638. 170997. 215623.
##  2     1   200. 134655. 159190. 172117. 211071.
##  3     2   219. 133815. 158420. 168708. 198666.
##  4     3   229. 130631. 160059. 164925. 190736.
##  5     4   240. 129885. 161282. 162274. 183611.
##  6     5   251. 128021. 163172. 159507. 177197.
##  7     6   258. 125143. 162237. 156778. 173472.
##  8     7   261. 121845. 161873. 155377. 171651.
##  9     8   262. 118680. 161182. 153895. 169450.
## 10     9   259. 115303. 158541. 153789. 171475.
## # ... with 77 more rows
```

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

```
## # A tibble: 87 x 6
##      age `1969`  `1982`  `1992`  `2002`  `2012`
##    <dbl>  <dbl>   <dbl>   <dbl>   <dbl>   <dbl>
##  1     0   238. 133357. 168079. 170637. 213895.
##  2     1   232. 129754. 158096. 172216. 210140.
##  3     2   231. 129163. 156962. 168433. 197420.
##  4     3   235. 127117. 158863. 164960. 189835.
##  5     4   242. 126939. 159839. 162197. 182613.
##  6     5   248. 125405. 161234. 159217. 176094.
##  7     6   255. 123103. 160066. 156209. 172218.
##  8     7   265. 120555. 159669. 154419. 170262.
##  9     8   271. 118210. 159182. 152264. 167883.
## 10     9   271. 115542. 156666. 152041. 170380.
## # ... with 77 more rows
```

Thiele log-Normal Hump Spline

```
## [1] "relative convergence (4)"
```

```
##           log_tau2_logpop_f           log_tau2_logpop_f
##                   6.5446865                   5.0208572
##           log_tau2_logpop_m           log_tau2_logpop_m
##                   6.5935728                   4.9595713
##                log_tau2_fx                log_tau2_gx_f
##                   5.4534491                   3.2162306
##               log_tau2_gx_m         log_lambda_gx_age_f
##                   2.9952896                   6.8287756
##         log_lambda_gx_age_m        log_lambda_gx_time_f
##                   6.7997177                   7.4300886
##        log_lambda_gx_time_m     log_lambda_gx_agetime_f
##                   7.7086168                   7.3641874
##     log_lambda_gx_agetime_m                log_lambda_tp
##                   6.9077304                   2.8257583
```

```
## log_lambda_tp_0_inflated_sd           log_dispersion_f
##                   0.5531036                  1.2133787
##            log_dispersion_m     log_marginal_prec_phi_f
##                   1.2496121                  4.6870696
##     log_marginal_prec_psi_f  log_marginal_prec_lambda_f
##                   4.6334922                  2.0408575
##   log_marginal_prec_delta_f log_marginal_prec_epsilon_f
##                   1.6818692                  3.6626627
##       log_marginal_prec_A_f      log_marginal_prec_B_f
##                   6.8920500                  3.0002987
##     log_marginal_prec_phi_m     log_marginal_prec_psi_m
##                   4.6995293                  4.6537749
##  log_marginal_prec_lambda_m   log_marginal_prec_delta_m
##                   1.4379655                  1.9691874
## log_marginal_prec_epsilon_m       log_marginal_prec_A_m
##                   3.8072693                  6.8843781
##       log_marginal_prec_B_m
##                   3.4530274
```

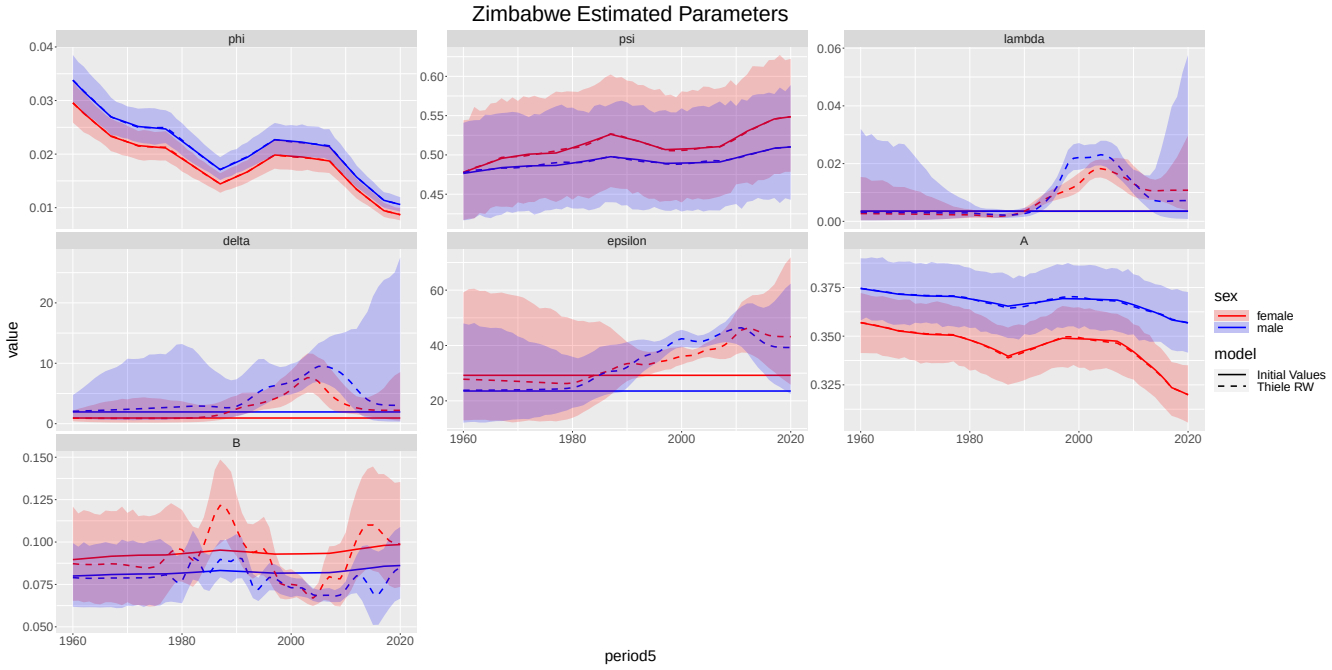

Figure 1: Estimated parameters

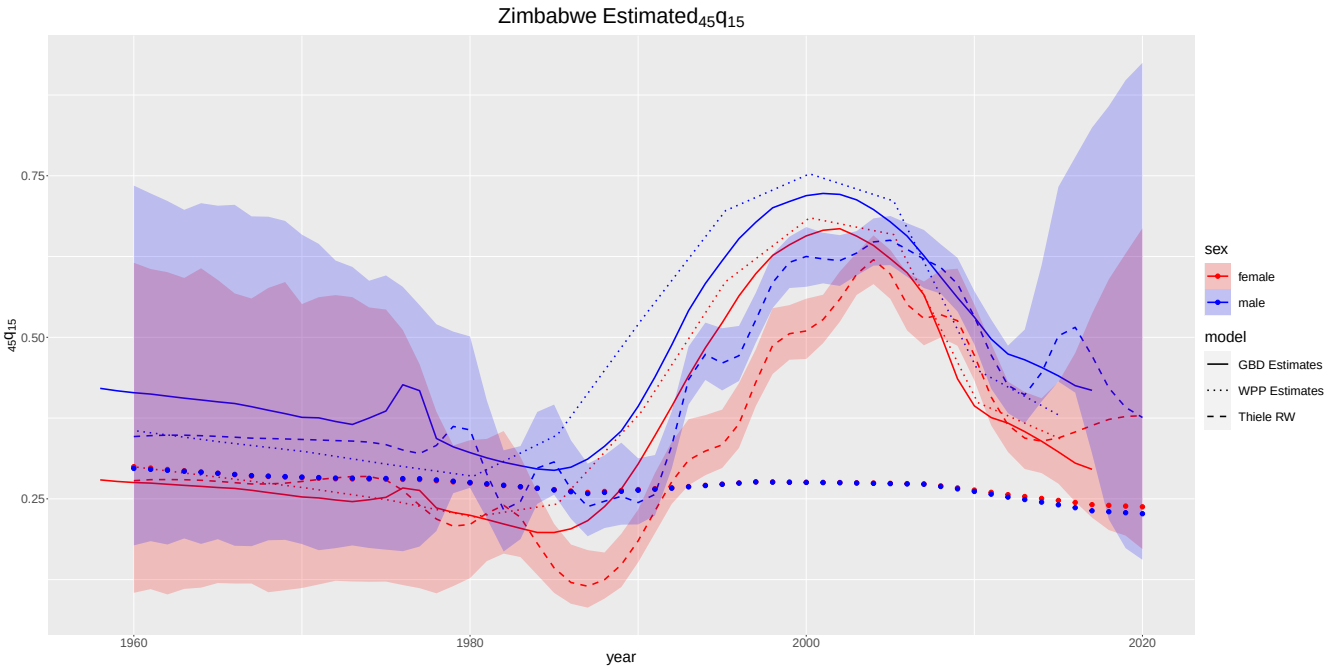

Figure 2: Estimated ${}_{45}q_{15}$

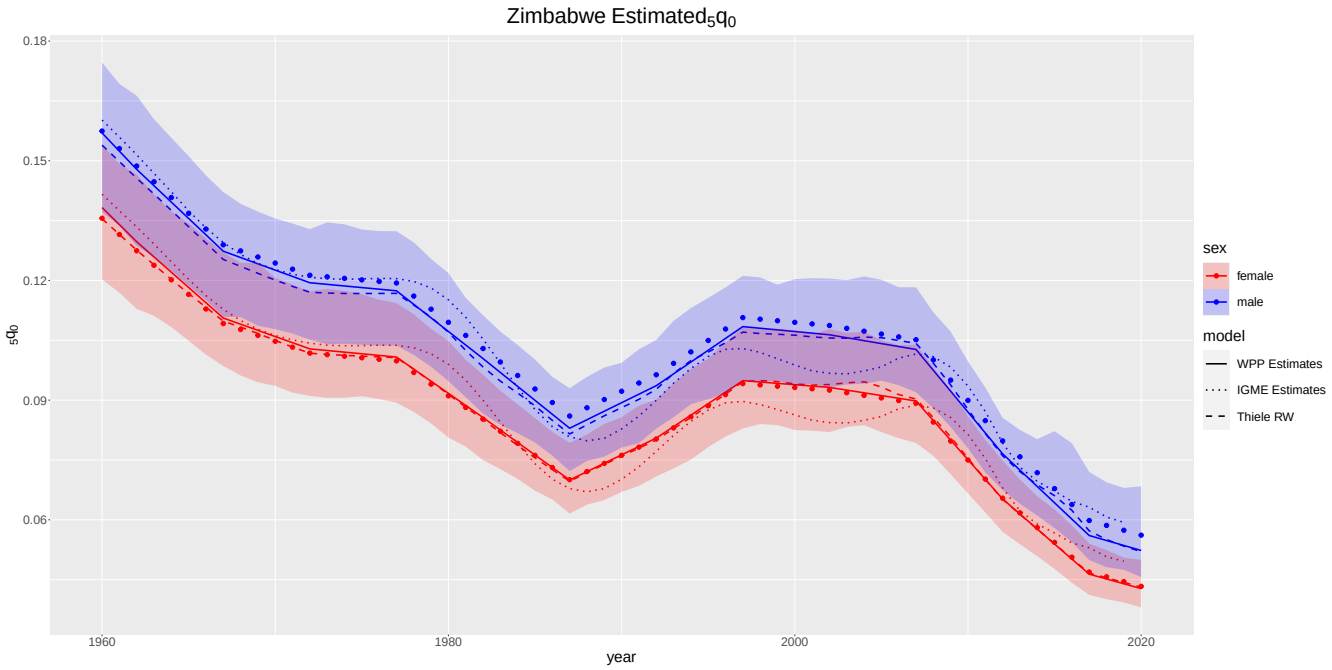

Figure 3: Estimated $_5q_0$

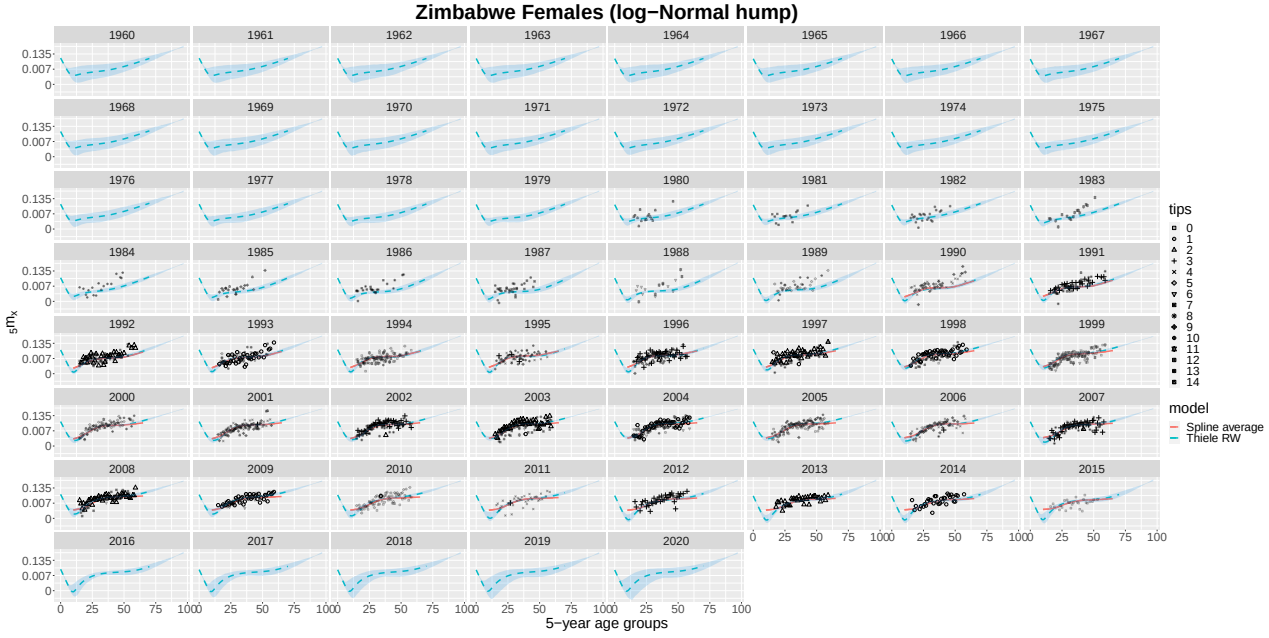

Figure 4: Mortality Schedules

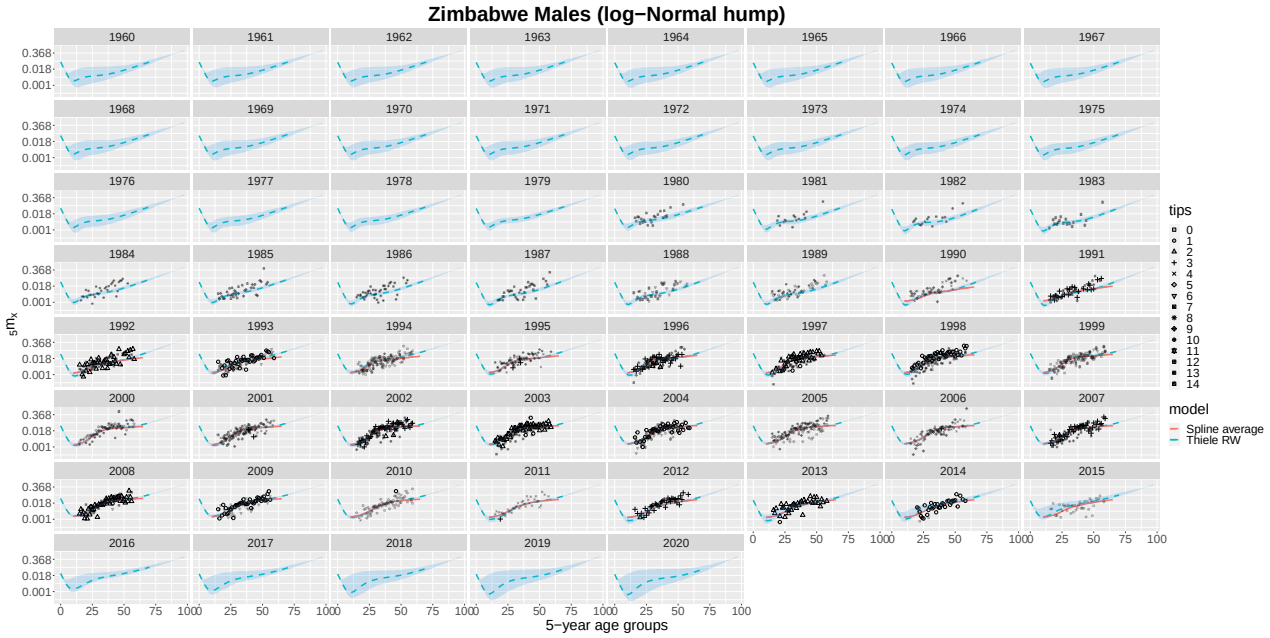

Figure 5: Mortality Schedules

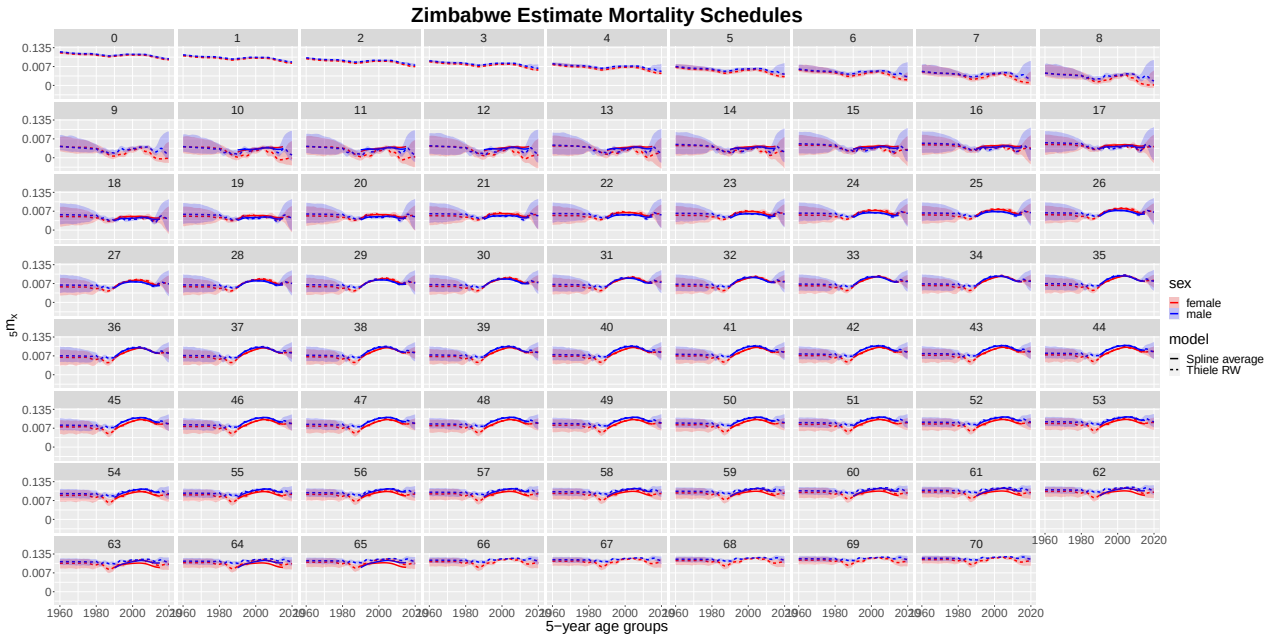

Figure 6: Mortality Schedules

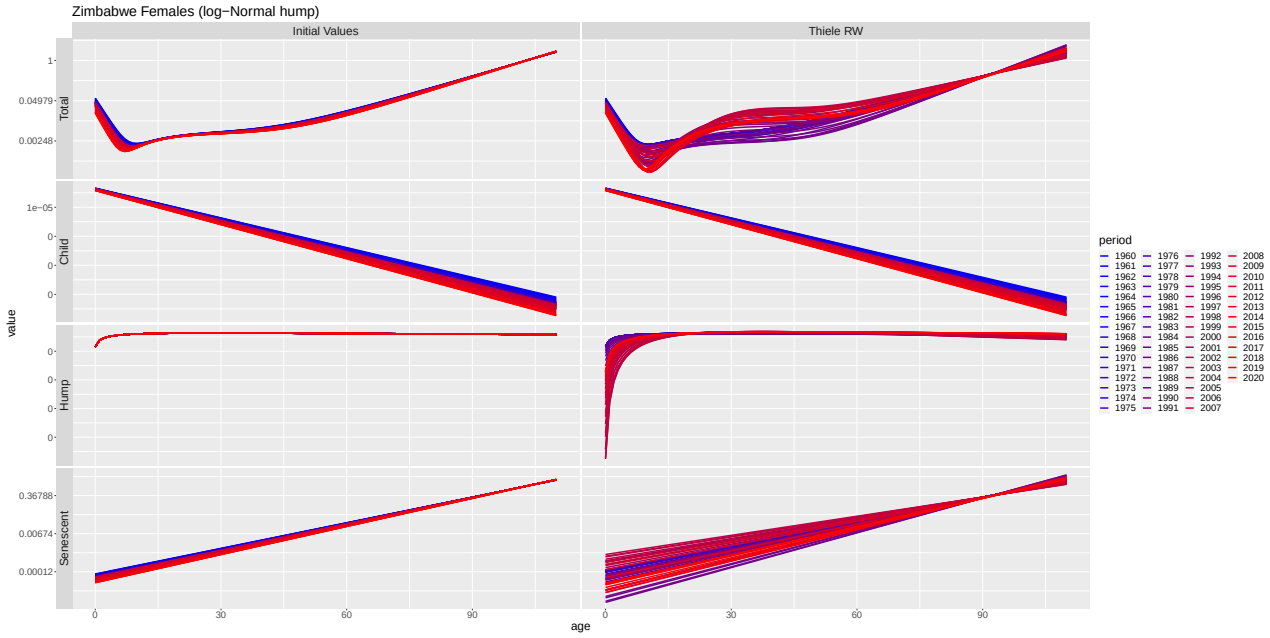

Figure 7: Thiele Decomposed

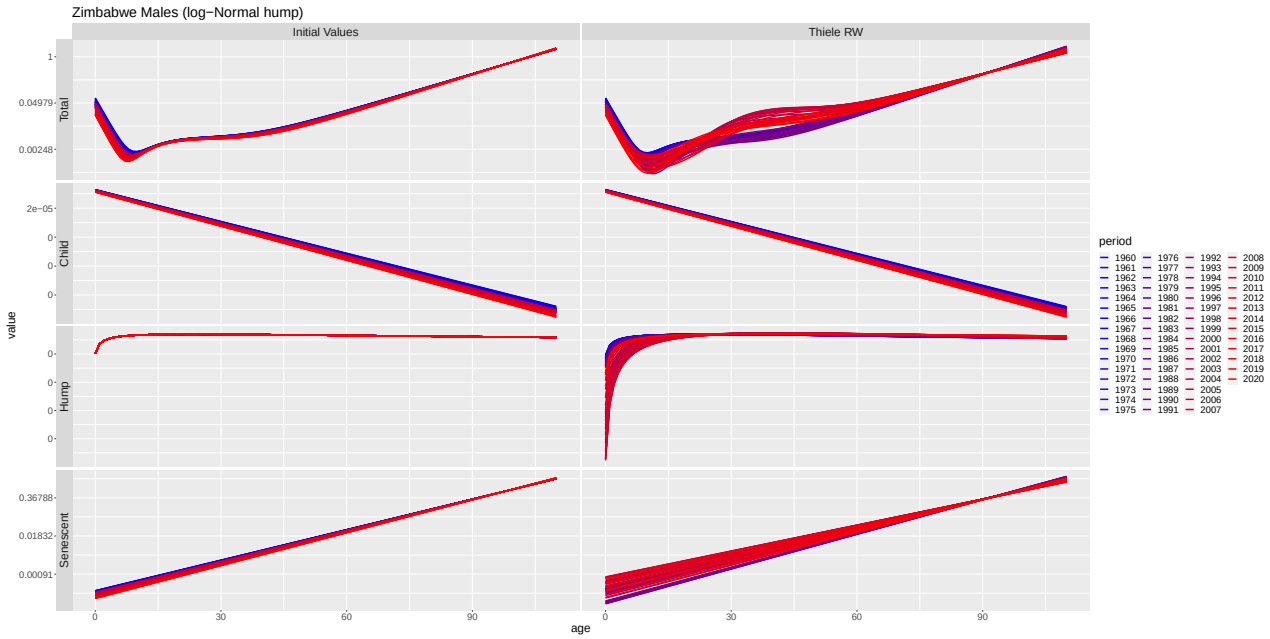

Figure 8: Thiele Decomposed

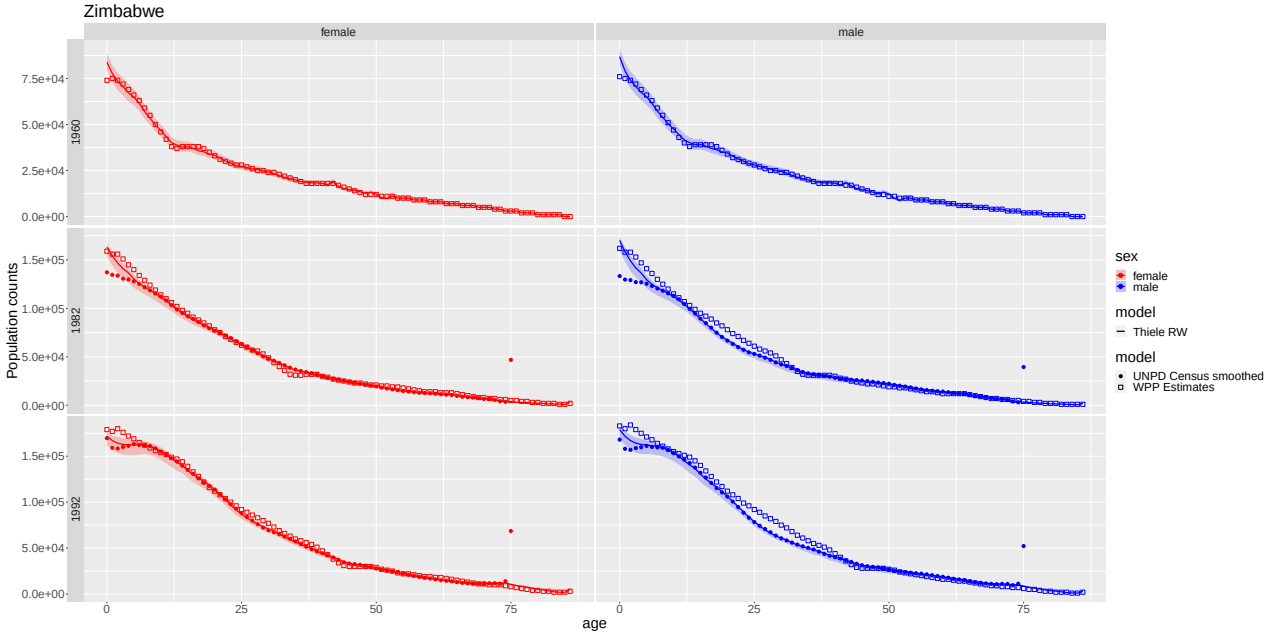

Figure 9: Population

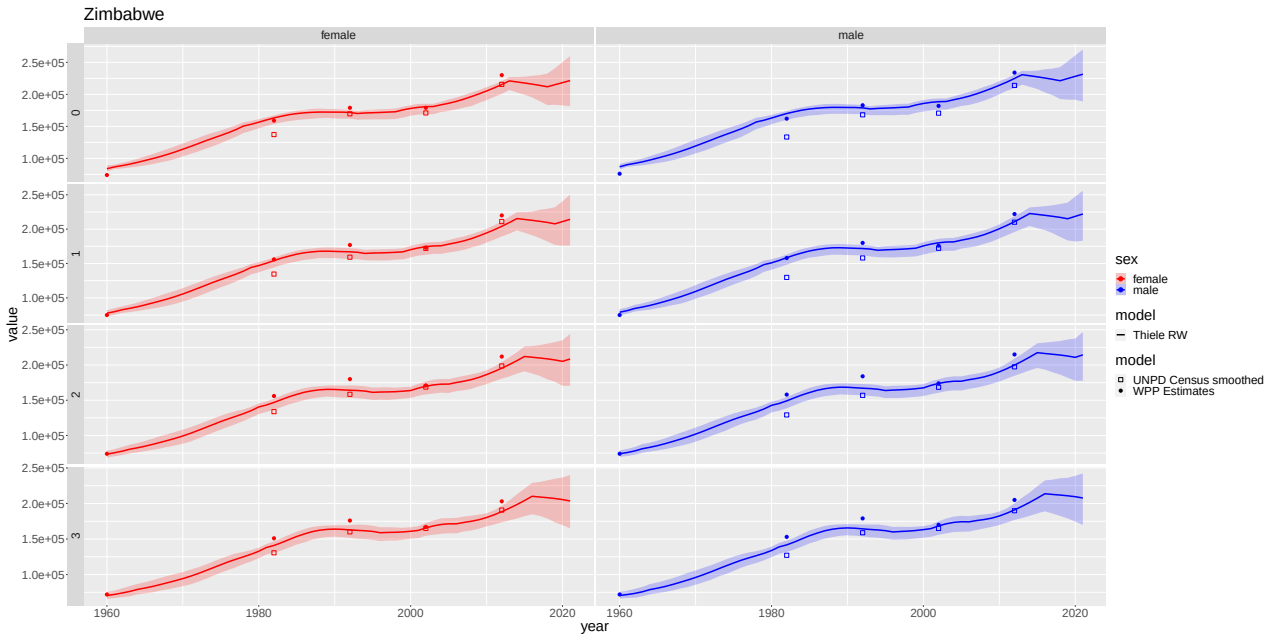

Figure 10: Population

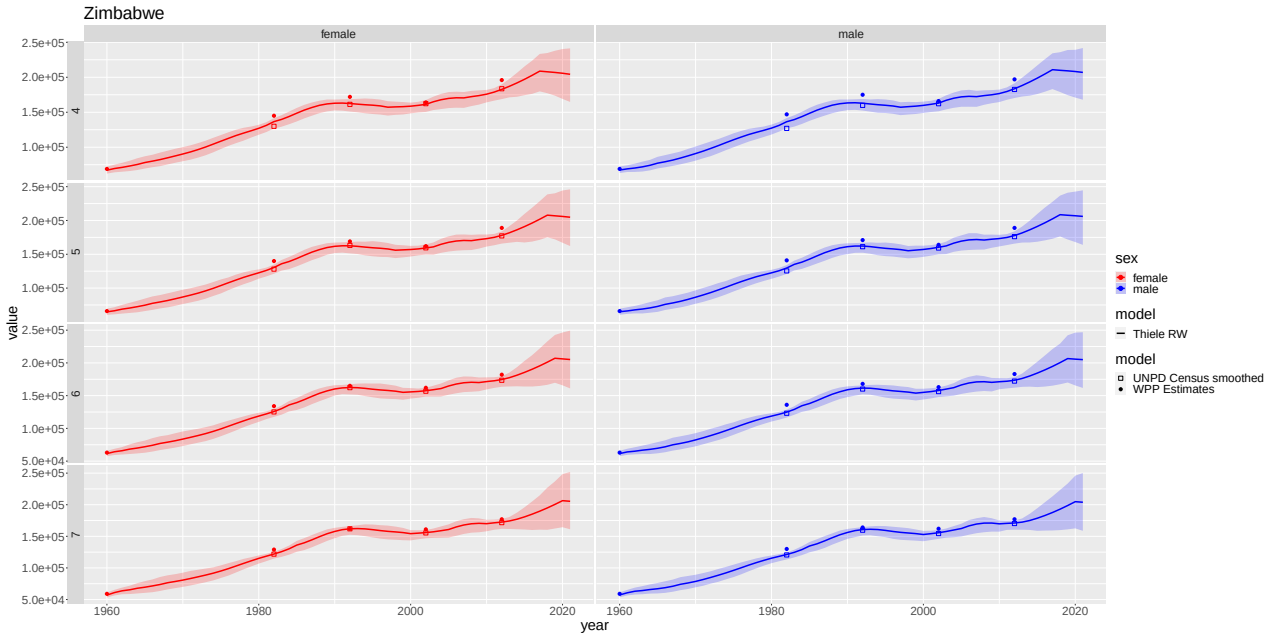

Figure 11: Population

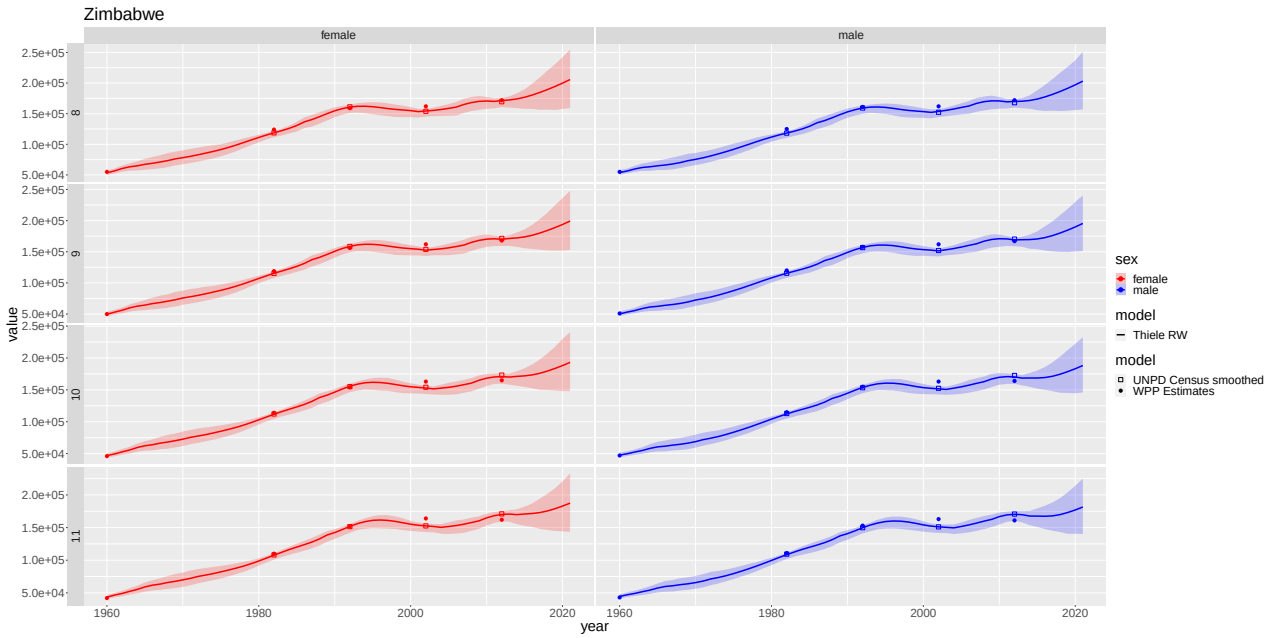

Figure 12: Population

Figure 13: Population

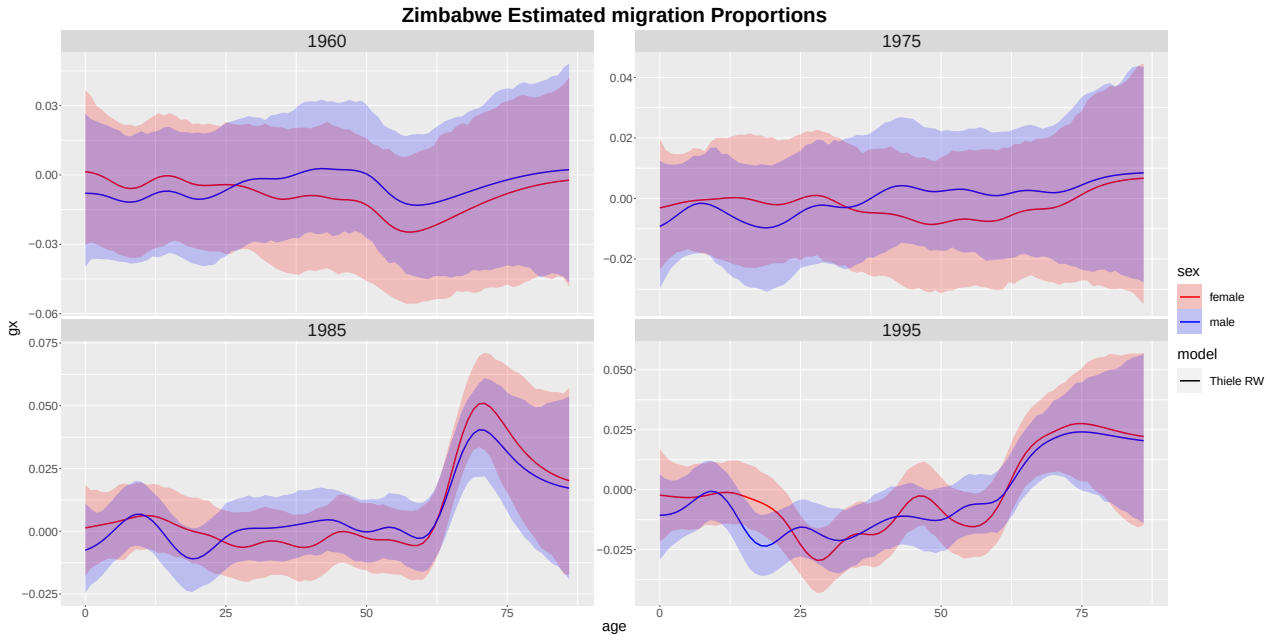

Figure 14: Migration

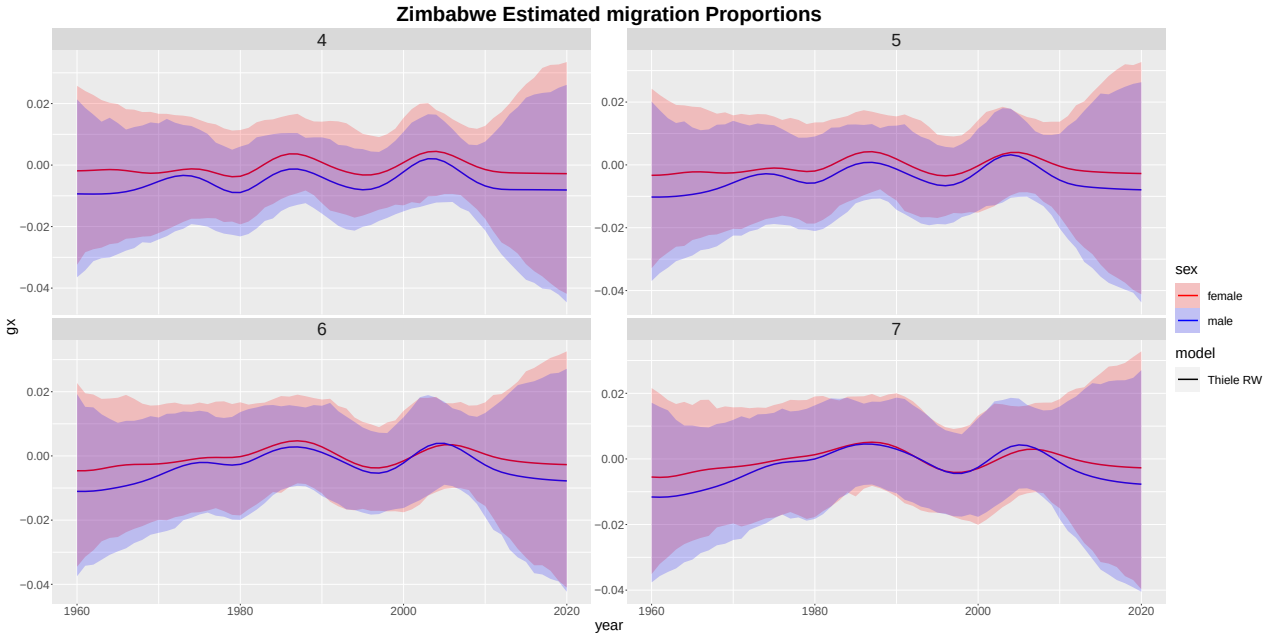

Figure 15: Migration

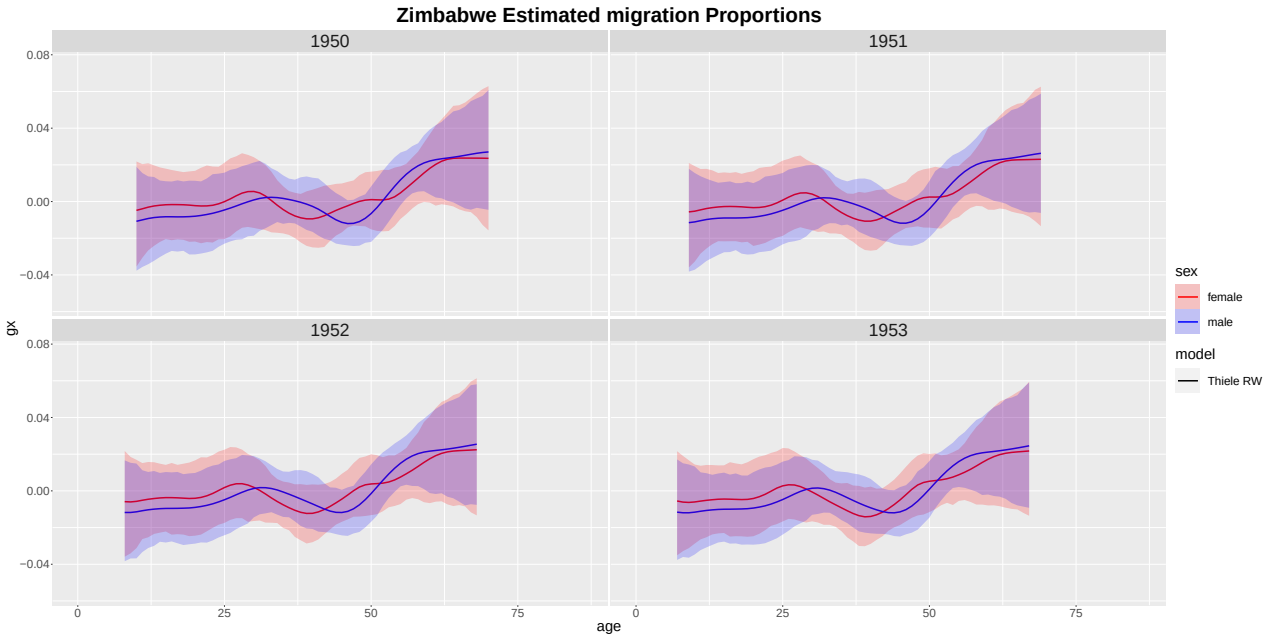

Figure 16: Migration

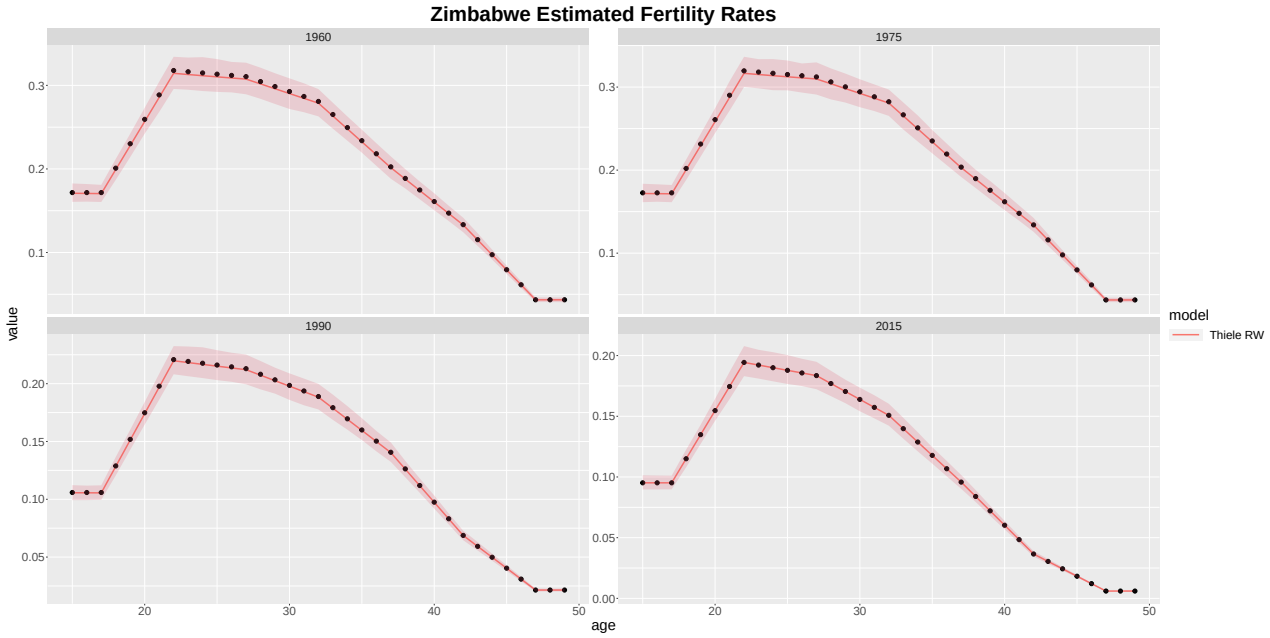

Figure 17: Fertility

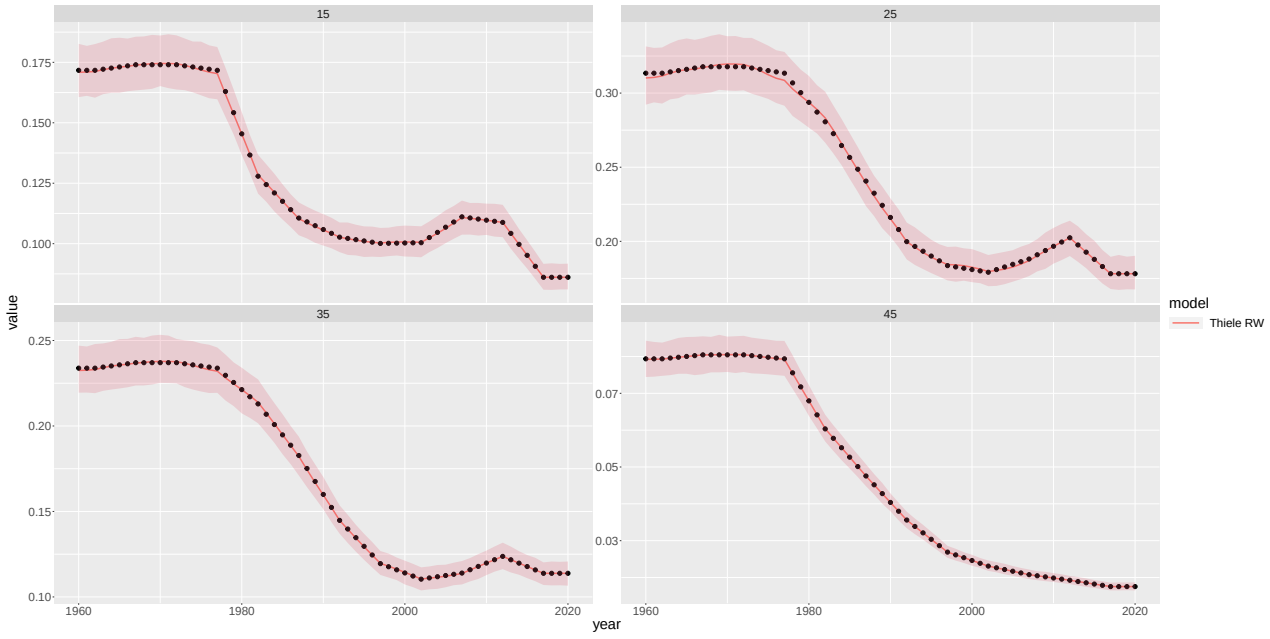

Figure 18: Fertility

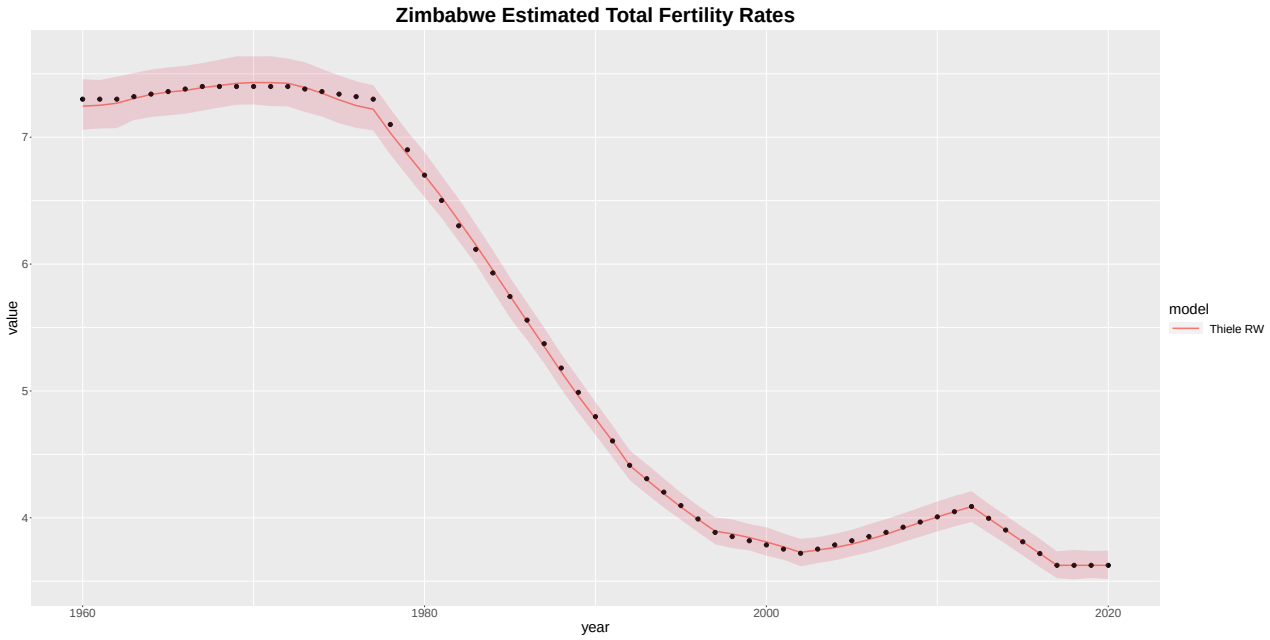

Figure 19: Total Fertility