

South Africa

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

```
## # A tibble: 86 x 7
```

```
##   age `1970` `1985` `1991` `1996` `2001` `2011`  
##   <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl>  
## 1    0 347577 265629 334664 434223. 454482 575028  
## 2    1 327004. 260708. 364874. 434296. 440667 567032.  
## 3    2 325266 271447. 381647. 449406. 442266. 564236.  
## 4    3 320516. 274451. 377053. 461697. 449032. 556210.  
## 5    4 318140. 273011. 379364. 474658. 459546. 544576.  
## 6    5 313147. 267934. 375903. 480788. 469845. 526048.  
## 7    6 309948 265764 368341. 479310. 477704. 502114.  
## 8    7 306471. 267165. 360249. 473457. 482862. 478502.  
## 9    8 303223. 272819. 354368. 467138. 492895. 460004.  
## 10   9 295460. 275083. 348572. 464657. 503893. 451534.  
## # ... with 76 more rows
```

```
## [1] "Census Females 5-year"
```

```
## # A tibble: 18 x 2
```

```
##   age `1980`  
##   <dbl> <dbl>  
## 1    0 1736315  
## 2    5 1575298  
## 3   10 1382085  
## 4   15 1296548  
## 5   20 1187044  
## 6   25  956402  
## 7   30  799542  
## 8   35  680398  
## 9   40  576749  
## 10  45  488030  
## 11  50  401384  
## 12  55  339598  
## 13  60  289582  
## 14  65  221493  
## 15  70  160492  
## 16  75   93129  
## 17  80   59494  
## 18  85   52494
```

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

```
## # A tibble: 86 x 7
```

```
##   age `1970` `1985` `1991` `1996` `2001` `2011`  
##   <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl>  
## 1    0 353187 266840 332158 432514. 453924 584097  
## 2    1 328995. 262455 371515 433911. 441106. 577574.  
## 3    2 322879 272988. 389101. 448461. 441893 574048.  
## 4    3 316004. 276266. 384583. 461203. 448540. 565571.  
## 5    4 313864. 275394. 387601. 475238. 459394. 553093.  
## 6    5 310881. 270720. 383920. 482371. 470590. 534653
```

```
## 7      6 309771. 268497. 375467. 481068. 478769. 510001.
## 8      7 307354. 269153. 366494. 473935. 482864. 485063.
## 9      8 304558. 274192. 360549. 465731. 491967. 465714.
## 10     9 296602. 275718. 354626. 461874. 503328. 457150.
## # ... with 76 more rows
```

```
## [1] "Census Males 5-year"
```

```
## # A tibble: 18 x 2
```

```
##   age `1980`
##   <dbl> <dbl>
```

```
## 1      0 1756592
## 2      5 1582313
## 3     10 1387903
## 4     15 1336257
## 5     20 1316011
## 6     25 1089762
## 7     30  908968
## 8     35  754899
## 9     40  626078
## 10    45  513247
## 11    50  416271
## 12    55  326920
## 13    60  262972
## 14    65  189590
## 15    70  123694
## 16    75   68244
## 17    80   33990
## 18    85   26737
```

Thiele log-Normal Hump Spline

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

##	log_tau2_logpop	log_tau2_logpop	log_tau2_logpop	log_tau2_logpop	log_lambda_fx	log
##	4.958921913	6.833850041	4.940434001	6.621883433	6.552399712	7
##	log_lambda_tp	tp_slope	tp_params_5	tp_params_10	log_lambda_phi	log
##	5.103757886	-0.004964438	0.119853127	0.182806028	11.314626753	11
##	log_lambda_lambda	log_lambda_delta	log_lambda_epsilon			
##	2.884135789	4.729316870	5.292525158			

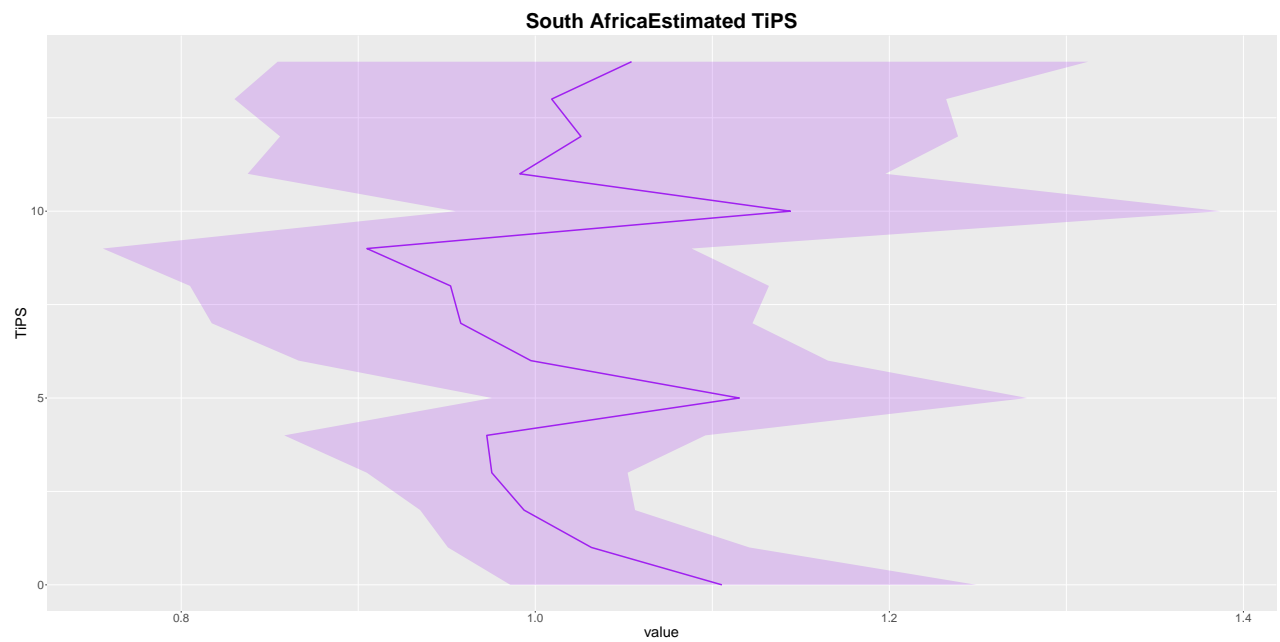


Figure 1: Estimated TiPS

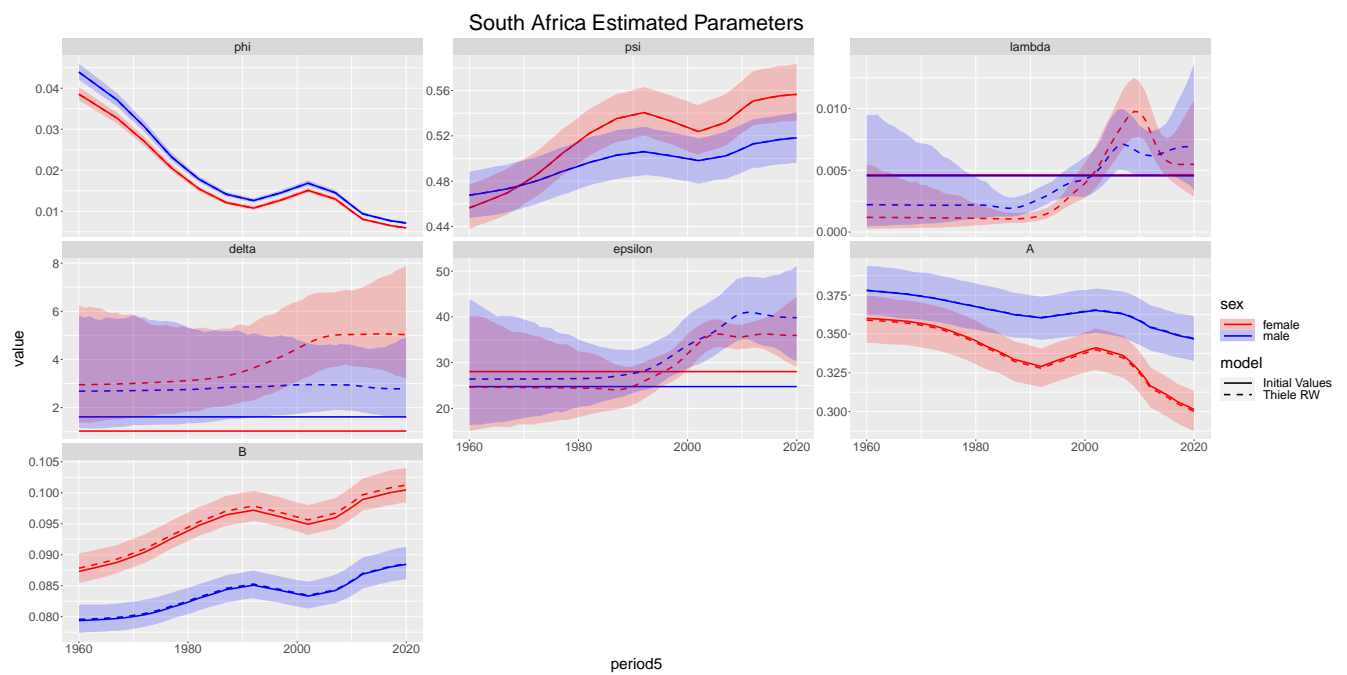


Figure 2: Estimated parameters

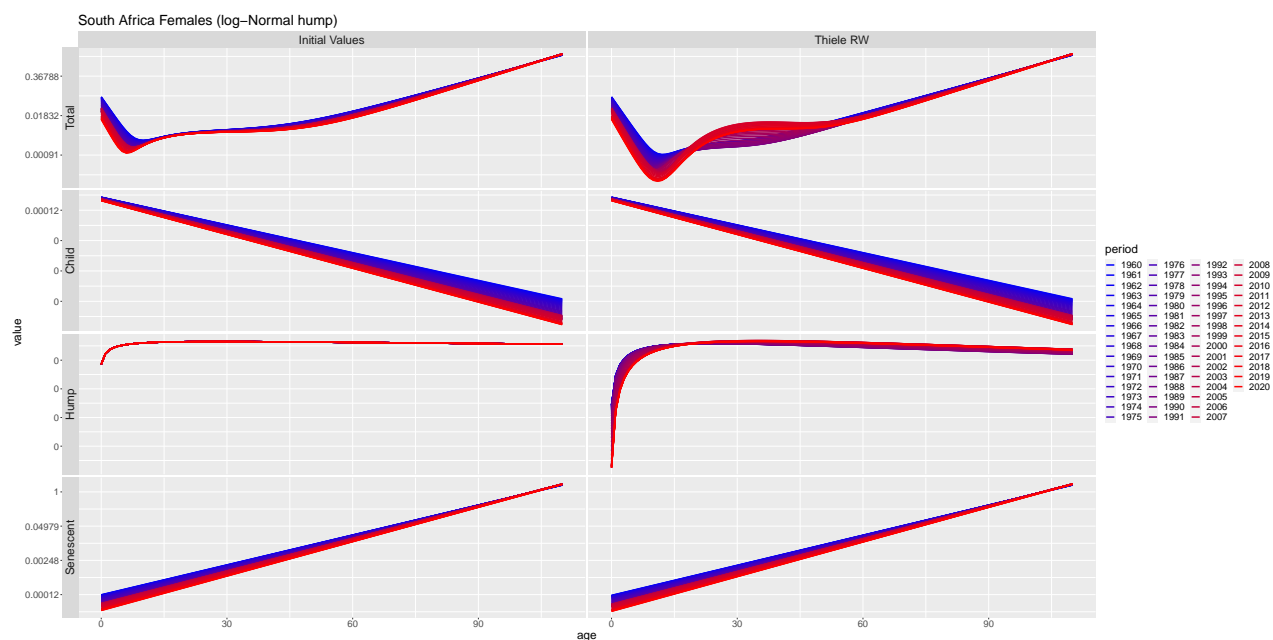


Figure 3: Thiele Decomposed

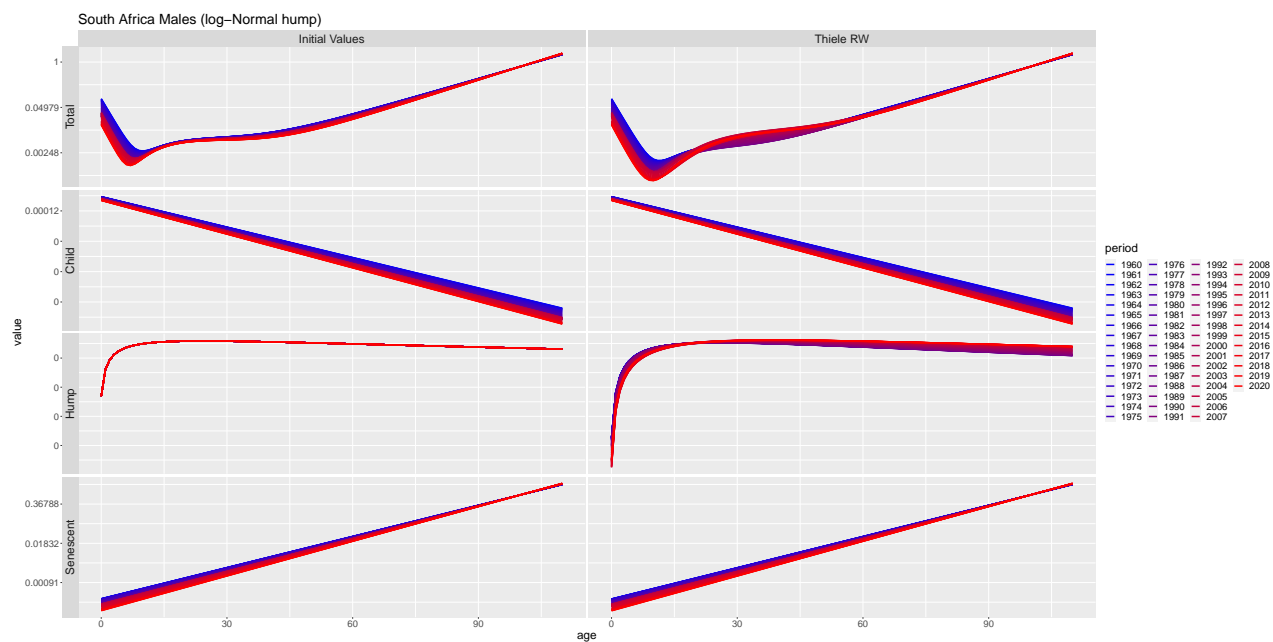


Figure 4: Thiele Decomposed

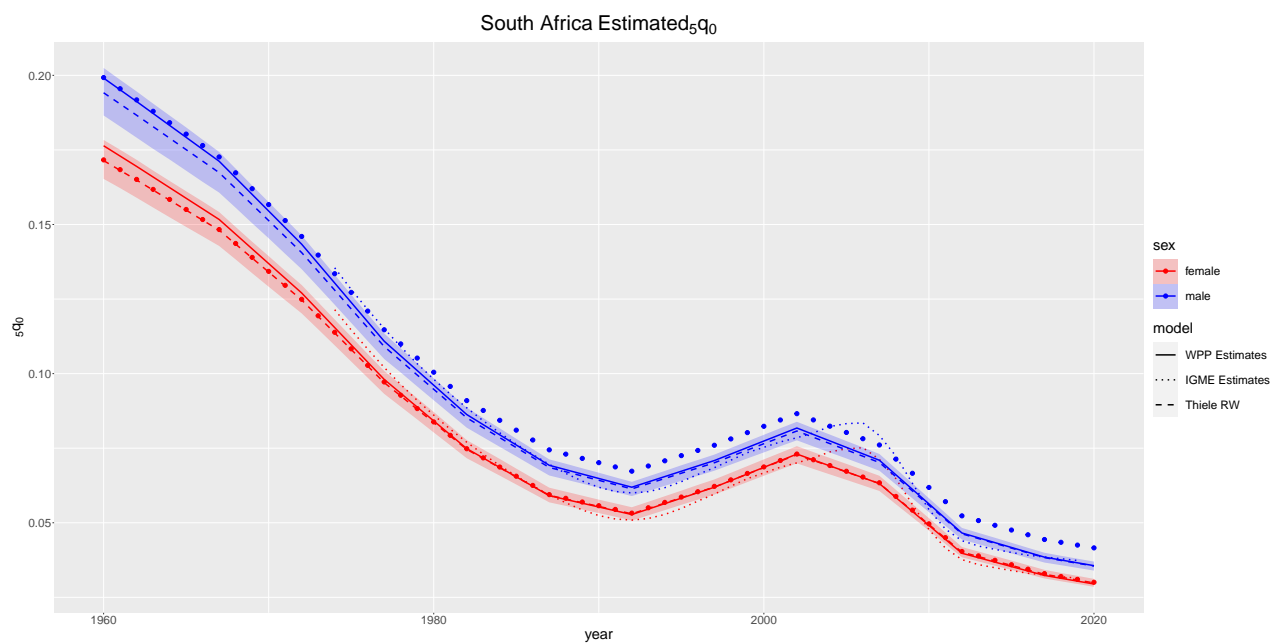


Figure 5: Estimated ${}_5q_0$

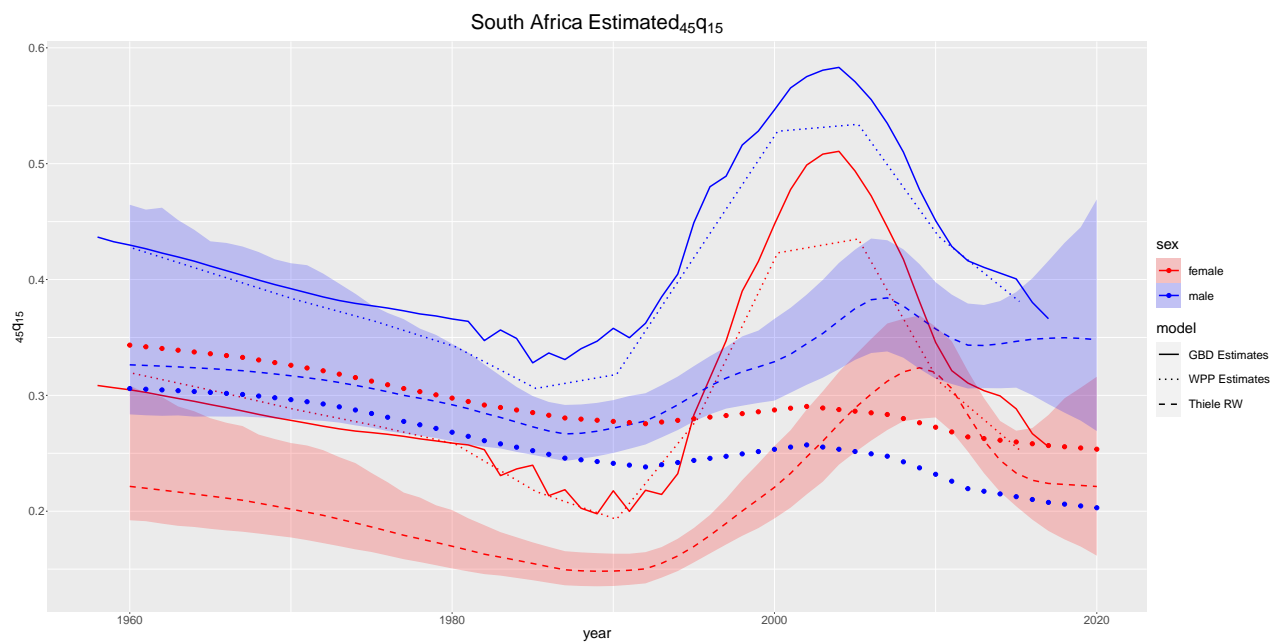


Figure 6: Estimated ${}_{45}q_{15}$

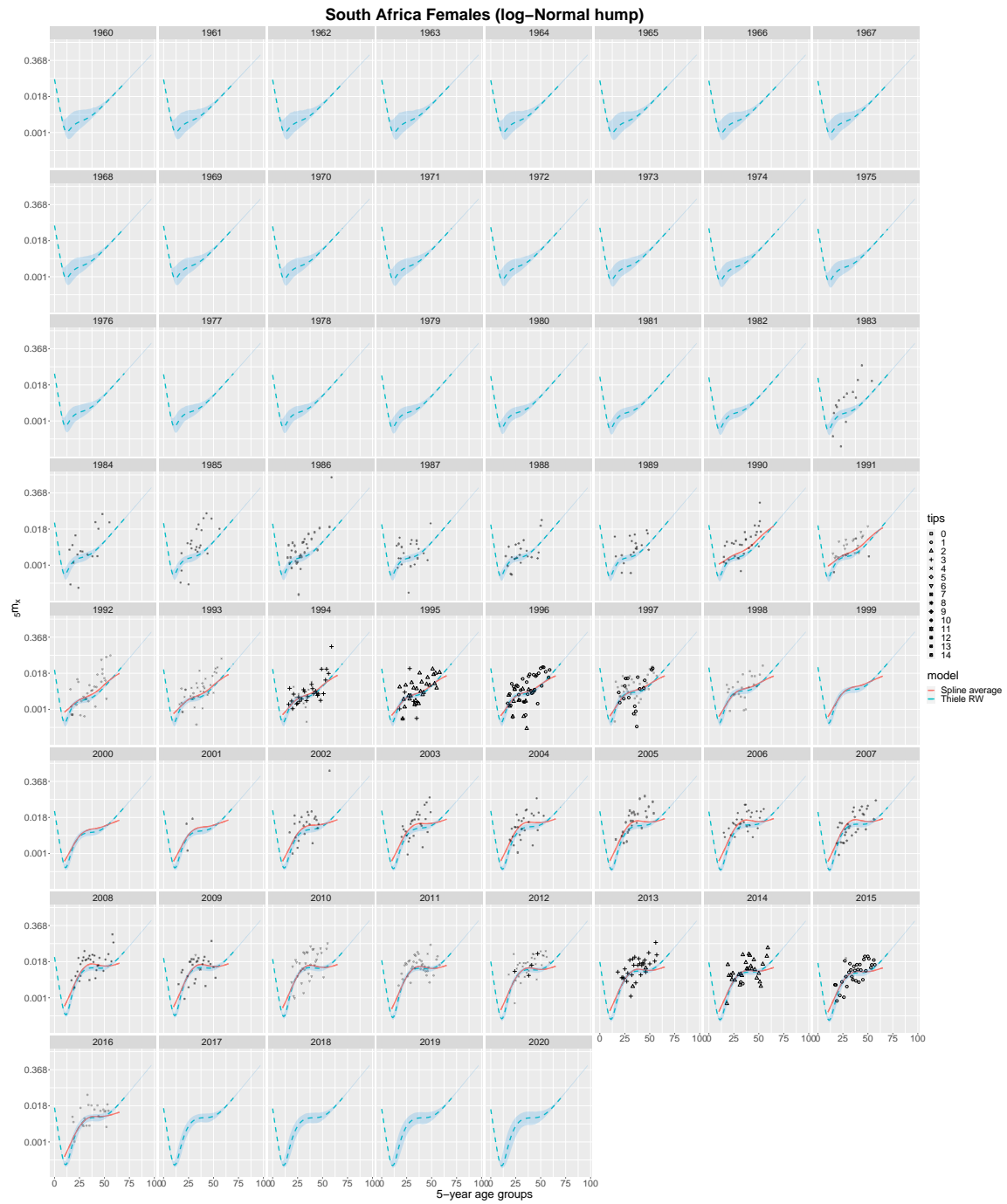


Figure 7: Mortality Schedules

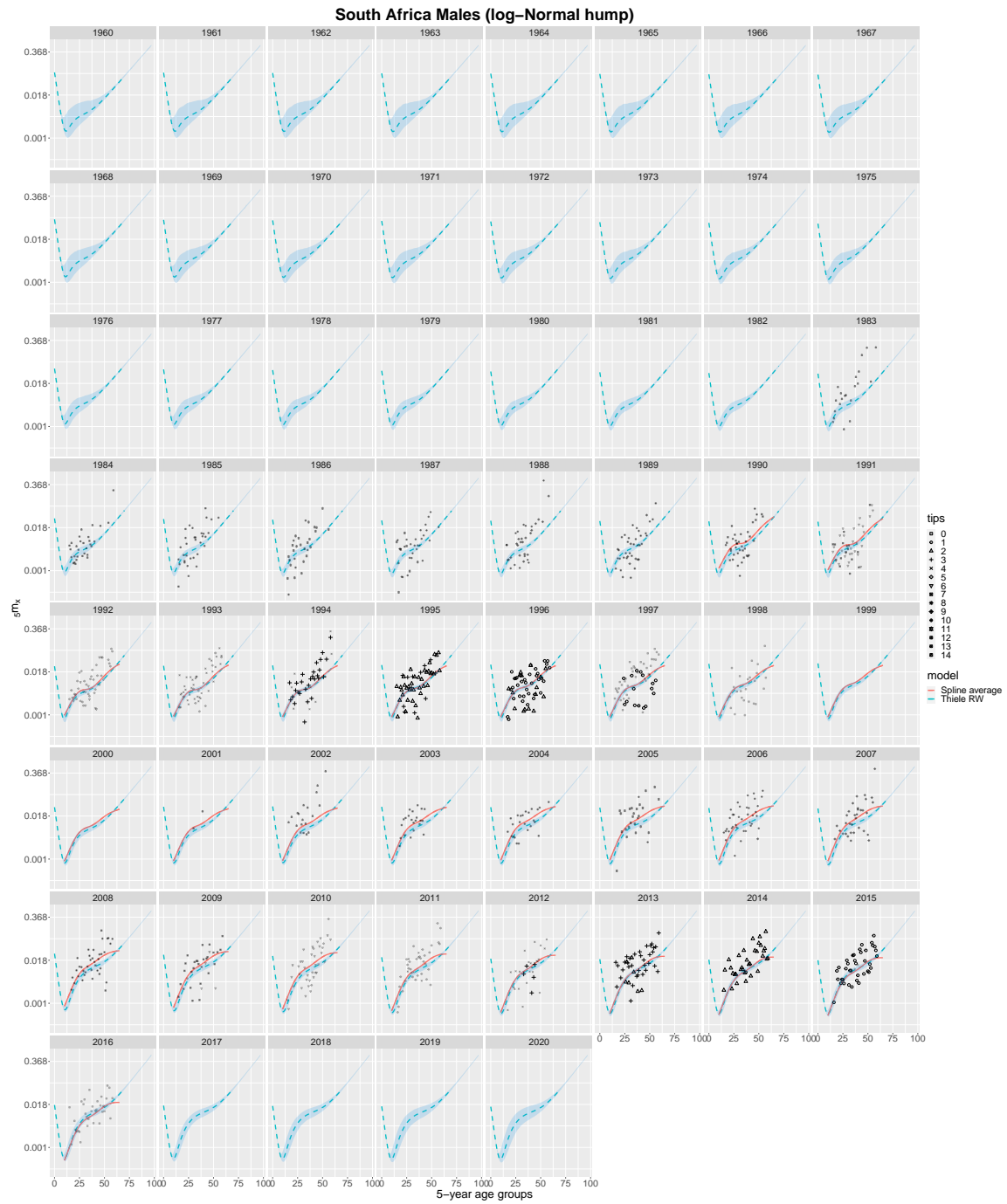


Figure 8: Mortality Schedules

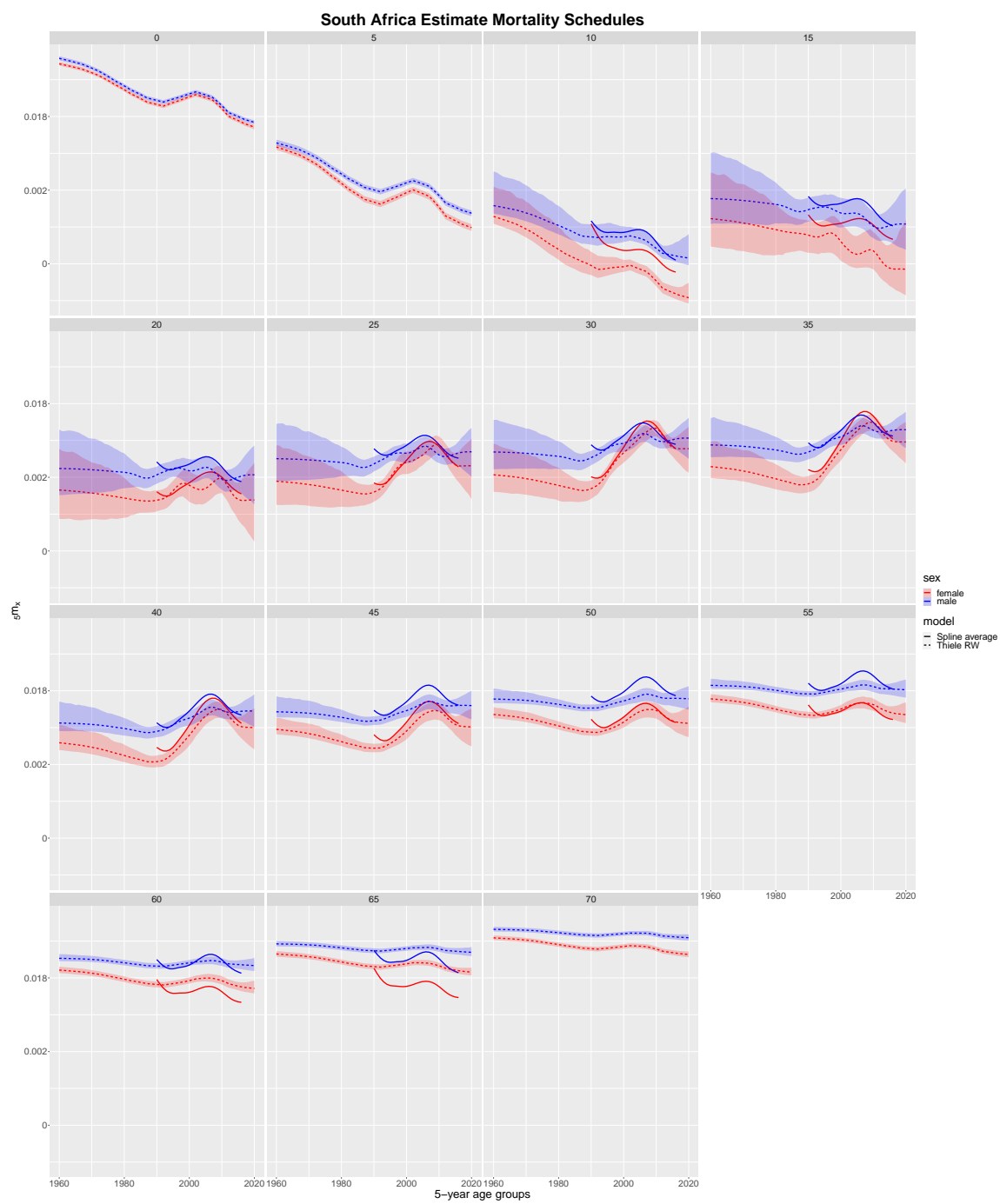


Figure 9: Mortality Schedules

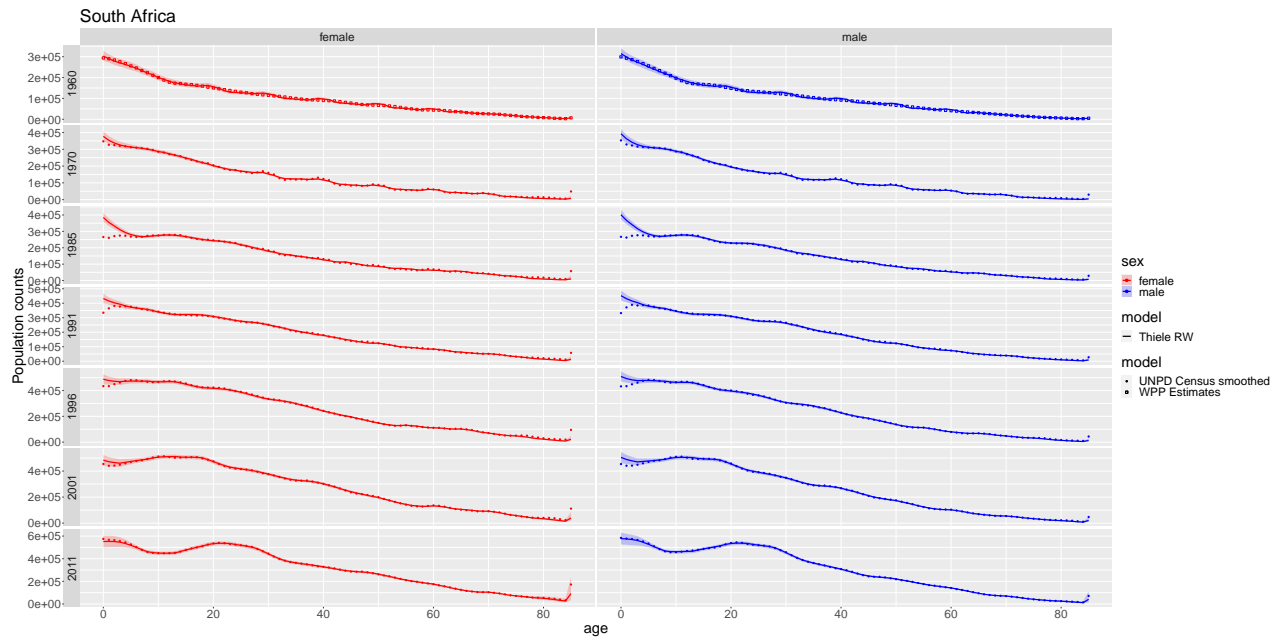


Figure 10: Population

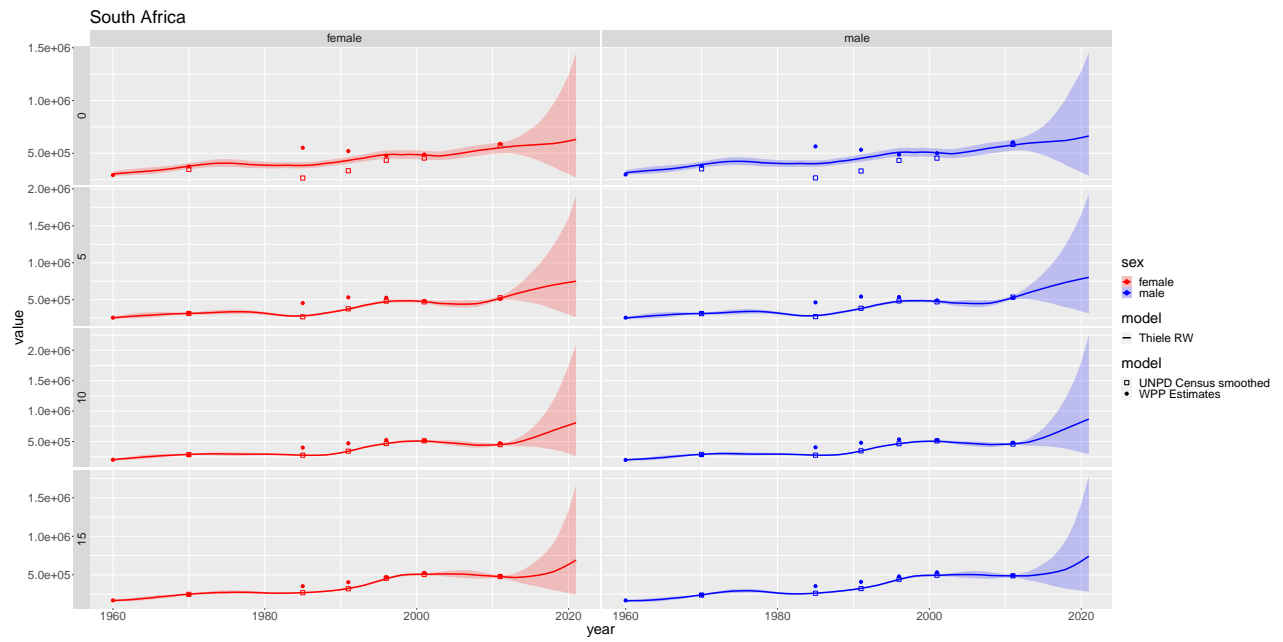


Figure 11: Population

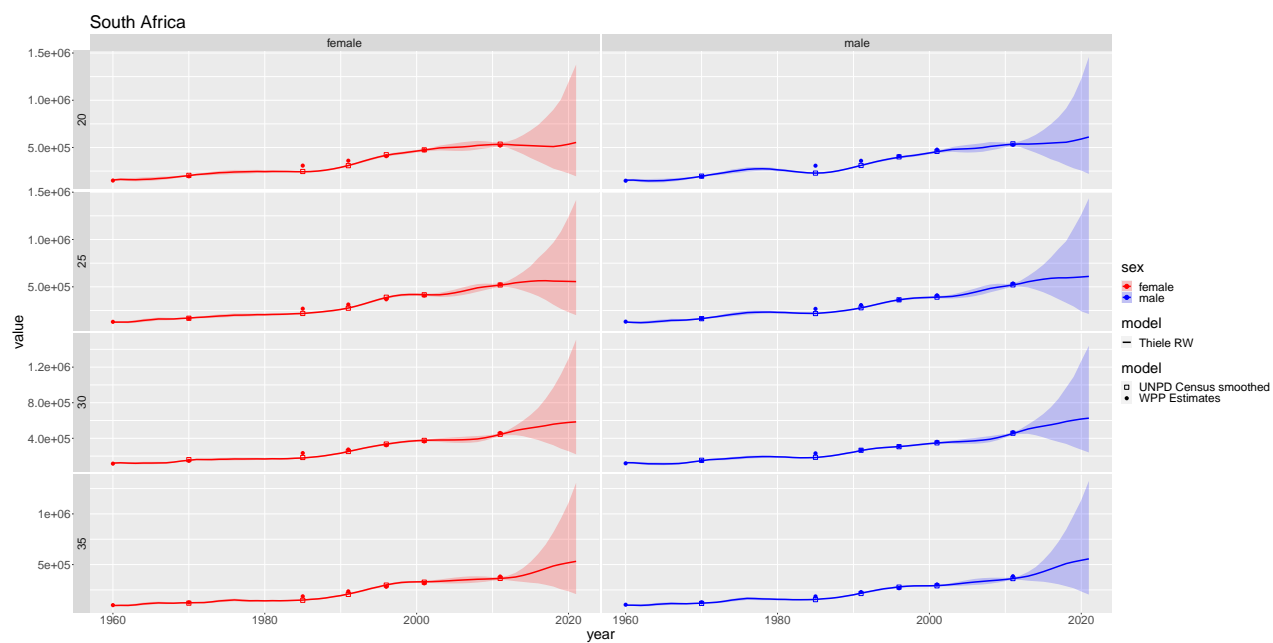


Figure 12: Population

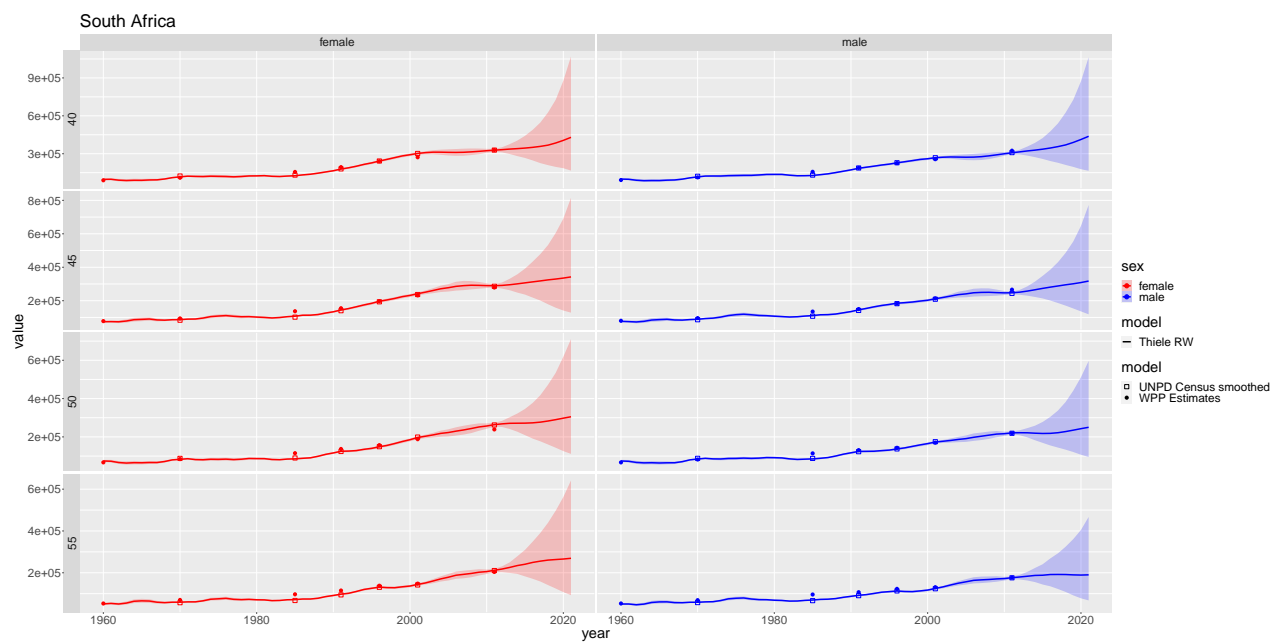


Figure 13: Population

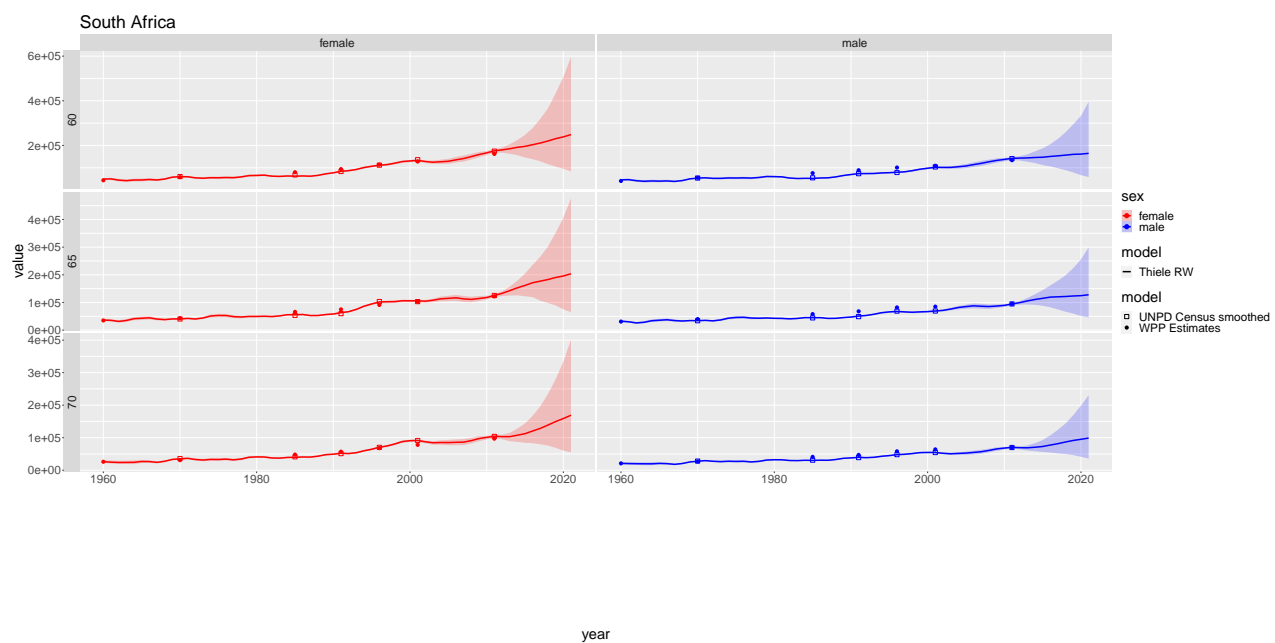


Figure 14: Population

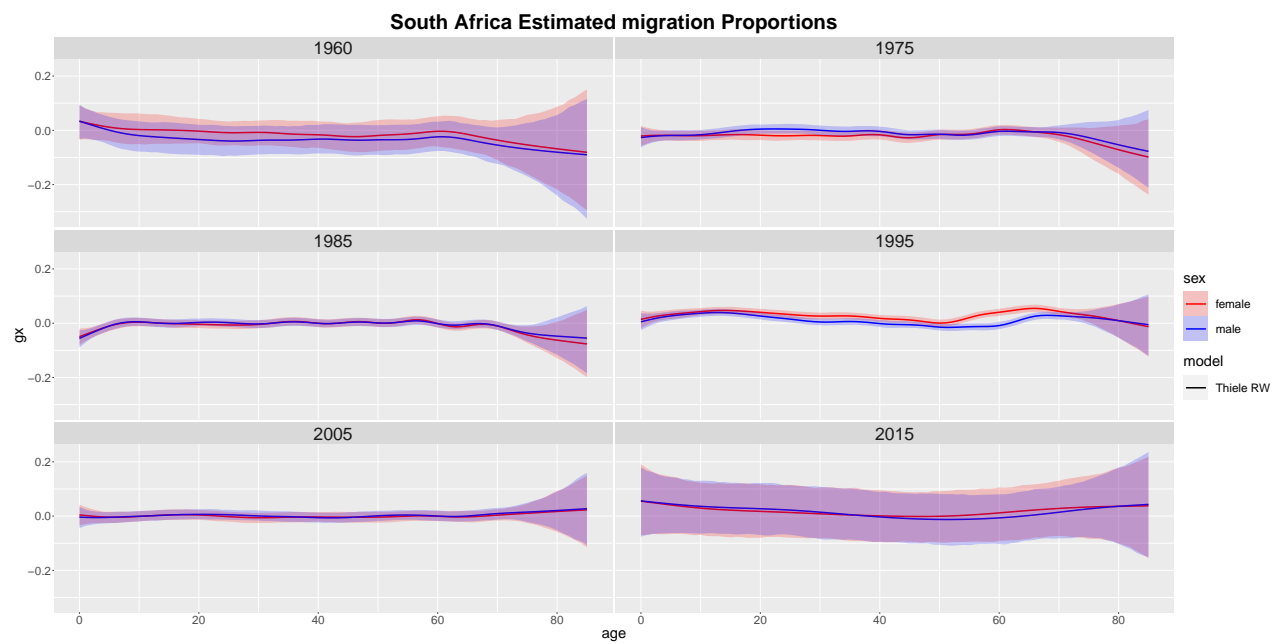


Figure 15: Migration

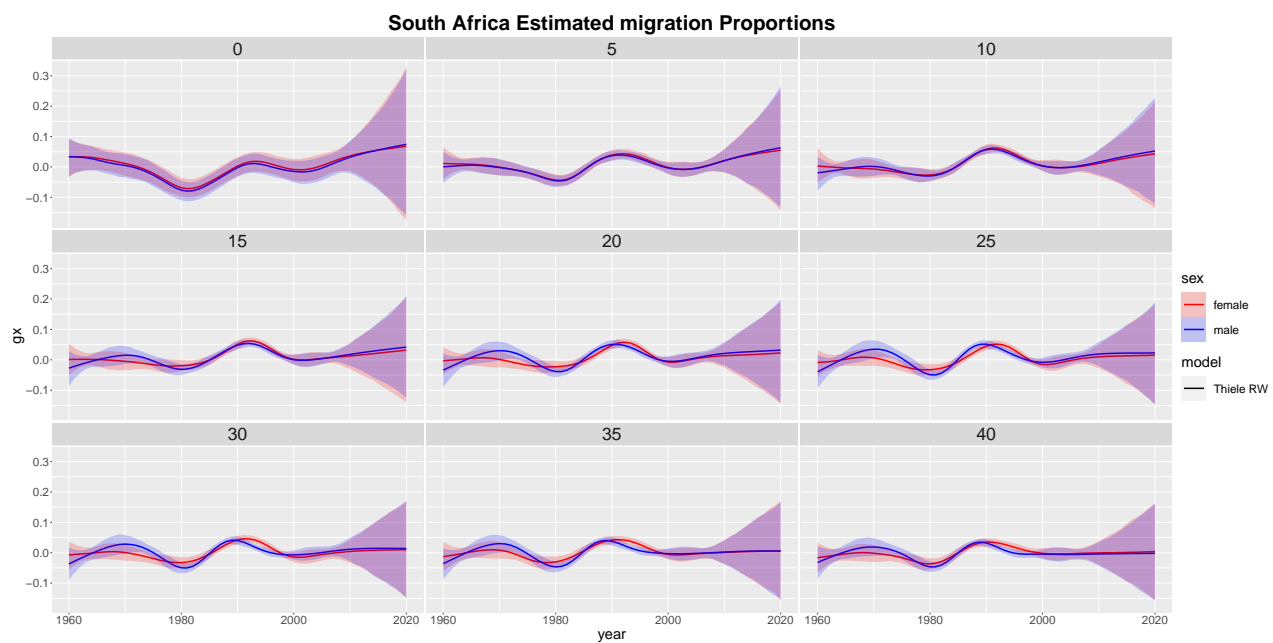


Figure 16: Migration

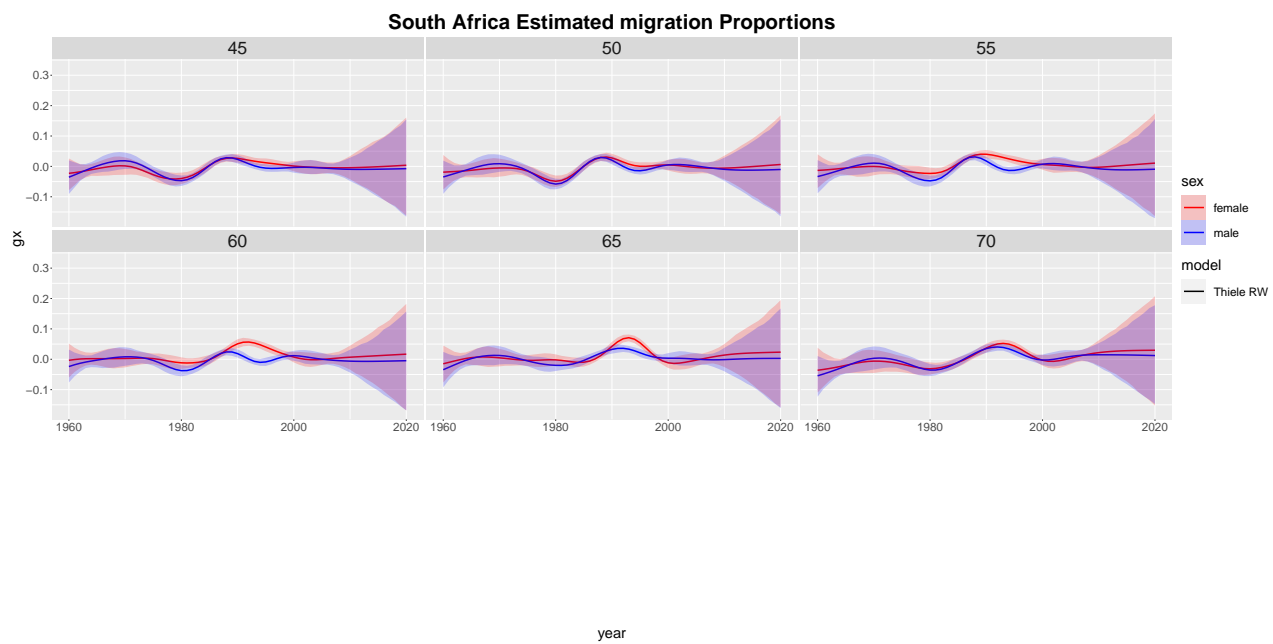


Figure 17: Migration

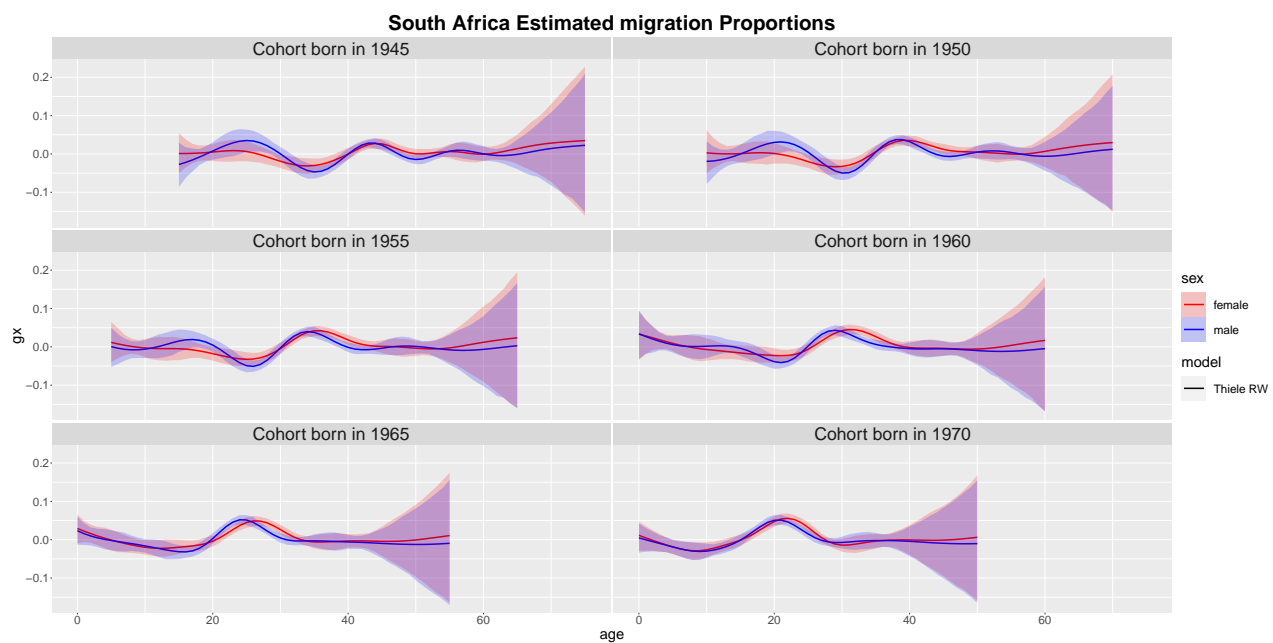


Figure 18: Migration

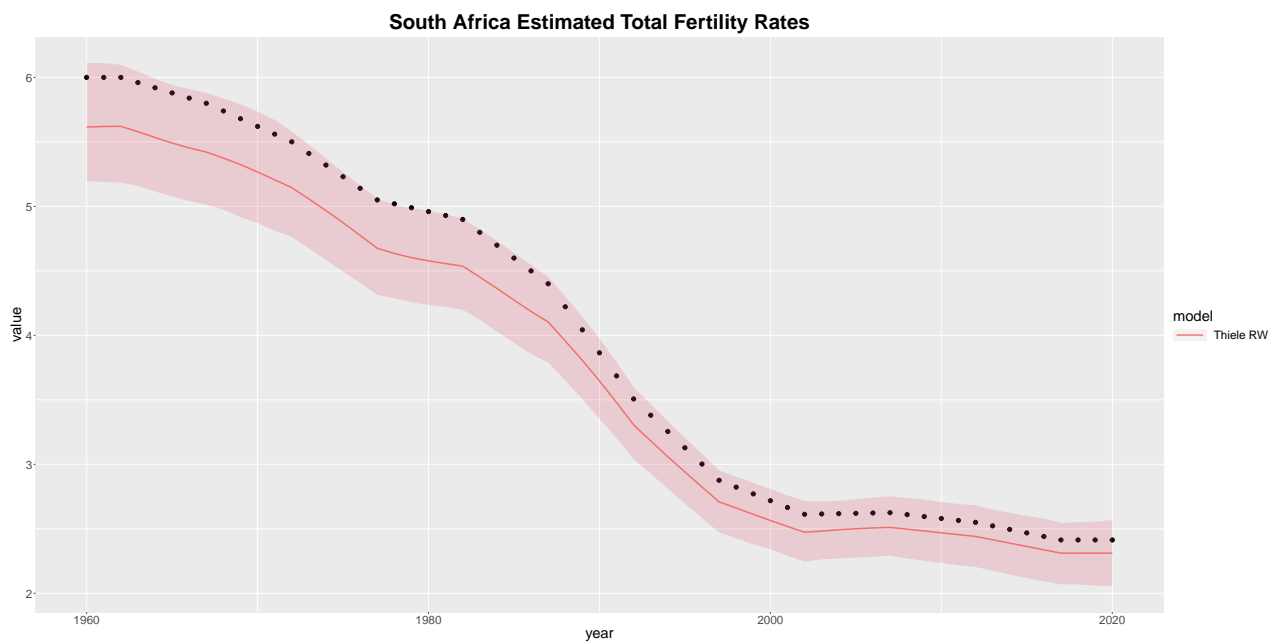


Figure 19: Total Fertility

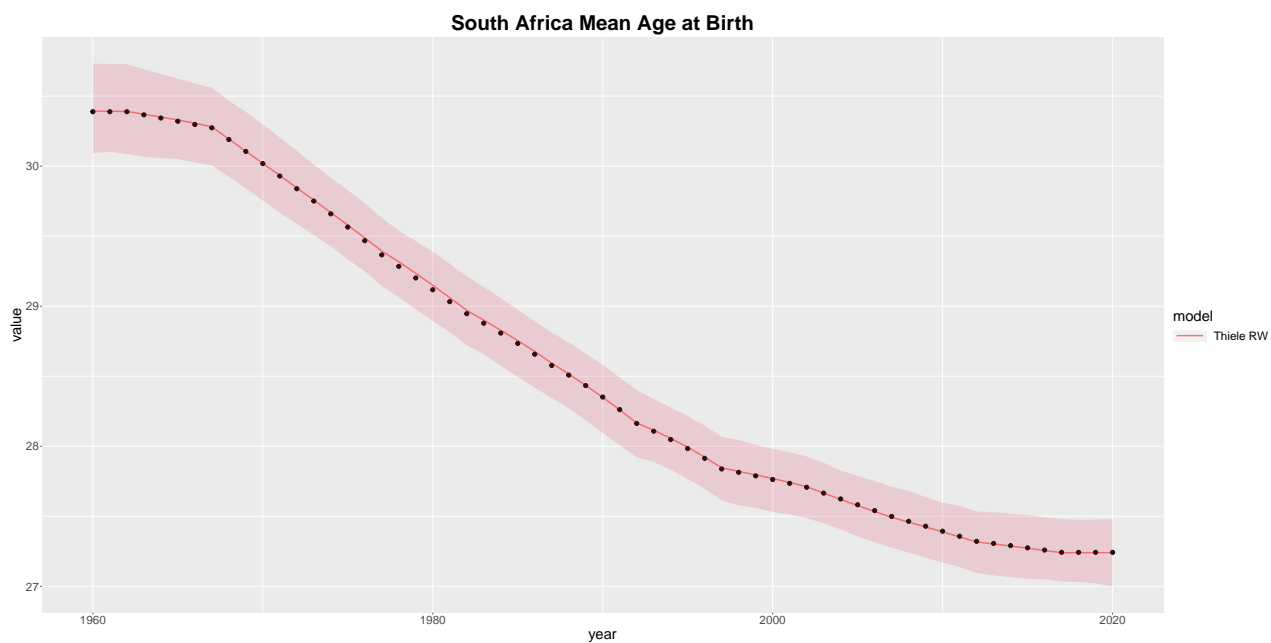


Figure 20: Mean age at births

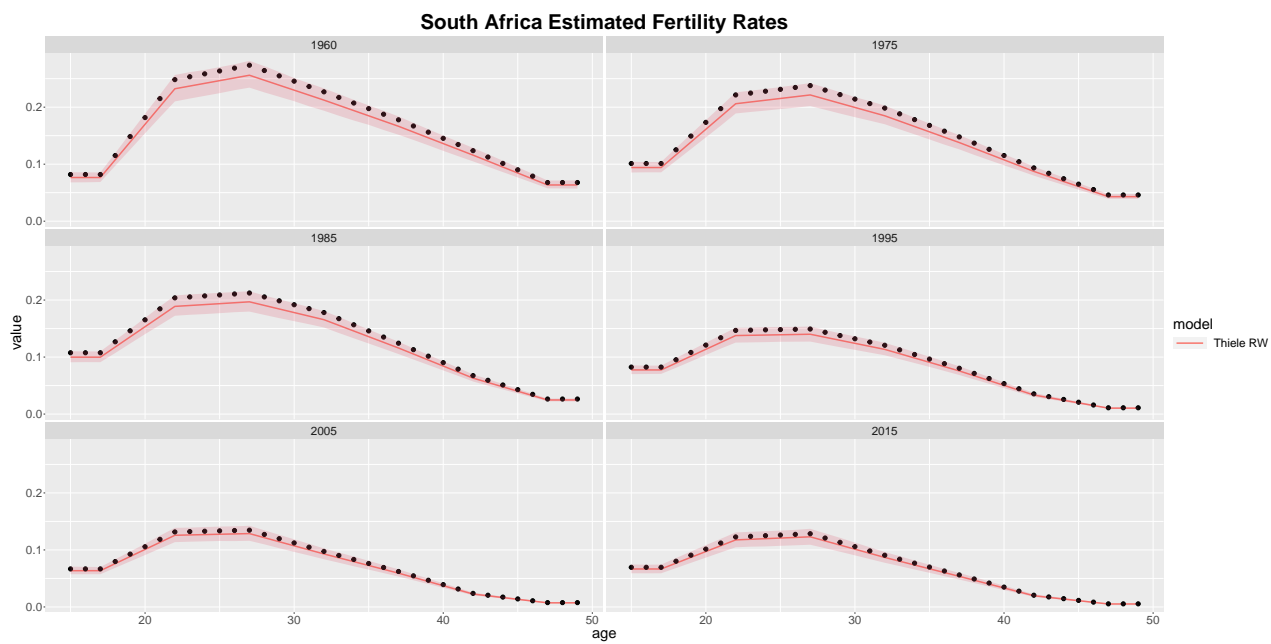


Figure 21: Fertility

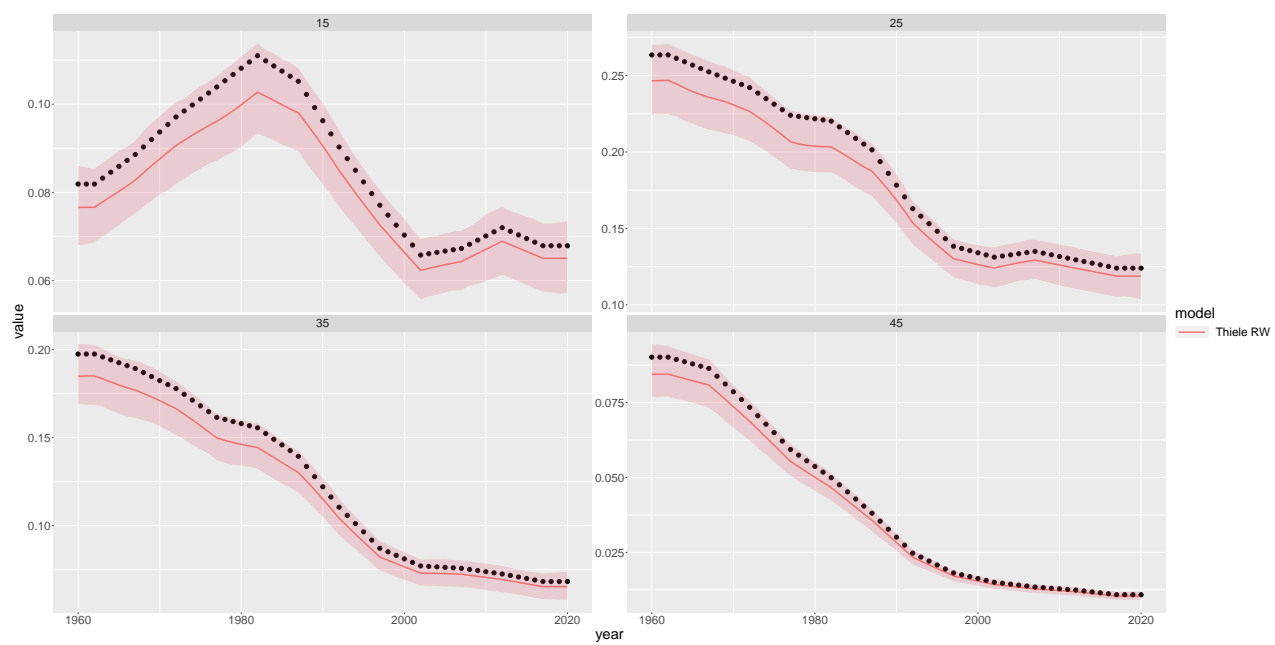


Figure 22: Fertility