Mali

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

```
## # A tibble: 81 x 4
##      age  `1987`  `1998`  `2009`
##    <dbl>   <dbl>   <dbl>   <dbl>
##  1     0 124801. 142036  223369.
##  2     1 130699. 143506. 257789.
##  3     2 143705. 166117. 268530.
##  4     3 145236. 169658. 265587.
##  5     4 139502. 169005. 258886.
##  6     5 131579. 162377. 249660.
##  7     6 128268. 161046. 244548.
##  8     7 122404. 157027. 234293.
##  9     8 114663. 150062. 222747.
## 10     9 106496. 142115. 211375.
## # ... with 71 more rows
```

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

```
## # A tibble: 81 x 4
##      age  `1987`  `1998`  `2009`
##    <dbl>   <dbl>   <dbl>   <dbl>
##  1     0 125225. 144399  228866.
##  2     1 132390. 146371. 265188.
##  3     2 145200. 169490. 275420.
##  4     3 146748. 173008  272373.
##  5     4 141834. 173487. 266457.
##  6     5 134933. 167741. 257909.
##  7     6 132457. 167302. 253433.
##  8     7 127260. 164167. 243723.
##  9     8 120096. 157807. 232511.
## 10     9 112285. 150088. 221235.
## # ... with 71 more rows
```

Thiele log-Normal Hump Spline

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

```
##           log_tau2_logpop_f          log_tau2_logpop_f          log_tau2_logpop_m          log_tau2_
##                   6.2950531                  5.0089243                  6.4471842                  5
##               log_tau2_gx_m        log_lambda_gx_age_f        log_lambda_gx_age_m       log_lambda_g
##                   3.4545949                  8.2111151                  7.2512004                  7
##     log_lambda_gx_agetime_m             log_lambda_tp log_lambda_tp_0_inflated_sd          log_dispe
##                   6.9077010                  1.1847795                 -2.4337009                  0
##     log_marginal_prec_psi_f      log_marginal_prec_A_f      log_marginal_prec_B_f     log_marginal_pre
##                   4.3293882                  6.7578833                  6.3304984                  4
##       log_marginal_prec_B_m          log_lambda_phi_f           log_lambda_psi_f        log_lambda_
##                   2.7037619                  4.4768019                  4.3841214                  4
##              log_lambda_A_f            log_lambda_B_f           log_lambda_phi_m          log_lambd
##                   4.2971759                  4.1049296                  4.5589397                  4
##        log_lambda_epsilon_m            log_lambda_A_m             log_lambda_B_m
##                   4.4629453                  4.3056917                  4.4613206
```

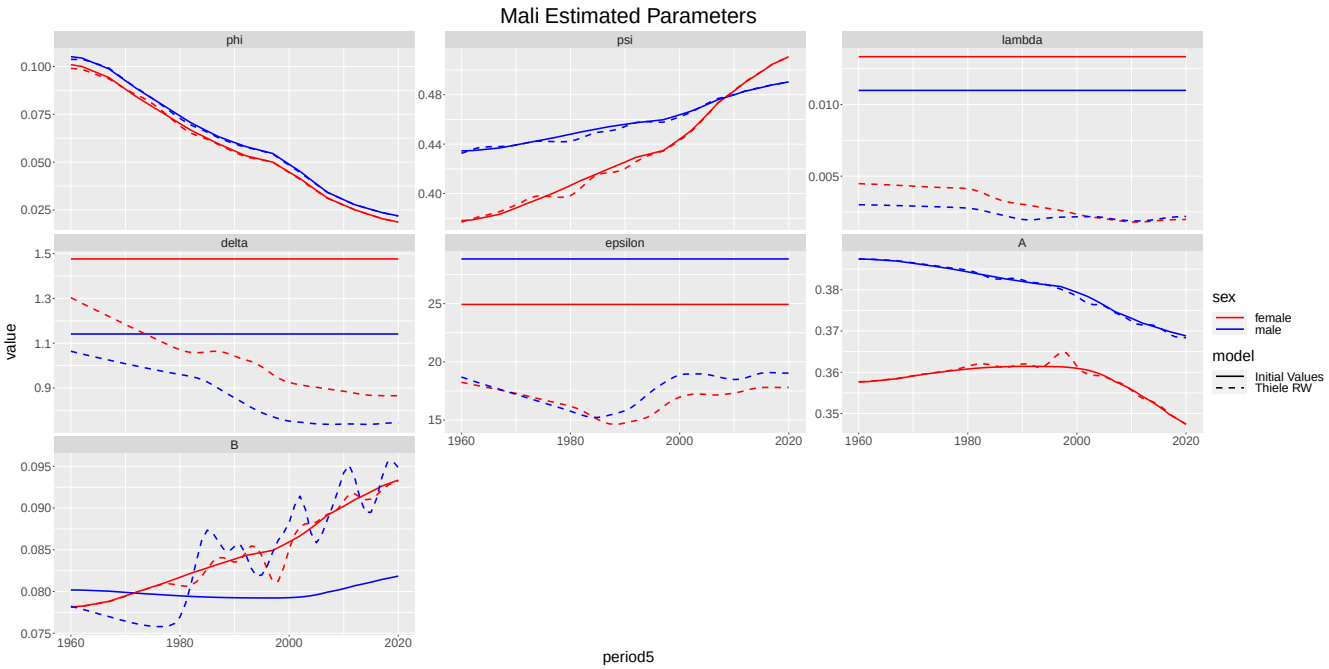

Figure 1: Estimated parameters

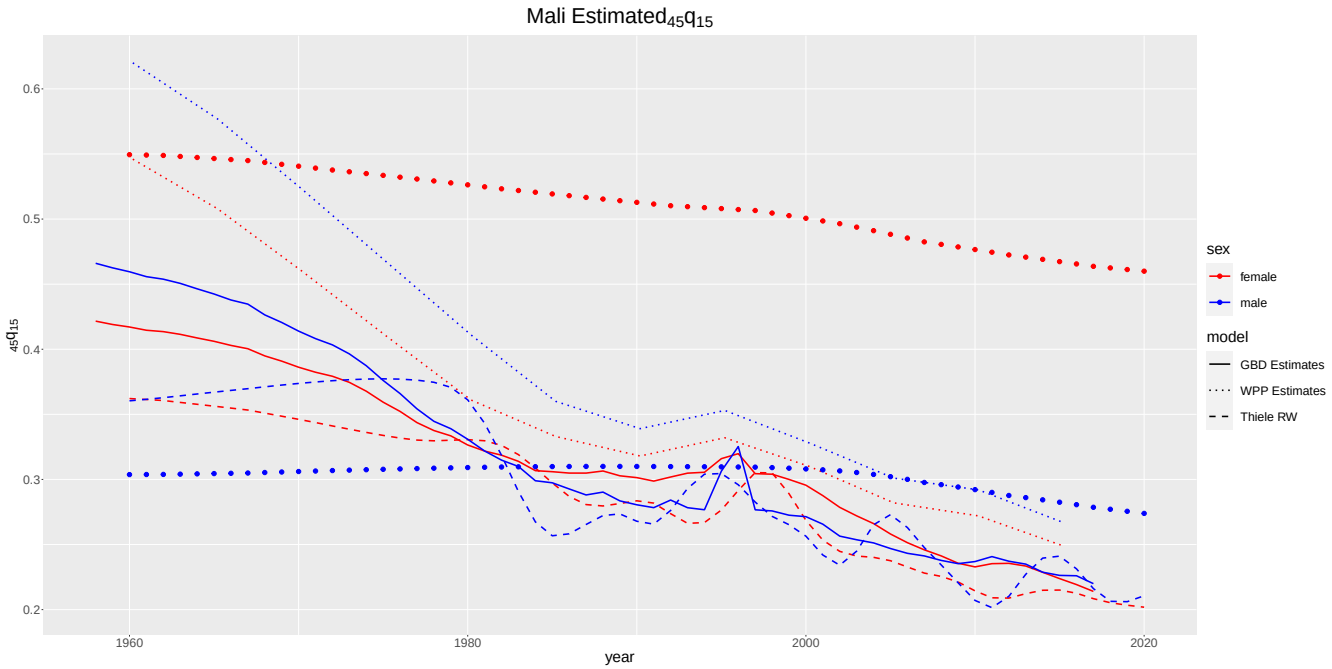

Figure 2: Estimated ${}_{45}q_{15}$

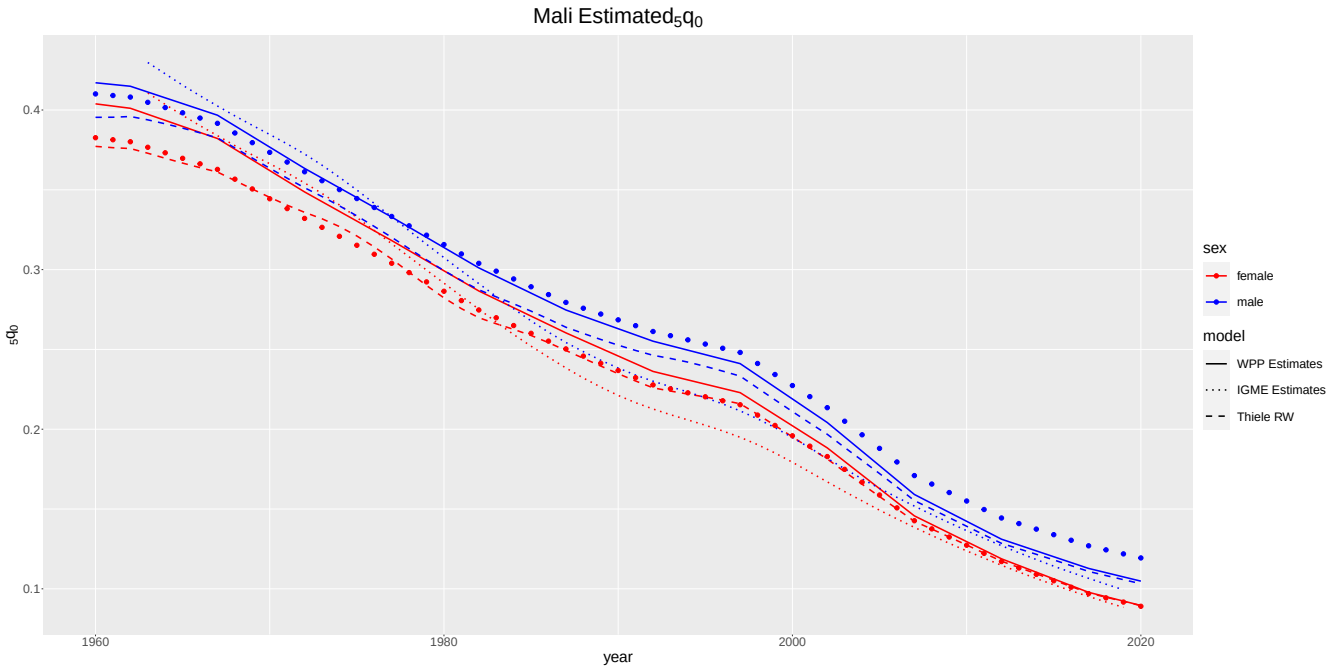

Figure 3: Estimated $_5q_0$

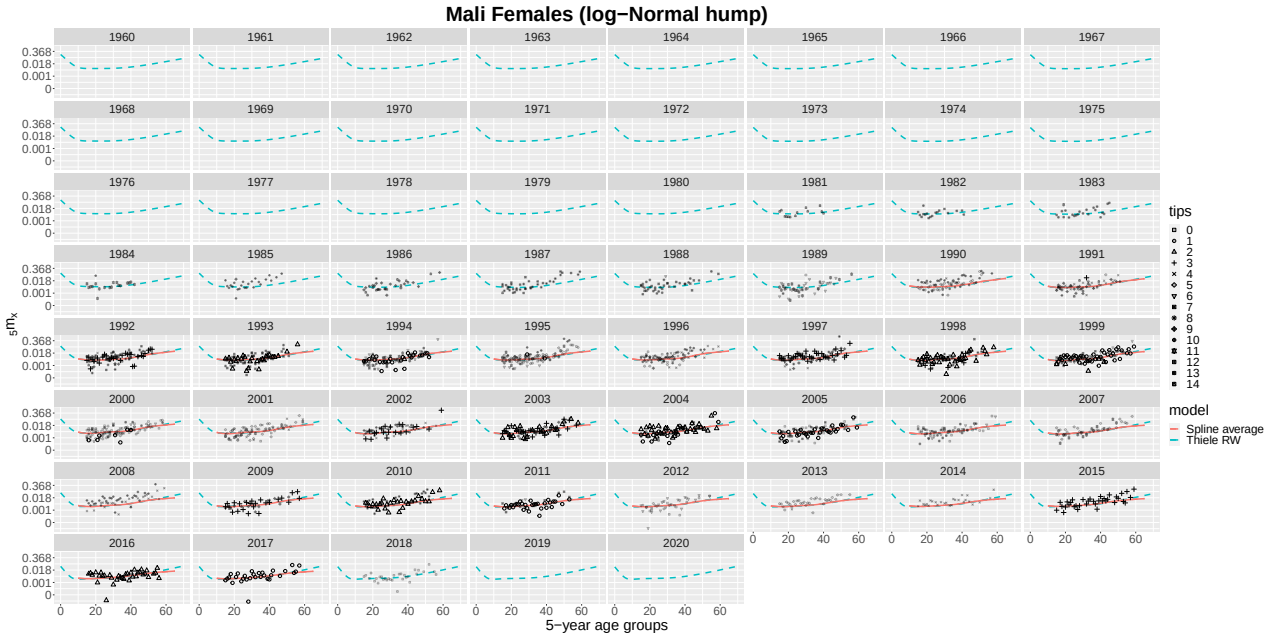

Figure 4: Mortality Schedules

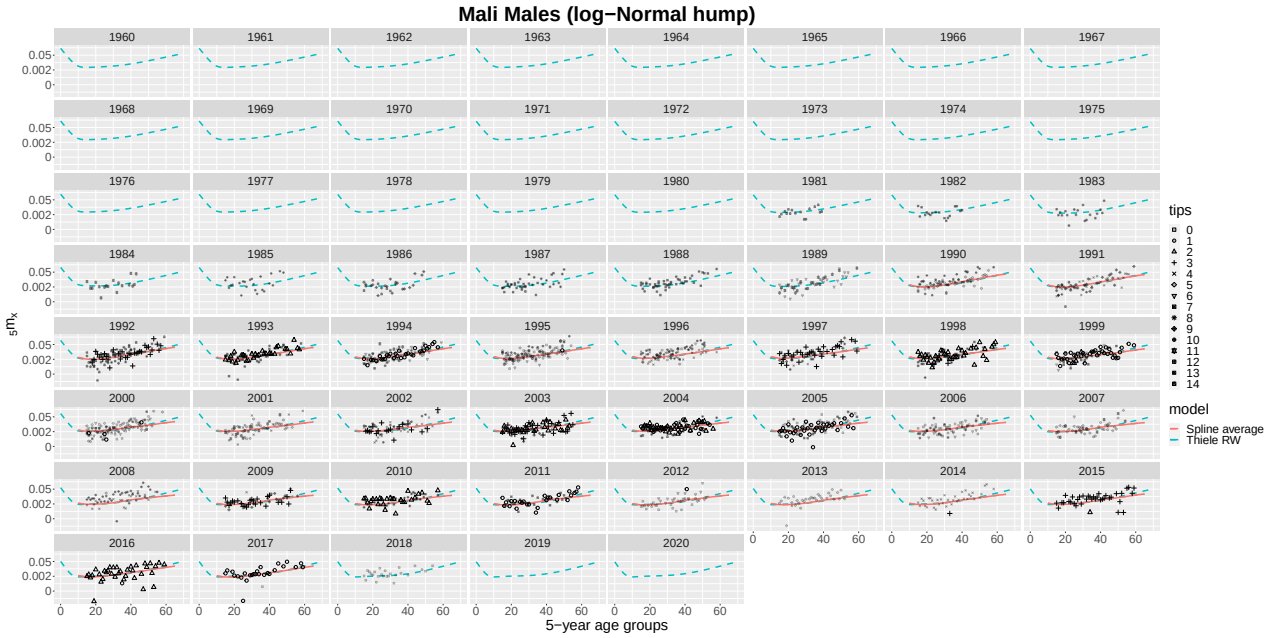

Figure 5: Mortality Schedules

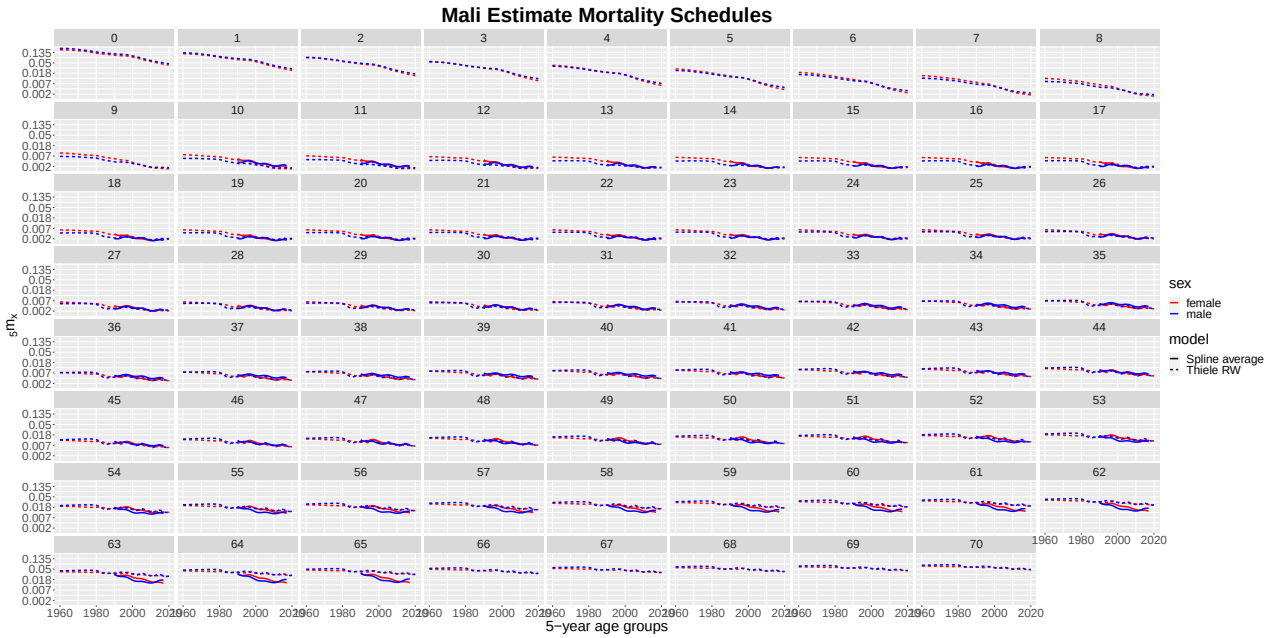

Figure 6: Mortality Schedules

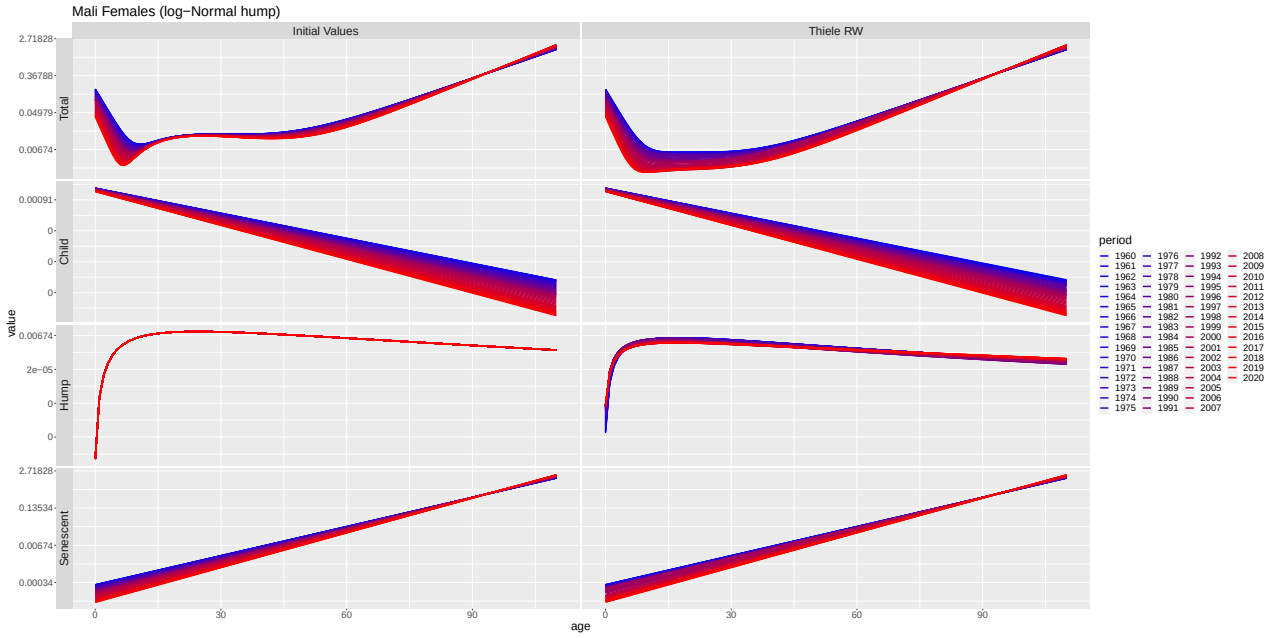

Figure 7: Thiele Decomposed

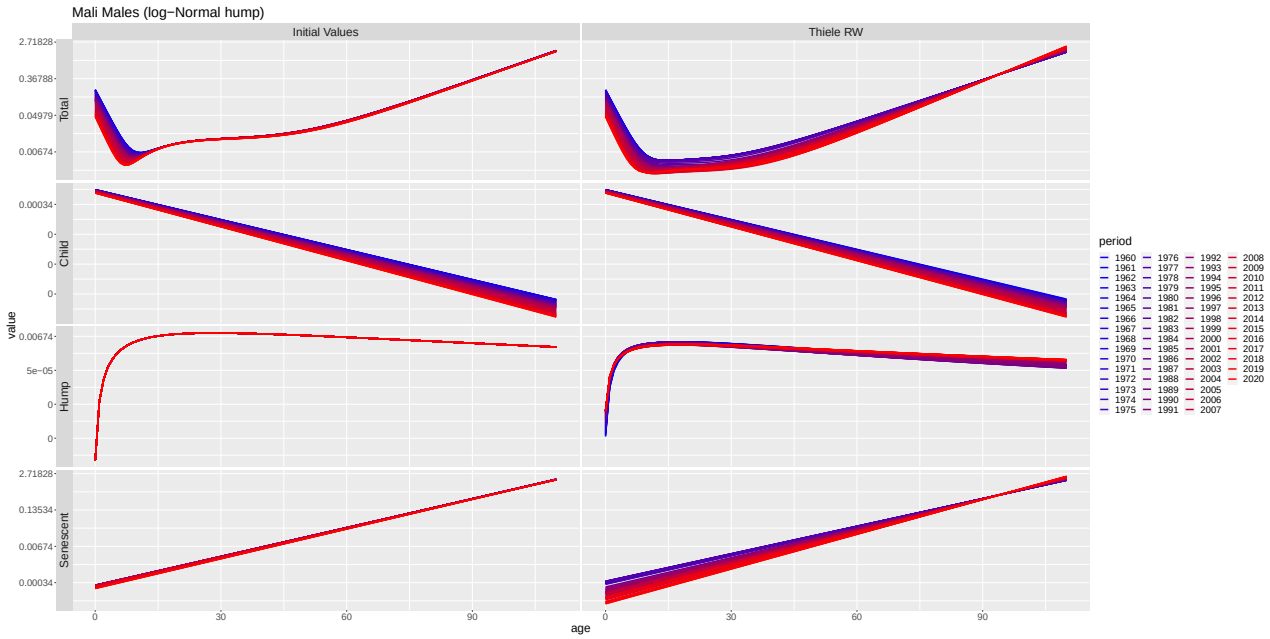

Figure 8: Thiele Decomposed

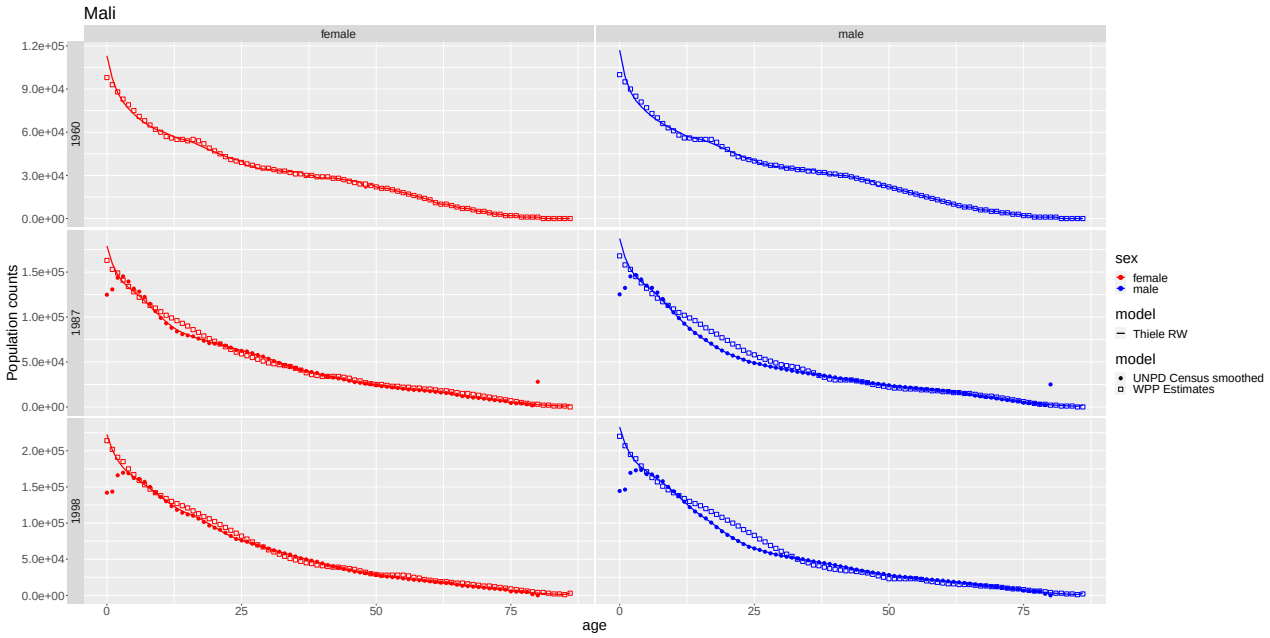

Figure 9: Population

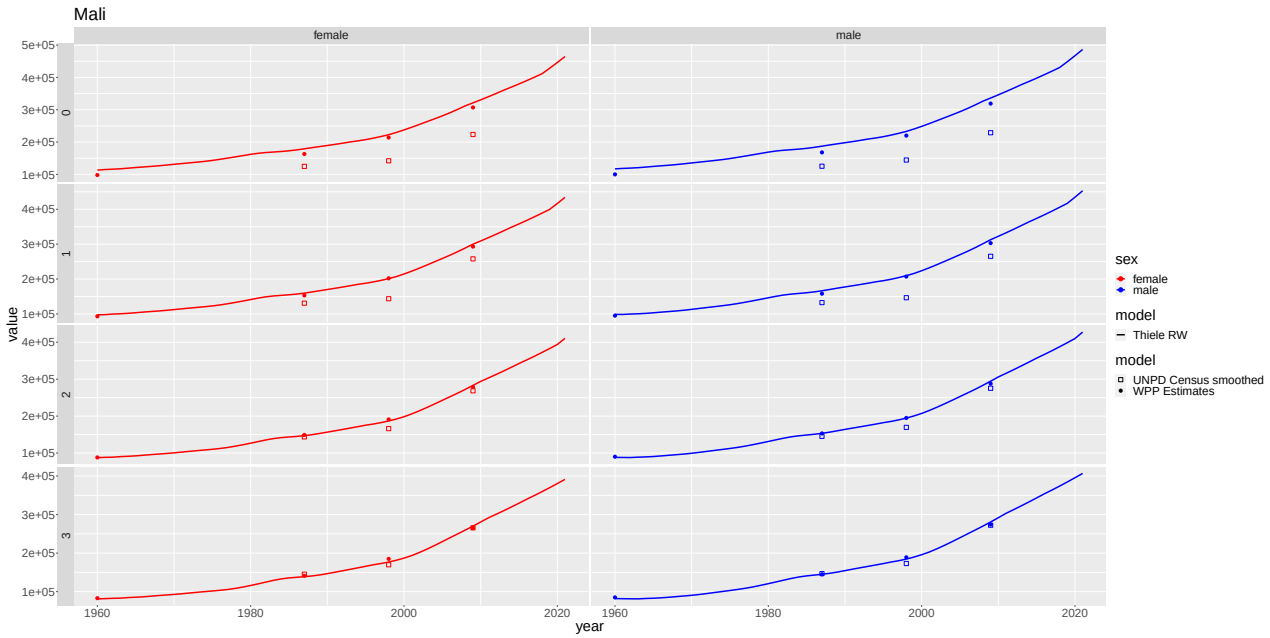

Figure 10: Population

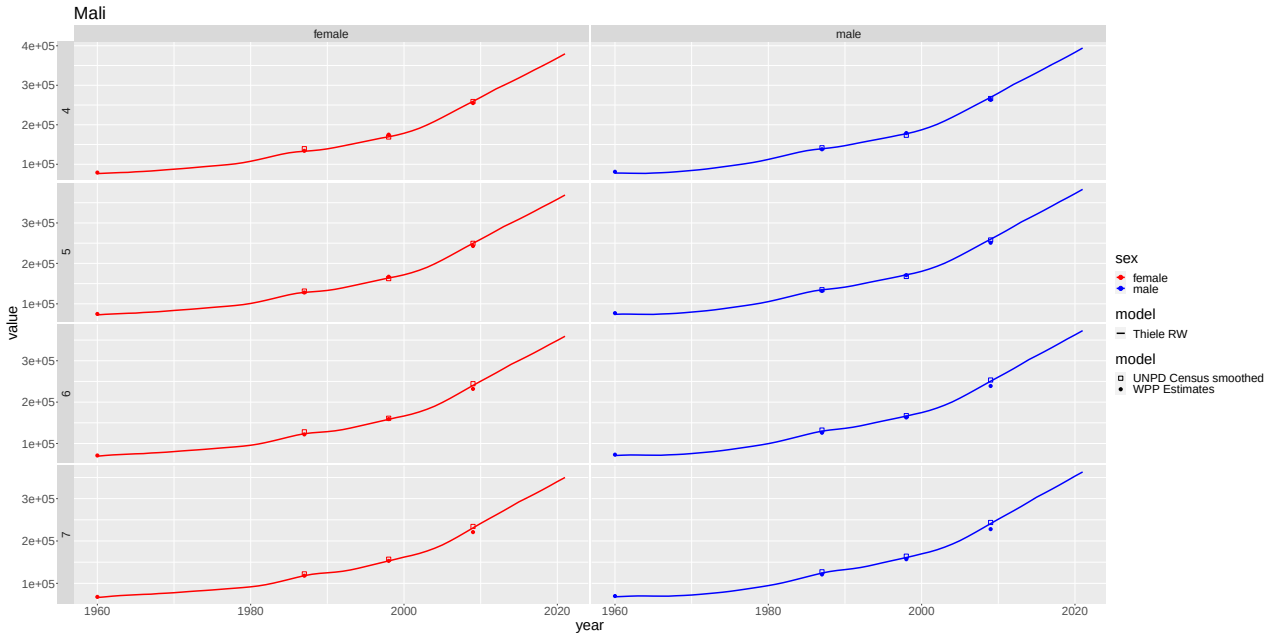

Figure 11: Population

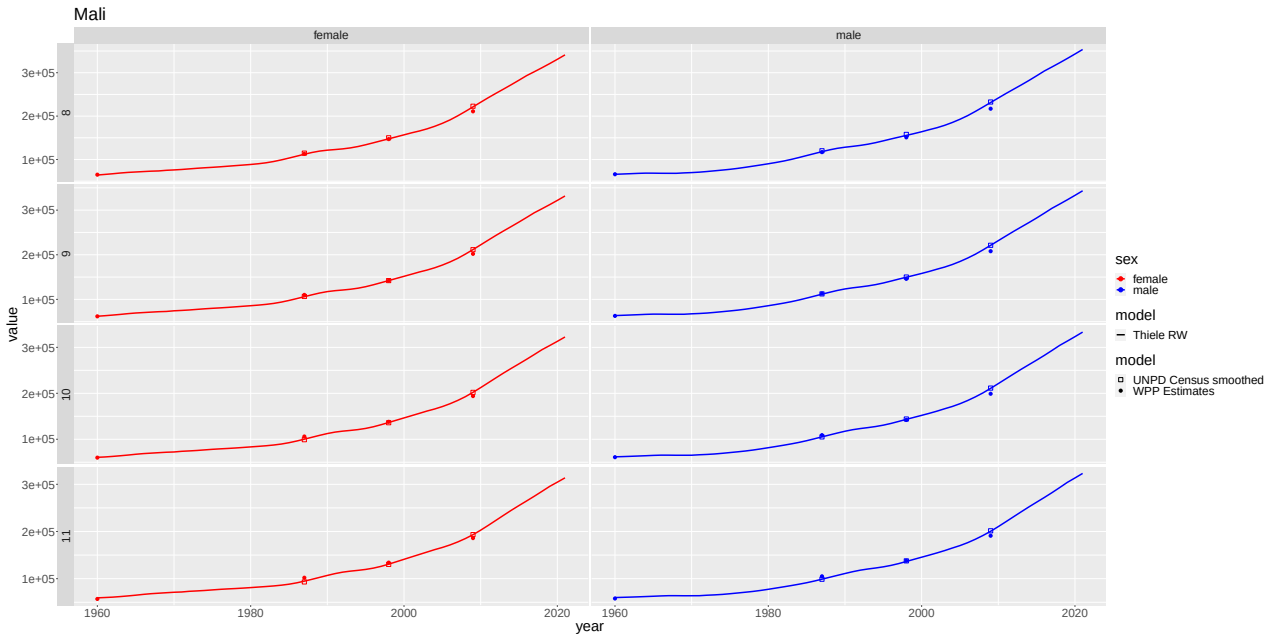

Figure 12: Population

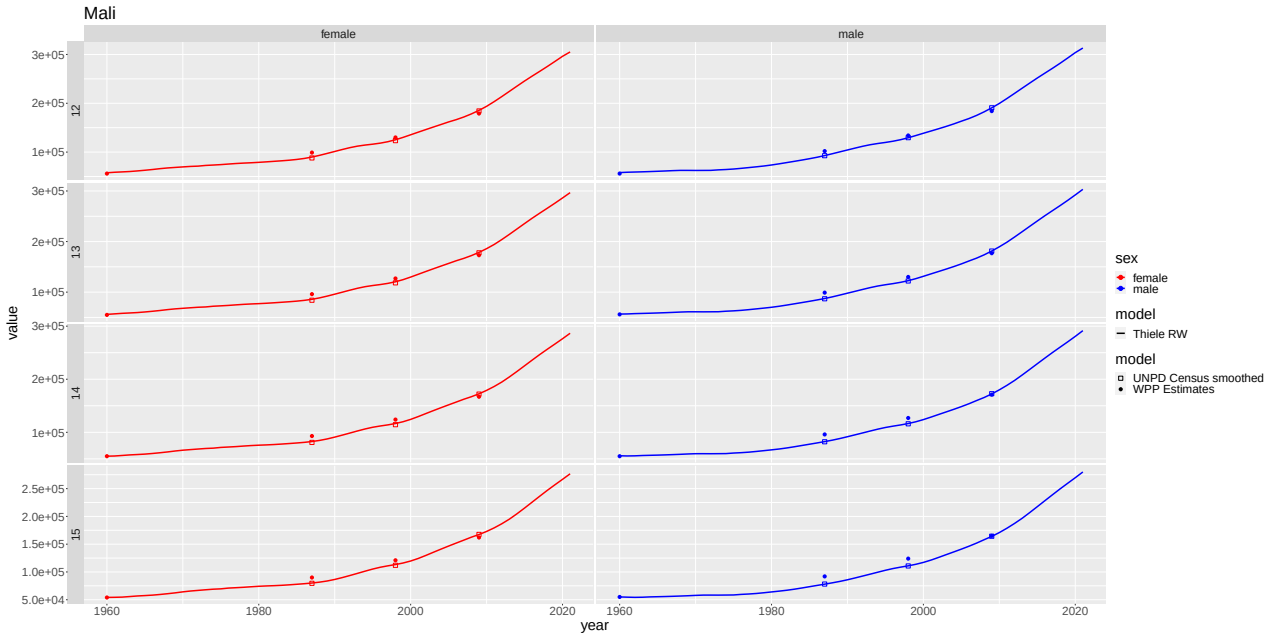

Figure 13: Population

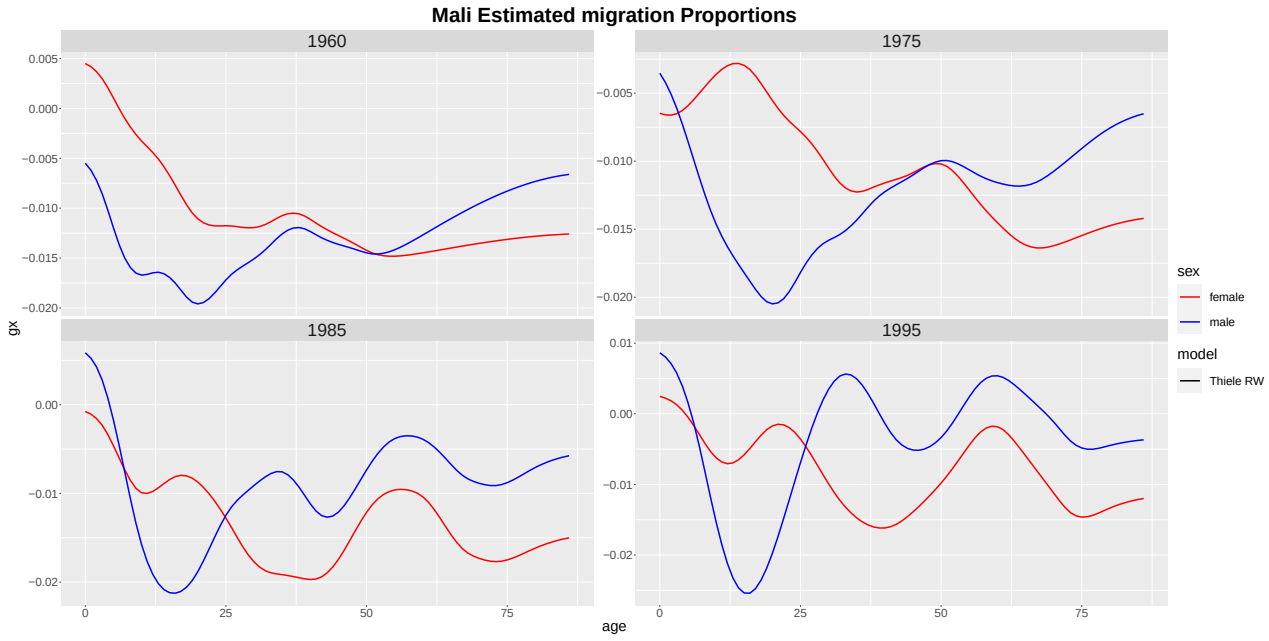

Figure 14: Migration

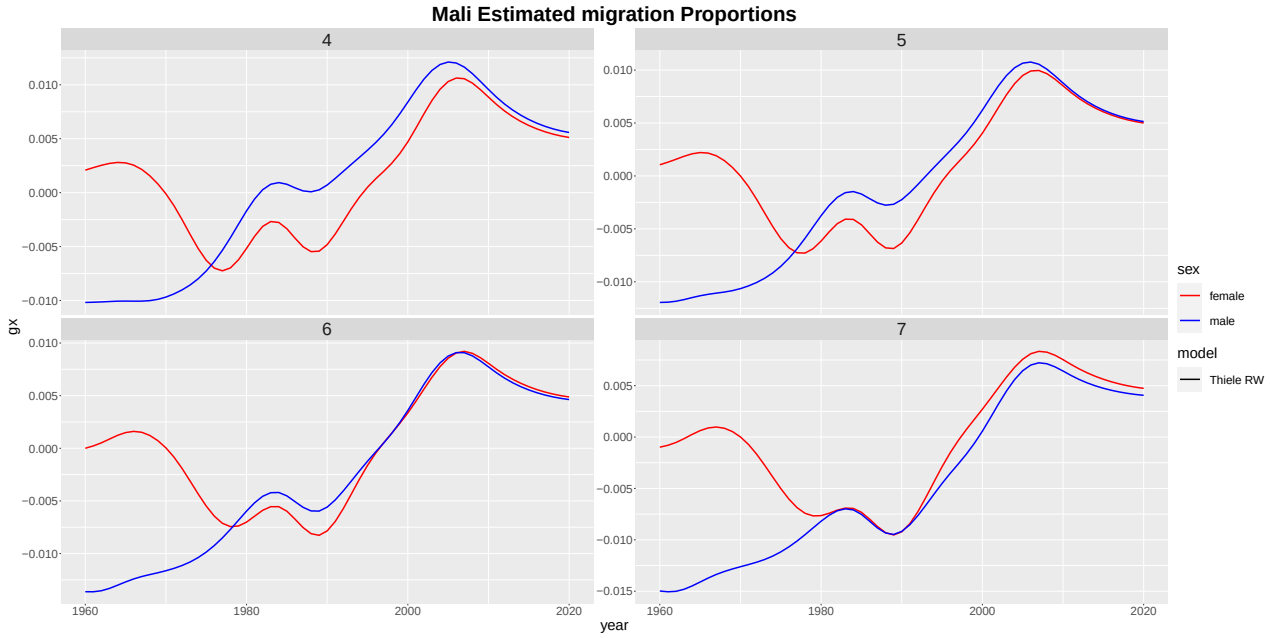

Figure 15: Migration

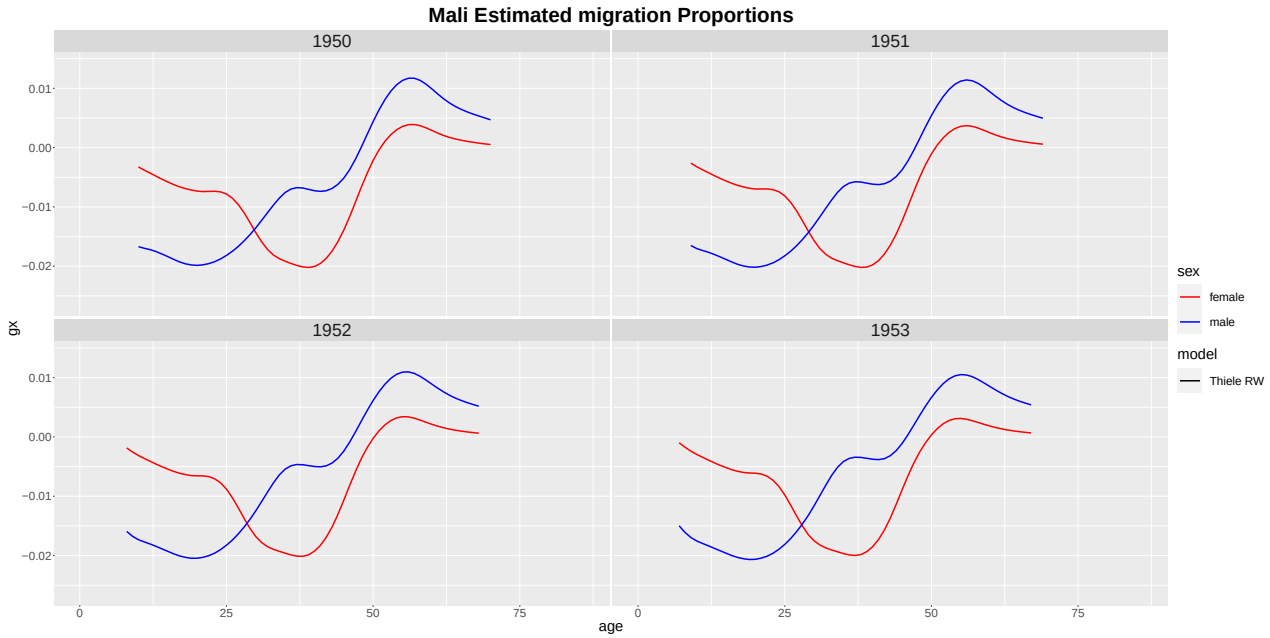

Figure 16: Migration

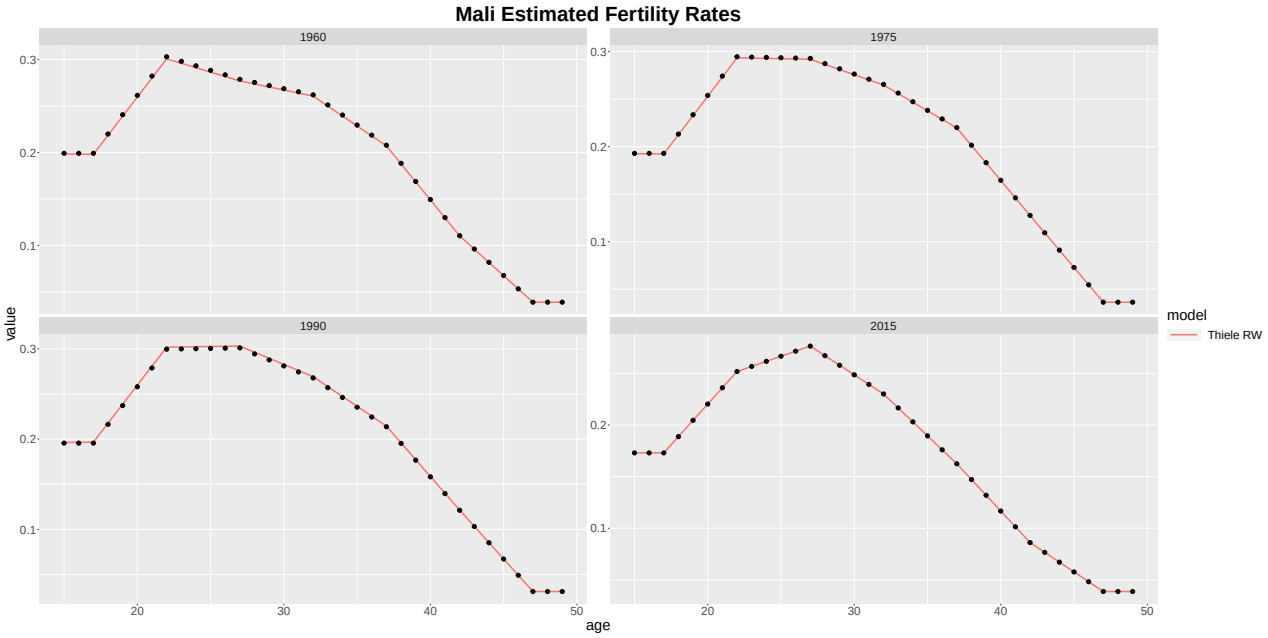

Figure 17: Fertility

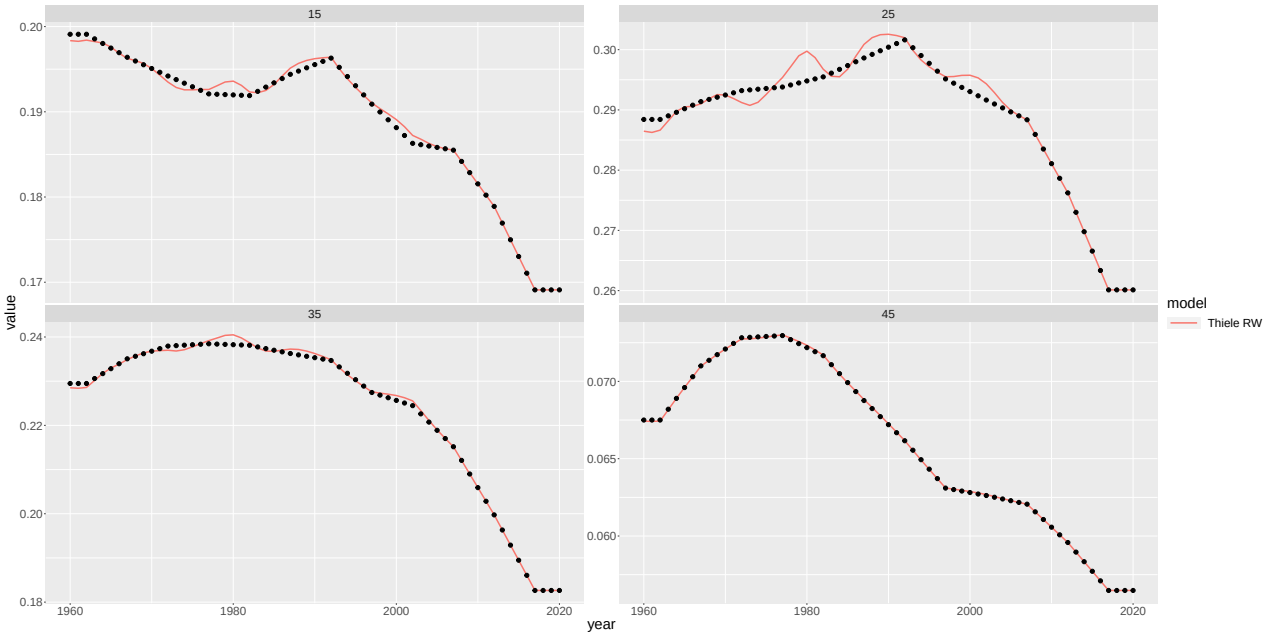

Figure 18: Fertility

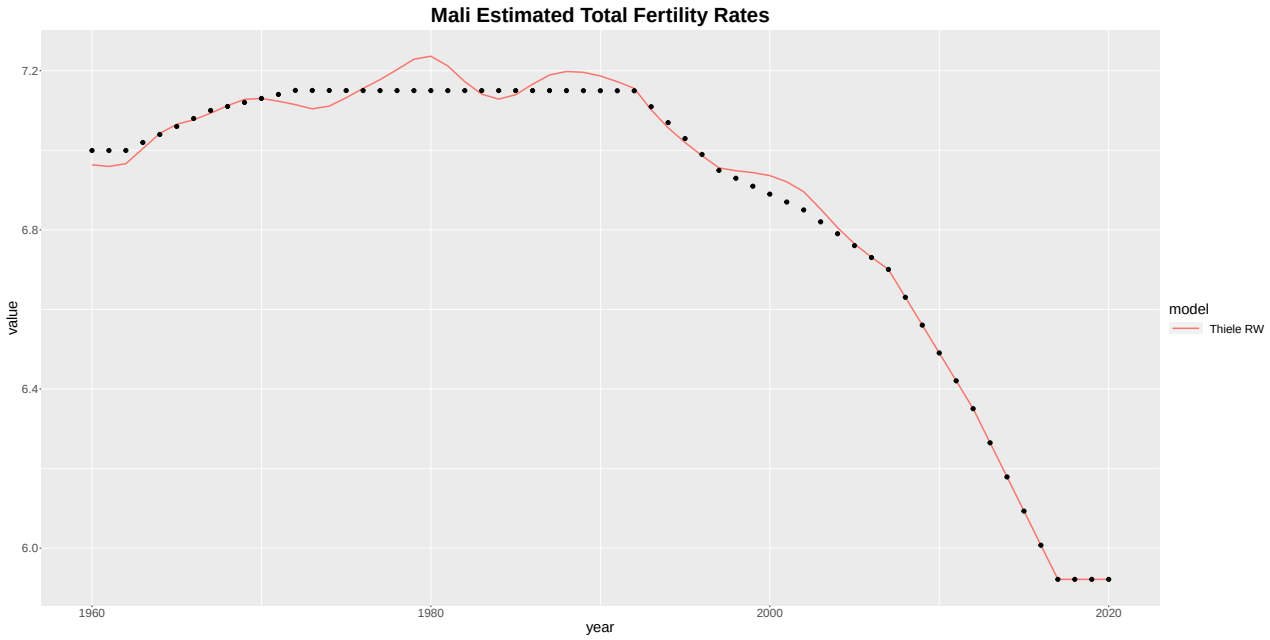

Figure 19: Total Fertility