

# Congo

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

## # A tibble: 18 x 4
##   aggr.age `1974` `1984` `2007`
## *   <dbl>   <dbl>   <dbl>   <dbl>
## 1       0 122503. 160880. 279158
## 2       5 100522. 142980. 235631
## 3      10  79490. 125040. 209662.
## 4      15  63470. 107660. 197640.
## 5      20  52055.  89407. 187422.
## 6      25  43495.  71045. 168917.
## 7      30  38750.  55496. 142430.
## 8      35  37288.  44130. 114435.
## 9      40  35104.  37502.  88631.
## 10     45  31605.  34621.  68360
## 11     50  27769.  31358.  53193
## 12     55  22732.  26843.  40778.
## 13     60  16571.  21959.  31928.
## 14     65  10763.  16189.  25778.
## 15     70   5981.  10300.  19624
## 16     75    790.   5440.  12855
## 17     80   689.   2437.   7073.
## 18     85    NA     671.   4684
```

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

## # A tibble: 18 x 4
##   aggr.age `1974` `1984` `2007`
## *   <dbl>   <dbl>   <dbl>   <dbl>
## 1       0 123393. 162414. 278342
## 2       5 101676. 143202. 235910.
## 3      10  79713. 123091. 205899
## 4      15  59314. 103336. 184008.
## 5      20  44571.  84483. 168768.
## 6      25  37019.  66284. 159526.
## 7      30  33944.  50872. 145566.
## 8      35  32040.  40701. 122364.
## 9      40  29112.  35058.  95512
## 10     45  25449.  31134.  70931.
## 11     50  22298.  26306.  51002.
## 12     55  19353.  21239.  36610
## 13     60  14853.  16981.  27375.
## 14     65   9391.  12954.  20781.
## 15     70   4895.   8572.  14673.
## 16     75    720.   4419.   8750
## 17     80   517.   1746.   4313.
## 18     85    NA     487.   2680
```

## Thiele Normal Hump

```
##   user  system elapsed
## 83.69   1.37   85.70
```

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

### Thiele log-Normal Hump

```
## user system elapsed
## 86.50 1.01 88.24
```

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

### Thiele log-Normal Hump RW

```
## Order of parameters:
```

## [1] "log_tau2_logpop_f"	"log_tau2_logpop_m"	"log_tau2_fx"	"log_tau2_gx_f"
## [5] "log_tau2_gx_m"	"log_basepop_f"	"log_basepop_m"	"log_fx"
## [9] "gx_f"	"gx_m"	"logit_rho_g_x_f"	"logit_rho_gx_f"
## [13] "logit_rho_g_t_f"	"logit_rho_g_t_m"	"log_lambda_tp"	"log_lambda_tp_f"
## [17] "tp_params"	"log_dispersion_f"	"log_dispersion_m"	"log_phi_f"
## [21] "log_phi_innov_m"	"log_psi_innov_f"	"log_psi_innov_m"	"log_lambda_f"
## [25] "log_lambda_innov_m"	"log_delta_innov_f"	"log_delta_innov_m"	"log_epsilon_f"
## [29] "log_epsilon_innov_m"	"log_A_innov_f"	"log_A_innov_m"	"log_B_innov_f"
## [33] "log_B_innov_m"	"log_phi_f"	"log_phi_m"	"log_psi_f"
## [37] "log_psi_m"	"log_lambda_f"	"log_lambda_m"	"log_delta_m"
## [41] "log_delta_m"	"log_epsilon_f"	"log_epsilon_m"	"log_A_f"
## [45] "log_A_m"	"log_B_f"	"log_B_m"	"log_marginal_prec_phi_f"
## [49] "log_marginal_prec_phi_m"	"log_marginal_prec_psi_f"	"log_marginal_prec_psi_m"	"log_marginal_prec_lambda_f"
## [53] "log_marginal_prec_lambda_m"	"log_marginal_prec_delta_f"	"log_marginal_prec_delta_m"	"log_marginal_prec_A_f"
## [57] "log_marginal_prec_epsilon_m"	"log_marginal_prec_A_f"	"log_marginal_prec_A_m"	"logit_rho_phi_f"
## [61] "log_marginal_prec_B_m"	"logit_rho_phi_f"	"logit_rho_phi_m"	"logit_rho_lambda_f"
## [65] "logit_rho_psi_m"	"logit_rho_lambda_f"	"logit_rho_lambda_m"	"logit_rho_epsilon_f"
## [69] "logit_rho_delta_m"	"logit_rho_epsilon_f"	"logit_rho_epsilon_m"	"logit_rho_B_f"
## [73] "logit_rho_A_m"	"logit_rho_B_f"	"logit_rho_B_m"	

```
## Not matching template order:
```

## [1] "log_tau2_logpop_f"	"log_tau2_logpop_m"	"log_tau2_fx"	"log_tau2_gx_f"
## [5] "log_tau2_gx_m"	"logit_rho_g_x_f"	"logit_rho_g_t_f"	"logit_rho_gx_f"
## [9] "logit_rho_g_t_m"	"log_basepop_f"	"log_basepop_m"	"log_fx"
## [13] "gx_f"	"gx_m"	"log_lambda_tp"	"log_lambda_tp_f"
## [17] "log_dispersion_f"	"log_dispersion_m"	"tp_params"	"log_phi_f"
## [21] "log_psi_f"	"log_lambda_f"	"log_delta_f"	"log_epsilon_f"
## [25] "log_A_f"	"log_B_f"	"log_phi_m"	"log_psi_f"
## [29] "log_lambda_m"	"log_delta_m"	"log_epsilon_m"	"log_A_m"
## [33] "log_B_m"	"log_marginal_prec_phi_f"	"log_marginal_prec_psi_f"	"log_marginal_prec_lambda_f"
## [37] "log_marginal_prec_delta_f"	"log_marginal_prec_epsilon_f"	"log_marginal_prec_A_f"	"log_marginal_prec_A_m"
## [41] "log_marginal_prec_phi_m"	"log_marginal_prec_psi_m"	"log_marginal_prec_lambda_m"	"log_marginal_prec_B_m"
## [45] "log_marginal_prec_epsilon_m"	"log_marginal_prec_A_m"	"log_marginal_prec_B_m"	"logit_rho_phi_f"
## [49] "logit_rho_psi_f"	"logit_rho_A_f"	"logit_rho_B_f"	"logit_rho_lambda_f"
## [53] "logit_rho_psi_m"	"logit_rho_A_m"	"logit_rho_B_m"	"logit_rho_epsilon_f"

```
## Your parameter list has been re-ordered.
```

```
## (Disable this warning with checkParameterOrder=FALSE)
```

```
## Constructing atomic D_lgamma
```

```
## Constructing atomic D_lgamma
```

```
## Constructing atomic D_lgamma
```

```
## Optimizing tape... Done
```

```
## iter: 1 value: 1644.343 mgc: 150.201 ustep: 0.01776843
## iter: 2 value: 1299.552 mgc: 61.08422 ustep: 0.03515011
## iter: 3 value: 1022.263 mgc: 482.6195 ustep: 0.02562289
## iter: 4 value: 808.7714 mgc: 105.829 ustep: 0.1601555
## iter: 5 value: 767.0914 mgc: 24.35011 ustep: 0.4002543
## iter: 6 value: 759.0911 mgc: 37.3308 ustep: 0.6326933
## iter: 7 value: 758.4316 mgc: 5.242639 ustep: 0.7954407
```

```

## iter: 8 value: 755.9237 mgc: 71.41637 ustep: 0.6711254
## iter: 9 value: 755.7581 mgc: 4.945709 ustep: 0.8192405
## iter: 10 value: 755.7197 mgc: 2.428962 ustep: 0.9051285
## iter: 11 value: 755.7099 mgc: 0.1483729 ustep: 0.9513873
## iter: 12 value: 755.7087 mgc: 0.09533302 ustep: 0.9753933
## iter: 13 value: 755.7086 mgc: 0.01206436 ustep: 0.9876213
## iter: 14 value: 755.7086 mgc: 0.0006674457 ustep: 0.993792
## iter: 15 value: 755.7086 mgc: 8.83355e-06 ustep: 0.9968915
## iter: 16 value: 755.7086 mgc: 1.572737e-07 ustep: 0.9984447
## iter: 17 mgc: 2.33583e-09
## iter: 1 mgc: 2.33583e-09
## Matching hessian patterns... Done
## outer mgc: 14.4143
## 0: 1687.9558: 2.00000 4.00000 2.00000 4.00000 3.00000 2.00000 2.00000 3.00000 2.00000 3
## iter: 1 mgc: 2.335511e-09
## iter: 1 mgc: 2.335511e-09
## outer mgc: 14.4143
## 1: 1687.9558: 2.00000 4.0000 2.00000 4.0000 3.00000 2.00000 2.00000 3.00000 2.00000 3
## iter: 1 mgc: 2.334872e-09
## iter: 1 mgc: 2.334872e-09
## outer mgc: 14.4143
## 2: 1687.9558: 2.00000 4.0000 2.00000 4.0000 3.00000 2.00000 2.00000 3.00000 2.00000 3
## iter: 1 mgc: 4.217388e-09
## iter: 1 mgc: 4.217388e-09
## outer mgc: 14.4143
## 3: 1687.9558: 2.00000 4.0000 2.00000 4.0000 3.00000 2.00000 2.00000 3.00000 2.00000 3
## iter: 1 mgc: 9.037156e-09
## iter: 1 mgc: 9.037156e-09
## outer mgc: 14.4143
## 4: 1687.9558: 2.00000 4.0000 2.00000 4.0000 3.00000 2.00000 2.00000 3.00000 2.00000 3
## iter: 1 value: 755.7086 mgc: 1.86767e-08 ustep: 1
## iter: 2 mgc: 1.74623e-10
## iter: 1 mgc: 1.74623e-10
## outer mgc: 14.4143
## 5: 1687.9558: 2.00000 4.0000 2.00000 4.0000 3.00000 2.00000 2.00000 3.00000 2.00000 3
## iter: 1 value: 755.7086 mgc: 1.927908e-08 ustep: 1
## mgc: 6.593215e-11
## iter: 1 mgc: 6.593215e-11
## outer mgc: 14.4143
## 6: 1687.9558: 2.00000 4.0000 2.00000 4.0000 3.00000 2.00000 2.00000 3.00000 2.00000 3
## iter: 1 value: 755.7086 mgc: 3.855814e-08 ustep: 1
## mgc: 1.164153e-10
## iter: 1 mgc: 1.164153e-10
## outer mgc: 14.4143
## 7: 1687.9558: 2.00000 4.0000 2.00000 4.0000 3.00000 2.00000 2.00000 3.00000 2.00000 3
## iter: 1 value: 755.7086 mgc: 7.711642e-08 ustep: 1
## mgc: 3.869882e-11
## iter: 1 value: 755.7086 mgc: 2.313491e-07 ustep: 1
## iter: 2 mgc: 1.007718e-10
## iter: 1 value: 755.7086 mgc: 9.253965e-07 ustep: 1
## iter: 2 mgc: 1.158725e-10
## iter: 1 value: 755.7085 mgc: 3.701587e-06 ustep: 1
## iter: 2 mgc: 1.164153e-10
## iter: 1 value: 755.7083 mgc: 1.480636e-05 ustep: 1
## iter: 2 mgc: 2.037738e-10
## iter: 1 value: 755.7075 mgc: 5.922556e-05 ustep: 1

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## iter: 2 mgc: 1.164153e-10
## iter: 1 value: 755.704 mgc: 0.0002369045 ustep: 1
## iter: 2 mgc: 1.060453e-09
## iter: 1 value: 755.6902 mgc: 0.0009476544 ustep: 1
## iter: 2 value: 755.6902 mgc: 1.697193e-08 ustep: 1
## mgc: 5.820766e-11
## iter: 1 value: 755.635 mgc: 0.003791216 ustep: 1
## iter: 2 value: 755.635 mgc: 2.718313e-07 ustep: 1
## iter: 3 mgc: 1.74623e-10
## iter: 1 value: 755.414 mgc: 0.01517438 ustep: 1
## iter: 2 value: 755.414 mgc: 4.367204e-06 ustep: 1
## iter: 3 mgc: 2.340532e-10
## iter: 1 value: 754.5305 mgc: 0.06084999 ustep: 1
## iter: 2 value: 754.5305 mgc: 7.103586e-05 ustep: 1
## iter: 3 mgc: 4.470948e-10
## iter: 1 value: 751.0029 mgc: 0.2458597 ustep: 1
## iter: 2 value: 751.0029 mgc: 0.001214811 ustep: 1
## iter: 3 value: 751.0029 mgc: 1.333418e-07 ustep: 1
## mgc: 1.164153e-10
## iter: 1 value: 736.991 mgc: 1.024098 ustep: 1
## iter: 2 value: 736.991 mgc: 0.02566842 ustep: 1
## iter: 3 value: 736.991 mgc: 6.370383e-05 ustep: 1
## iter: 4 mgc: 3.667555e-10
## iter: 1 value: 682.4736 mgc: 4.838823 ustep: 1
## iter: 2 value: 682.4409 mgc: 1.680755 ustep: 1
## iter: 3 value: 682.4402 mgc: 0.2051622 ustep: 1
## iter: 4 value: 682.4402 mgc: 0.005404927 ustep: 1
## iter: 5 value: 682.4402 mgc: 3.51795e-06 ustep: 1
## iter: 6 mgc: 1.74623e-10
## iter: 1 value: 498.2831 mgc: 36.02558 ustep: 0.008923143
## iter: 2 value: 495.3202 mgc: 39.912 ustep: 0.04844534
## iter: 3 value: 494.3577 mgc: 21.96984 ustep: 0.220181
## iter: 4 value: 494.1383 mgc: 11.52331 ustep: 0.4692876
## iter: 5 value: 494.121 mgc: 1.34499 ustep: 0.6850772
## iter: 6 value: 494.1205 mgc: 0.07733813 ustep: 0.8277111
## iter: 7 value: 494.1203 mgc: 0.002168393 ustep: 0.9097953
## iter: 8 value: 494.1202 mgc: 0.001381903 ustep: 0.9538365
## iter: 9 value: 494.1202 mgc: 0.0004805574 ustep: 0.9766479
## iter: 10 value: 494.1202 mgc: 5.602671e-05 ustep: 0.9882561
## iter: 11 value: 494.1202 mgc: 4.230699e-06 ustep: 0.9941113
## iter: 12 value: 494.1202 mgc: 2.042339e-07 ustep: 0.9970516
## iter: 13 mgc: 5.050302e-09
## iter: 1 mgc: 5.050302e-09
## outer mgc: 21.92524
## 8: 1644.2051: 3.93308 3.41113 3.88110 3.42639 3.14213 2.64264 2.64453 3.22097 2.02601 3
## iter: 1 value: 379.2446 mgc: 379.319 ustep: 0.002237842
## iter: 2 value: 360.2114 mgc: 506.7761 ustep: 0.00151563
## iter: 3 value: 346.8009 mgc: 212.402 ustep: 0.004962293
## iter: 4 value: 337.0713 mgc: 77.52309 ustep: 0.0181171
## iter: 5 value: 334.0364 mgc: 342.7062 ustep: 0.00450824
## iter: 6 value: 331.7662 mgc: 312.7415 ustep: 0.002171663
## iter: 7 value: 328.9753 mgc: 9.928276 ustep: 0.04669645
## iter: 8 value: 327.8926 mgc: 294.3675 ustep: 0.007578666
## iter: 9 value: 327.194 mgc: 219.0103 ustep: 0.002843894
## iter: 10 value: 326.2808 mgc: 6.688548 ustep: 0.05342284
## iter: 11 value: 325.8553 mgc: 83.24327 ustep: 0.0636077

```

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## iter: 12 value: 325.6936 mgc: 29.14655 ustep: 0.03567753
## iter: 13 value: 325.4825 mgc: 58.15647 ustep: 0.09941584
## iter: 14 value: 325.409 mgc: 51.31613 ustep: 0.02339206
## iter: 15 value: 325.242 mgc: 13.50922 ustep: 0.1530293
## iter: 16 value: 325.0462 mgc: 1.064414 ustep: 0.3912505
## iter: 17 value: 324.9509 mgc: 3.838482 ustep: 0.6255377
## iter: 18 value: 324.9292 mgc: 2.664829 ustep: 0.7909303
## iter: 19 value: 324.926 mgc: 2.046374 ustep: 0.8893537
## iter: 20 value: 324.9256 mgc: 0.527088 ustep: 0.9430612
## iter: 21 value: 324.9256 mgc: 0.06124433 ustep: 0.9711163
## iter: 22 value: 324.9256 mgc: 0.001830718 ustep: 0.9854538
## iter: 23 value: 324.9256 mgc: 3.741195e-05 ustep: 0.992701
## iter: 24 value: 324.9256 mgc: 7.839067e-07 ustep: 0.9963442
## iter: 25 value: 324.9256 mgc: 1.672282e-08 ustep: 0.9981706
## iter: 26 mgc: 3.155007e-10
## iter: 1 value: 436.3653 mgc: 13.03344 ustep: 1
## iter: 2 value: 436.3589 mgc: 1.020637 ustep: 1
## iter: 3 value: 436.3589 mgc: 0.06057265 ustep: 1
## iter: 4 value: 436.3589 mgc: 0.0002526173 ustep: 1
## iter: 5 mgc: 4.733797e-09
## iter: 1 mgc: 4.733797e-09
## outer mgc: 4.803477
## 9: 1627.1655: 4.21488 3.29885 4.14119 3.29794 3.20761 2.79905 2.77577 3.27195 2.03450 3
## iter: 1 value: 322.5527 mgc: 11.07863 ustep: 1
## iter: 2 value: 322.4731 mgc: 12.49195 ustep: 1
## iter: 3 value: 322.4719 mgc: 0.7558263 ustep: 1
## iter: 4 value: 322.4719 mgc: 0.02200712 ustep: 1
## iter: 5 value: 322.4719 mgc: 2.906472e-05 ustep: 1
## iter: 6 mgc: 5.820766e-11
## iter: 1 mgc: 5.820766e-11
## outer mgc: 9.067637
## 10: 1620.5540: 4.70065 3.04770 4.61558 3.00205 3.37637 3.16040 3.09362 3.38953 2.05335 3
## iter: 1 value: 225.625 mgc: 21.33118 ustep: 1
## iter: 2 value: 225.5212 mgc: 16.44793 ustep: 1
## iter: 3 value: 225.5171 mgc: 2.280118 ustep: 1
## iter: 4 value: 225.5171 mgc: 0.1973602 ustep: 1
## iter: 5 value: 225.5171 mgc: 0.000896709 ustep: 1
## iter: 6 value: 225.5171 mgc: 2.486842e-08 ustep: 1
## mgc: 5.820766e-11
## iter: 1 value: 282.1982 mgc: 13.55426 ustep: 1
## iter: 2 value: 282.195 mgc: 2.414988 ustep: 1
## iter: 3 value: 282.195 mgc: 0.02752871 ustep: 1
## iter: 4 value: 282.195 mgc: 4.066009e-05 ustep: 1
## iter: 5 mgc: 8.516743e-11
## iter: 1 mgc: 8.516743e-11
## outer mgc: 7.151043
## 11: 1618.2900: 4.69979 2.95068 4.63675 2.89044 3.45814 3.29449 3.22818 3.43300 2.06366 3
## iter: 1 value: 221.1716 mgc: 11.04928 ustep: 1
## iter: 2 value: 221.1581 mgc: 5.616918 ustep: 1
## iter: 3 value: 221.1581 mgc: 0.1637311 ustep: 1
## iter: 4 value: 221.1581 mgc: 0.001410309 ustep: 1
## iter: 5 value: 221.1581 mgc: 3.882928e-08 ustep: 1
## mgc: 5.820766e-11
## iter: 1 mgc: 5.820766e-11
## outer mgc: 4.679705
## 12: 1615.7366: 4.71155 2.81110 4.66919 2.73186 3.58018 3.48132 3.42163 3.49329 2.08074 3

```

```

## iter: 1 value: 77.52779 mgc: 9.095304 ustep: 1
## iter: 2 value: 77.36765 mgc: 30.68823 ustep: 0.2494656
## iter: 3 value: 77.23658 mgc: 22.87705 ustep: 0.4995153
## iter: 4 value: 77.22155 mgc: 4.741703 ustep: 0.7067933
## iter: 5 value: 77.22119 mgc: 0.8778349 ustep: 0.8407259
## iter: 6 value: 77.22117 mgc: 0.0215878 ustep: 0.9169194
## iter: 7 value: 77.22117 mgc: 0.0002142527 ustep: 0.9575633
## iter: 8 value: 77.22117 mgc: 5.975507e-05 ustep: 0.9785538
## iter: 9 value: 77.22117 mgc: 9.42522e-06 ustep: 0.9892199
## iter: 10 value: 77.22117 mgc: 8.024007e-07 ustep: 0.9945959
## iter: 11 value: 77.22117 mgc: 3.618193e-08 ustep: 0.9972945
## iter: 12 mgc: 8.356097e-10
## iter: 1 mgc: 8.356097e-10
## outer mgc: 2.660847
## 13: 1611.6881: 4.74850 2.46380 4.71802 2.34826 3.90674 3.90465 3.88286 3.63411 2.13510 3
## iter: 1 value: -36.32223 mgc: 10.86782 ustep: 1
## iter: 2 value: -36.36757 mgc: 11.91729 ustep: 1
## iter: 3 value: -36.36855 mgc: 0.8559647 ustep: 1
## iter: 4 value: -36.36856 mgc: 0.04990279 ustep: 1
## iter: 5 value: -36.36856 mgc: 4.391558e-05 ustep: 1
## iter: 6 mgc: 9.544188e-11
## iter: 1 mgc: 9.544188e-11
## outer mgc: 3.993066
## 14: 1610.9541: 4.45423 2.19787 4.47103 2.14086 4.40172 4.04893 4.11397 3.79112 2.27588 4
## iter: 1 value: -156.7277 mgc: 4.130801 ustep: 1
## iter: 2 value: -156.7439 mgc: 7.870927 ustep: 1
## iter: 3 value: -156.7441 mgc: 0.4269149 ustep: 1
## iter: 4 value: -156.7441 mgc: 0.001985859 ustep: 1
## iter: 5 value: -156.7441 mgc: 8.477444e-07 ustep: 1
## mgc: 5.820766e-11
## iter: 1 mgc: 5.820766e-11
## outer mgc: 2.502546
## 15: 1608.7563: 4.76165 1.99998 4.75110 1.97572 4.88358 4.15942 4.23603 3.97462 2.43623 4
## iter: 1 value: -250.0555 mgc: 12.84954 ustep: 1
## iter: 2 value: -250.0565 mgc: 2.158546 ustep: 1
## iter: 3 value: -250.0565 mgc: 0.01089977 ustep: 1
## iter: 4 value: -250.0565 mgc: 3.498993e-05 ustep: 1
## iter: 5 mgc: 7.182566e-11
## iter: 1 mgc: 7.182566e-11
## outer mgc: 1.077635
## 16: 1608.1803: 4.77801 2.15225 4.81607 1.96070 5.13524 4.27795 3.99005 4.34741 2.70298 5
## iter: 1 value: -290.8687 mgc: 6.849704 ustep: 1
## iter: 2 value: -290.87 mgc: 1.406816 ustep: 1
## iter: 3 value: -290.87 mgc: 0.02810161 ustep: 1
## iter: 4 value: -290.87 mgc: 0.0001296329 ustep: 1
## iter: 5 mgc: 1.579967e-10
## iter: 1 mgc: 1.579967e-10
## outer mgc: 2.478568
## 17: 1608.1141: 4.93316 1.84381 4.68504 2.01604 5.06602 3.92300 3.94812 4.64597 2.96320 5
## iter: 1 value: -306.0842 mgc: 4.3279 ustep: 1
## iter: 2 value: -306.0844 mgc: 0.3088275 ustep: 1
## iter: 3 value: -306.0844 mgc: 0.0003332097 ustep: 1
## iter: 4 value: -306.0844 mgc: 3.701312e-08 ustep: 1
## mgc: 5.820766e-11
## iter: 1 mgc: 5.820766e-11
## outer mgc: 1.309243

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## 18:      1607.7250:  4.73660  1.78051  4.85391  2.00010  4.90858  3.79254  3.94897  4.80531  3.09628  5
## iter: 1  value: -327.5864 mgc: 4.871075 ustep: 1
## iter: 2  value: -327.5865 mgc: 0.1281953 ustep: 1
## iter: 3  value: -327.5865 mgc: 0.001183964 ustep: 1
## iter: 4  value: -327.5865 mgc: 1.004365e-07 ustep: 1
## mgc: 1.164153e-10
## iter: 1  mgc: 1.164153e-10
## outer mgc:  2.580359
## 19:      1607.6665:  4.83535  2.02040  4.59103  1.90920  4.84893  3.95035  3.92940  4.91910  3.18991  5
## iter: 1  value: -336.756 mgc: 2.834098 ustep: 1
## iter: 2  value: -336.756 mgc: 0.1594519 ustep: 1
## iter: 3  value: -336.756 mgc: 0.0005047984 ustep: 1
## iter: 4  mgc: 7.147499e-09
## iter: 1  mgc: 7.147499e-09
## outer mgc:  1.060551
## 20:      1607.2046:  4.79526  1.99408  4.68934  1.91054  4.82684  3.92987  3.93586  4.98086  3.25873  5
## iter: 1  value: -352.1418 mgc: 5.147612 ustep: 1
## iter: 2  value: -352.1425 mgc: 1.018501 ustep: 1
## iter: 3  value: -352.1425 mgc: 0.003982852 ustep: 1
## iter: 4  value: -352.1425 mgc: 2.648203e-06 ustep: 1
## iter: 5  mgc: 1.164153e-10
## iter: 1  value: -393.8917 mgc: 9.729573 ustep: 1
## iter: 2  value: -394.035 mgc: 18.0567 ustep: 1
## iter: 3  value: -394.0361 mgc: 0.4598832 ustep: 1
## iter: 4  value: -394.0362 mgc: 0.1100618 ustep: 1
## iter: 5  value: -394.0362 mgc: 0.0003266169 ustep: 1
## iter: 6  value: -394.0362 mgc: 1.147696e-08 ustep: 1
## mgc: 1.164153e-10
## iter: 1  mgc: 1.164153e-10
## outer mgc:  0.9663788
## 21:      1606.4847:  4.70225  1.84752  4.82891  1.97194  4.68943  3.82642  3.75729  5.38488  3.71331  5
## iter: 1  value: -443.8609 mgc: 9.023891 ustep: 0.6827823
## iter: 2  value: -444.8914 mgc: 68.39968 ustep: 0.103588
## iter: 3  value: -444.9513 mgc: 3.164388 ustep: 0.3219187
## iter: 4  value: -444.9624 mgc: 1.62921 ustep: 0.5674221
## iter: 5  value: -444.9653 mgc: 0.09349273 ustep: 0.7532989
## iter: 6  value: -444.9659 mgc: 0.02017524 ustep: 0.8679412
## iter: 7  value: -444.9659 mgc: 0.002587065 ustep: 0.9316404
## iter: 8  value: -444.9659 mgc: 0.0002382311 ustep: 0.9652187
## iter: 9  value: -444.9659 mgc: 2.510048e-05 ustep: 0.9824572
## iter: 10 value: -444.9659 mgc: 1.437754e-06 ustep: 0.9911907
## iter: 11 value: -444.9659 mgc: 4.465329e-08 ustep: 0.995586
## iter: 12 mgc: 7.044354e-10
## iter: 1  value: -410.4677 mgc: 3.113941 ustep: 1
## iter: 2  value: -410.612 mgc: 20.33465 ustep: 1
## iter: 3  value: -410.6138 mgc: 0.4342639 ustep: 1
## iter: 4  value: -410.6138 mgc: 0.1985266 ustep: 1
## iter: 5  value: -410.6138 mgc: 0.0007982858 ustep: 1
## iter: 6  value: -410.6138 mgc: 9.295819e-08 ustep: 1
## mgc: 5.820766e-11
## iter: 1  mgc: 5.820766e-11
## outer mgc:  0.8000383
## 22:      1606.3351:  4.71500  1.78636  4.82767  1.86101  4.74083  3.74245  3.61051  5.48997  3.89367  5
## iter: 1  value: -386.8097 mgc: 3.448481 ustep: 1
## iter: 2  value: -386.8463 mgc: 9.06008 ustep: 1
## iter: 3  value: -386.8464 mgc: 0.05858575 ustep: 1

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## iter: 4 value: -386.8464 mgc: 0.00906374 ustep: 1
## iter: 5 value: -386.8464 mgc: 1.241008e-06 ustep: 1
## iter: 6 mgc: 5.820766e-11
## iter: 1 mgc: 5.820766e-11
## outer mgc: 0.6323196
## 23: 1606.1996: 4.78785 1.81334 4.77401 2.08734 4.88273 3.75069 3.50936 5.41009 4.02553 5
## iter: 1 value: -301.8598 mgc: 6.377669 ustep: 1
## iter: 2 value: -301.8603 mgc: 1.506781 ustep: 1
## iter: 3 value: -301.8603 mgc: 0.005447333 ustep: 1
## iter: 4 value: -301.8603 mgc: 3.305597e-06 ustep: 1
## iter: 5 mgc: 1.74623e-10
## iter: 1 mgc: 1.74623e-10
## outer mgc: 0.5011277
## 24: 1606.0649: 4.80154 1.86998 4.76193 2.03189 4.84157 3.73927 3.40824 5.20625 4.05694 4
## iter: 1 value: -277.2944 mgc: 2.550079 ustep: 1
## iter: 2 value: -277.2955 mgc: 1.885609 ustep: 1
## iter: 3 value: -277.2955 mgc: 0.01230365 ustep: 1
## iter: 4 value: -277.2955 mgc: 3.414159e-05 ustep: 1
## iter: 5 mgc: 5.820766e-11
## iter: 1 mgc: 5.820766e-11
## outer mgc: 0.4448175
## 25: 1605.9840: 4.78487 1.95666 4.75601 2.01679 4.77273 3.75074 3.53624 5.08038 4.14044 4
## iter: 1 value: -250.5404 mgc: 3.430548 ustep: 1
## iter: 2 value: -250.5421 mgc: 1.794531 ustep: 1
## iter: 3 value: -250.5421 mgc: 0.01216834 ustep: 1
## iter: 4 value: -250.5421 mgc: 5.980429e-05 ustep: 1
## iter: 5 mgc: 1.212475e-10
## iter: 1 mgc: 1.212475e-10
## outer mgc: 0.2754539
## 26: 1605.9397: 4.75367 1.81971 4.74772 2.09377 4.74799 3.86706 3.45315 4.99525 4.17901 3
## iter: 1 value: -260.83 mgc: 1.219107 ustep: 1
## iter: 2 value: -260.83 mgc: 0.3844455 ustep: 1
## iter: 3 value: -260.83 mgc: 0.0003640247 ustep: 1
## iter: 4 value: -260.83 mgc: 3.067692e-08 ustep: 1
## mgc: 5.820766e-11
## iter: 1 mgc: 5.820766e-11
## outer mgc: 0.1476629
## 27: 1605.9129: 4.76429 1.85557 4.76515 2.13321 4.76032 3.79255 3.43127 5.01391 4.21018 3
## iter: 1 value: -259.5486 mgc: 0.8269558 ustep: 1
## iter: 2 value: -259.5486 mgc: 0.1008173 ustep: 1
## iter: 3 value: -259.5486 mgc: 5.551721e-05 ustep: 1
## iter: 4 mgc: 2.108415e-09
## iter: 1 mgc: 2.108415e-09
## outer mgc: 0.1146966
## 28: 1605.9073: 4.77678 1.86482 4.76514 2.16458 4.77935 3.79236 3.39577 4.98139 4.25493 3
## iter: 1 value: -254.6137 mgc: 0.4229788 ustep: 1
## iter: 2 value: -254.6137 mgc: 0.02294731 ustep: 1
## iter: 3 value: -254.6137 mgc: 2.709125e-06 ustep: 1
## iter: 4 mgc: 1.098956e-10
## iter: 1 mgc: 1.098956e-10
## outer mgc: 0.03161094
## 29: 1605.9029: 4.77043 1.86837 4.75693 2.18017 4.77028 3.79095 3.37832 4.94846 4.28375 3
## iter: 1 value: -256.9267 mgc: 0.3032721 ustep: 1
## iter: 2 value: -256.9267 mgc: 0.002342459 ustep: 1
## iter: 3 value: -256.9267 mgc: 3.892244e-08 ustep: 1
## iter: 4 mgc: 1.164153e-10

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## iter: 1  mgc: 1.164153e-10
## outer mgc: 0.04518795
## 30:      1605.9004: 4.76642  1.86308  4.75470  2.18215  4.76745  3.80050  3.37216  4.93488  4.29696  3
## iter: 1  value: -256.6604 mgc: 0.23847  ustep: 1
## iter: 2  value: -256.6604 mgc: 0.002730528 ustep: 1
## iter: 3  value: -256.6604 mgc: 3.281389e-08 ustep: 1
## mgc: 6.956613e-11
## iter: 1  value: -256.3238 mgc: 0.315398 ustep: 1
## iter: 2  value: -256.3238 mgc: 0.004842384 ustep: 1
## iter: 3  value: -256.3238 mgc: 9.673921e-08 ustep: 1
## mgc: 9.261303e-11
## iter: 1  mgc: 9.261303e-11
## outer mgc: 0.05161473
## 31:      1605.8959: 4.76480  1.86123  4.75535  2.18558  4.77003  3.81005  3.36329  4.88923  4.34591  3
## iter: 1  value: -261.0421 mgc: 1.280912 ustep: 1
## iter: 2  value: -261.0421 mgc: 0.1337663 ustep: 1
## iter: 3  value: -261.0421 mgc: 6.237764e-05 ustep: 1
## iter: 4  mgc: 3.371348e-10
## iter: 1  mgc: 3.371348e-10
## outer mgc: 0.05083671
## 32:      1605.8864: 4.76379  1.85573  4.75683  2.18448  4.76925  3.82228  3.35711  4.80701  4.48451  3
## iter: 1  value: -268.2753 mgc: 1.765835 ustep: 1
## iter: 2  value: -268.2753 mgc: 0.1243163 ustep: 1
## iter: 3  value: -268.2753 mgc: 5.526186e-05 ustep: 1
## iter: 4  mgc: 3.069189e-10
## iter: 1  mgc: 3.069189e-10
## outer mgc: 0.04089342
## 33:      1605.8790: 4.76448  1.84837  4.76035  2.17920  4.77466  3.82007  3.36078  4.76967  4.62873  3
## iter: 1  value: -280.5165 mgc: 2.606489 ustep: 1
## iter: 2  value: -280.5165 mgc: 0.04109847 ustep: 1
## iter: 3  value: -280.5165 mgc: 3.462688e-06 ustep: 1
## iter: 4  mgc: 8.731149e-11
## iter: 1  mgc: 8.731149e-11
## outer mgc: 0.03650868
## 34:      1605.8723: 4.76705  1.83368  4.76274  2.17709  4.77117  3.80902  3.36834  4.79032  4.76955  3
## iter: 1  value: -292.2217 mgc: 2.637136 ustep: 1
## iter: 2  value: -292.2218 mgc: 0.208353 ustep: 1
## iter: 3  value: -292.2218 mgc: 7.386345e-05 ustep: 1
## iter: 4  mgc: 9.611334e-10
## iter: 1  mgc: 9.611334e-10
## outer mgc: 0.03235579
## 35:      1605.8662: 4.76863  1.81679  4.76407  2.17755  4.77791  3.78808  3.37699  4.85210  4.87789  3
## iter: 1  value: -301.1309 mgc: 1.959551 ustep: 1
## iter: 2  value: -301.1309 mgc: 0.2156817 ustep: 1
## iter: 3  value: -301.1309 mgc: 0.0001167866 ustep: 1
## iter: 4  mgc: 1.987122e-09
## iter: 1  mgc: 1.987122e-09
## outer mgc: 0.03081705
## 36:      1605.8613: 4.77018  1.79900  4.76392  2.18371  4.77112  3.77227  3.37918  4.92141  4.93598  3
## iter: 1  value: -304.0988 mgc: 0.8423458 ustep: 1
## iter: 2  value: -304.0988 mgc: 0.07977152 ustep: 1
## iter: 3  value: -304.0988 mgc: 1.947387e-05 ustep: 1
## iter: 4  mgc: 5.820766e-11
## iter: 1  mgc: 5.820766e-11
## outer mgc: 0.03514001
## 37:      1605.8567: 4.76910  1.78769  4.76298  2.19227  4.77599  3.76031  3.37430  4.97417  4.94244  3

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## iter: 1 value: -301.6543 mgc: 0.5310422 ustep: 1
## iter: 2 value: -301.6543 mgc: 0.01071275 ustep: 1
## iter: 3 value: -301.6543 mgc: 1.870969e-07 ustep: 1
## iter: 4 mgc: 7.722045e-11
## iter: 1 mgc: 7.722045e-11
## outer mgc: 0.03723184
## 38: 1605.8522: 4.76870 1.78424 4.76272 2.20097 4.77051 3.75854 3.36431 5.00540 4.89760 3
## iter: 1 value: -293.9791 mgc: 1.24994 ustep: 1
## iter: 2 value: -293.9791 mgc: 0.02539908 ustep: 1
## iter: 3 value: -293.9791 mgc: 3.589204e-06 ustep: 1
## iter: 4 mgc: 2.910383e-11
## iter: 1 mgc: 2.910383e-11
## outer mgc: 0.03209033
## 39: 1605.8474: 4.76788 1.79032 4.76152 2.21173 4.76529 3.76336 3.34917 5.01571 4.80519 3
## iter: 1 value: -279.4402 mgc: 2.400236 ustep: 1
## iter: 2 value: -279.4402 mgc: 0.134235 ustep: 1
## iter: 3 value: -279.4402 mgc: 1.885544e-05 ustep: 1
## iter: 4 mgc: 5.820766e-11
## iter: 1 mgc: 5.820766e-11
## outer mgc: 0.03395438
## 40: 1605.8423: 4.76632 1.80968 4.76138 2.21681 4.76926 3.77455 3.33710 4.99342 4.66128 3
## iter: 1 value: -261.3778 mgc: 2.988609 ustep: 1
## iter: 2 value: -261.3778 mgc: 0.4089496 ustep: 1
## iter: 3 value: -261.3778 mgc: 0.0002937297 ustep: 1
## iter: 4 value: -261.3778 mgc: 1.261146e-08 ustep: 1
## mgc: 1.164153e-10
## iter: 1 mgc: 1.164153e-10
## outer mgc: 0.02352014
## 41: 1605.8383: 4.76720 1.83835 4.76176 2.21956 4.76240 3.79373 3.32777 4.94081 4.49834 3
## iter: 1 value: -257.876 mgc: 0.6663153 ustep: 1
## iter: 2 value: -257.876 mgc: 0.03603182 ustep: 1
## iter: 3 value: -257.876 mgc: 3.288724e-06 ustep: 1
## iter: 4 mgc: 2.910383e-11
## iter: 1 mgc: 2.910383e-11
## outer mgc: 0.00902042
## 42: 1605.8374: 4.76726 1.84604 4.76234 2.21609 4.76832 3.79741 3.33191 4.91512 4.47917 3
## iter: 1 value: -258.6798 mgc: 0.1350536 ustep: 1
## iter: 2 value: -258.6798 mgc: 0.001076944 ustep: 1
## iter: 3 mgc: 2.250189e-09
## iter: 1 mgc: 2.250189e-09
## outer mgc: 0.004372082
## 43: 1605.8372: 4.76807 1.84564 4.76279 2.21428 4.76574 3.79710 3.33547 4.91197 4.49071 3
## iter: 1 value: -259.253 mgc: 0.09647766 ustep: 1
## iter: 2 value: -259.253 mgc: 0.0004171112 ustep: 1
## iter: 3 mgc: 2.921787e-10
## iter: 1 mgc: 2.921787e-10
## outer mgc: 0.004362796
## 44: 1605.8372: 4.76796 1.84472 4.76282 2.21377 4.76666 3.79581 3.33691 4.91526 4.49447 3
## iter: 1 value: -260.2732 mgc: 0.1923595 ustep: 1
## iter: 2 value: -260.2732 mgc: 0.002764587 ustep: 1
## iter: 3 value: -260.2732 mgc: 1.634174e-08 ustep: 1
## mgc: 8.277157e-11
## iter: 1 mgc: 8.277157e-11
## outer mgc: 0.005787335
## 45: 1605.8370: 4.76803 1.84267 4.76282 2.21365 4.76699 3.79318 3.33870 4.92543 4.49862 3
## iter: 1 value: -261.406 mgc: 0.2225696 ustep: 1

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## iter: 2 value: -261.406 mgc: 0.005789781 ustep: 1
## iter: 3 value: -261.406 mgc: 6.80693e-08 ustep: 1
## mgc: 1.191767e-10
## iter: 1 mgc: 1.191767e-10
## outer mgc: 0.008687689
## 46: 1605.8366: 4.76811 1.83987 4.76273 2.21470 4.76739 3.78992 3.33938 4.94240 4.49812 3
## iter: 1 value: -261.6394 mgc: 0.133173 ustep: 1
## iter: 2 value: -261.6394 mgc: 0.001154293 ustep: 1
## iter: 3 mgc: 1.941451e-09
## iter: 1 mgc: 1.941451e-09
## outer mgc: 0.008515372
## 47: 1605.8363: 4.76828 1.83868 4.76267 2.21640 4.76718 3.78899 3.33768 4.95189 4.49304 3
## iter: 1 value: -261.1933 mgc: 0.2742823 ustep: 1
## iter: 2 value: -261.1933 mgc: 0.001559747 ustep: 1
## iter: 3 value: -261.1933 mgc: 1.125531e-08 ustep: 1
## mgc: 1.164153e-10
## iter: 1 mgc: 1.164153e-10
## outer mgc: 0.007555416
## 48: 1605.8358: 4.76857 1.83832 4.76258 2.22056 4.76610 3.79021 3.33145 4.95929 4.47997 3
## iter: 1 value: -260.4239 mgc: 0.1538525 ustep: 1
## iter: 2 value: -260.4239 mgc: 0.001111302 ustep: 1
## iter: 3 mgc: 4.516862e-09
## iter: 1 mgc: 4.516862e-09
## outer mgc: 0.006660699
## 49: 1605.8355: 4.76866 1.83969 4.76263 2.22275 4.76532 3.79289 3.32691 4.95211 4.47516 3
## iter: 1 value: -259.5593 mgc: 0.2214676 ustep: 1
## iter: 2 value: -259.5593 mgc: 0.004027801 ustep: 1
## iter: 3 value: -259.5593 mgc: 2.267077e-08 ustep: 1
## mgc: 1.164153e-10
## iter: 1 mgc: 1.164153e-10
## outer mgc: 0.005978625
## 50: 1605.8352: 4.76852 1.84220 4.76280 2.22444 4.76457 3.79671 3.32255 4.93363 4.47776 3
## iter: 1 value: -259.4917 mgc: 0.1811961 ustep: 1
## iter: 2 value: -259.4917 mgc: 0.0008860635 ustep: 1
## iter: 3 mgc: 3.738779e-09
## iter: 1 mgc: 3.738779e-09
## outer mgc: 0.007101943
## 51: 1605.8349: 4.76824 1.84376 4.76301 2.22447 4.76460 3.79837 3.32183 4.91740 4.48884 3
## iter: 1 value: -260.2843 mgc: 0.1551654 ustep: 1
## iter: 2 value: -260.2843 mgc: 0.002318724 ustep: 1
## iter: 3 value: -260.2843 mgc: 2.726778e-08 ustep: 1
## mgc: 9.988677e-11
## iter: 1 mgc: 9.988677e-11
## outer mgc: 0.004398584
## 52: 1605.8347: 4.76786 1.84397 4.76319 2.22354 4.76515 3.79775 3.32401 4.90699 4.50564 3
## iter: 1 value: -261.3507 mgc: 0.1696438 ustep: 1
## iter: 2 value: -261.3507 mgc: 0.0001562043 ustep: 1
## iter: 3 mgc: 3.330456e-10
## iter: 1 mgc: 3.330456e-10
## outer mgc: 0.004157238
## 53: 1605.8345: 4.76766 1.84291 4.76326 2.22254 4.76585 3.79568 3.32701 4.90732 4.51754 3
## iter: 1 value: -262.3607 mgc: 0.1724536 ustep: 1
## iter: 2 value: -262.3607 mgc: 0.001456817 ustep: 1
## iter: 3 mgc: 4.759674e-09
## iter: 1 mgc: 4.759674e-09
## outer mgc: 0.004360396

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## 54:      1605.8344:  4.76757  1.84140  4.76324  2.22183  4.76639  3.79337  3.32960  4.91301  4.52453  3
## iter: 1  value: -263.318 mgc: 0.1702179 ustep: 1
## iter: 2  value: -263.318 mgc: 0.002318308 ustep: 1
## iter: 3  value: -263.318 mgc: 1.200632e-08 ustep: 1
## mgc: 8.809442e-11
## iter: 1  mgc: 8.809442e-11
## outer mgc: 0.005897599
## 55:      1605.8342:  4.76760  1.83962  4.76317  2.22131  4.76680  3.79109  3.33172  4.92191  4.52820  3
## iter: 1  value: -263.8895 mgc: 0.1206318 ustep: 1
## iter: 2  value: -263.8895 mgc: 0.001324854 ustep: 1
## iter: 3  mgc: 2.735373e-09
## iter: 1  mgc: 2.735373e-09
## outer mgc: 0.006650242
## 56:      1605.8340:  4.76775  1.83816  4.76305  2.22112  4.76681  3.78983  3.33250  4.93116  4.52676  3
## iter: 1  value: -263.5124 mgc: 0.09793708 ustep: 1
## iter: 2  value: -263.5124 mgc: 0.0007491365 ustep: 1
## iter: 3  mgc: 2.095231e-09
## iter: 1  mgc: 2.095231e-09
## outer mgc: 0.00436584
## 57:      1605.8338:  4.76798  1.83819  4.76294  2.22131  4.76632  3.79093  3.33107  4.93402  4.51947  3
## iter: 1  value: -262.5709 mgc: 0.1581185 ustep: 1
## iter: 2  value: -262.5709 mgc: 0.0006649106 ustep: 1
## iter: 3  mgc: 8.729586e-10
## iter: 1  mgc: 8.729586e-10
## outer mgc: 0.005064019
## 58:      1605.8337:  4.76813  1.83942  4.76290  2.22159  4.76568  3.79328  3.32887  4.93020  4.51141  3
## iter: 1  value: -261.701 mgc: 0.1503482 ustep: 1
## iter: 2  value: -261.701 mgc: 0.00118453 ustep: 1
## iter: 3  mgc: 3.107544e-09
## iter: 1  mgc: 3.107544e-09
## outer mgc: 0.004819834
## 59:      1605.8336:  4.76819  1.84077  4.76289  2.22165  4.76524  3.79531  3.32735  4.92477  4.50569  3
## iter: 1  value: -260.7368 mgc: 0.1692109 ustep: 1
## iter: 2  value: -260.7368 mgc: 0.00163533 ustep: 1
## iter: 3  mgc: 5.652002e-09
## iter: 1  mgc: 5.652002e-09
## outer mgc: 0.005312237
## 60:      1605.8335:  4.76821  1.84237  4.76287  2.22127  4.76487  3.79731  3.32647  4.91829  4.49984  3
## iter: 1  value: -259.9106 mgc: 0.1476155 ustep: 1
## iter: 2  value: -259.9106 mgc: 0.001038318 ustep: 1
## iter: 3  mgc: 1.884647e-09
## iter: 1  mgc: 1.884647e-09
## outer mgc: 0.006340318
## 61:      1605.8334:  4.76816  1.84378  4.76282  2.22003  4.76479  3.79852  3.32734  4.91335  4.49451  3
## iter: 1  value: -259.8917 mgc: 0.1270715 ustep: 1
## iter: 2  value: -259.8917 mgc: 0.0006825406 ustep: 1
## iter: 3  mgc: 2.214181e-09
## iter: 1  mgc: 2.214181e-09
## outer mgc: 0.00420498
## 62:      1605.8332:  4.76807  1.84382  4.76273  2.21825  4.76520  3.79753  3.33044  4.91514  4.49323  3
## iter: 1  value: -260.4552 mgc: 0.1011522 ustep: 1
## iter: 2  value: -260.4552 mgc: 0.0007390032 ustep: 1
## iter: 3  mgc: 1.368026e-09
## iter: 1  mgc: 1.368026e-09
## outer mgc: 0.001155582
## 63:      1605.8332:  4.76801  1.84282  4.76267  2.21723  4.76571  3.79558  3.33315  4.92085  4.49553  3

```

```

## iter: 1 value: -260.7786 mgc: 0.05857934 ustep: 1
## iter: 2 value: -260.7786 mgc: 0.0002322818 ustep: 1
## iter: 3 mgc: 1.216627e-10
## iter: 1 mgc: 1.216627e-10
## outer mgc: 0.000648254
## 64: 1605.8332: 4.76800 1.84225 4.76266 2.21713 4.76588 3.79474 3.33386 4.92362 4.49714 3
## iter: 1 value: -260.8704 mgc: 0.01710071 ustep: 1
## iter: 2 value: -260.8704 mgc: 1.737136e-05 ustep: 1
## iter: 3 mgc: 1.164153e-10
## iter: 1 mgc: 1.164153e-10
## outer mgc: 0.0006367792
## 65: 1605.8332: 4.76800 1.84208 4.76266 2.21717 4.76591 3.79454 3.33395 4.92435 4.49765 3
## iter: 1 value: -261.0096 mgc: 0.02723879 ustep: 1
## iter: 2 value: -261.0096 mgc: 3.725658e-05 ustep: 1
## iter: 3 mgc: 6.475709e-11
## iter: 1 mgc: 6.475709e-11
## outer mgc: 0.0006020903
## 66: 1605.8332: 4.76800 1.84182 4.76266 2.21726 4.76595 3.79424 3.33402 4.92544 4.49852 3
## iter: 1 value: -261.168 mgc: 0.03397079 ustep: 1
## iter: 2 value: -261.168 mgc: 4.067297e-05 ustep: 1
## iter: 3 mgc: 1.017577e-10
## iter: 1 mgc: 1.017577e-10
## outer mgc: 0.0009524526
## 67: 1605.8332: 4.76801 1.84152 4.76267 2.21740 4.76601 3.79391 3.33406 4.92663 4.49973 3
## iter: 1 value: -261.2854 mgc: 0.03243749 ustep: 1
## iter: 2 value: -261.2854 mgc: 6.352989e-06 ustep: 1
## iter: 3 mgc: 1.443419e-10
## iter: 1 mgc: 1.443419e-10
## outer mgc: 0.001206071
## 68: 1605.8332: 4.76801 1.84126 4.76268 2.21759 4.76605 3.79367 3.33399 4.92739 4.50119 3
## iter: 1 value: -261.2236 mgc: 0.01482461 ustep: 1
## iter: 2 value: -261.2236 mgc: 5.230276e-06 ustep: 1
## iter: 3 mgc: 7.8336e-11
## iter: 1 mgc: 7.8336e-11
## outer mgc: 0.00103431
## 69: 1605.8331: 4.76801 1.84133 4.76269 2.21768 4.76603 3.79381 3.33380 4.92670 4.50173 3
## iter: 1 value: -260.9607 mgc: 0.03588392 ustep: 1
## iter: 2 value: -260.9607 mgc: 0.0001664923 ustep: 1
## iter: 3 mgc: 1.241909e-10
## iter: 1 mgc: 1.241909e-10
## outer mgc: 0.0003952953
## 70: 1605.8331: 4.76801 1.84175 4.76270 2.21768 4.76596 3.79437 3.33347 4.92440 4.50129 3
## iter: 1 value: -260.8267 mgc: 0.02342782 ustep: 1
## iter: 2 value: -260.8267 mgc: 3.792012e-05 ustep: 1
## iter: 3 mgc: 5.820766e-11
## iter: 1 mgc: 5.820766e-11
## outer mgc: 0.0001357634
## 71: 1605.8331: 4.76800 1.84199 4.76270 2.21761 4.76592 3.79465 3.33338 4.92333 4.50066 3
## iter: 1 value: -260.7857 mgc: 0.008433409 ustep: 1
## iter: 2 value: -260.7857 mgc: 2.982574e-06 ustep: 1
## mgc: 9.886714e-11
## iter: 1 mgc: 9.886714e-11
## outer mgc: 0.0001202279
## 72: 1605.8331: 4.76800 1.84207 4.76270 2.21758 4.76590 3.79474 3.33336 4.92302 4.50037 3
## iter: 1 mgc: 9.886714e-11
## converged: relative convergence (4)

```

```

## Order of parameters:
## [1] "log_tau2_logpop_f"      "log_tau2_logpop_m"      "log_tau2_fx"            "log_tau2_gx_m"
## [5] "log_tau2_gx_m"          "log_basepop_f"          "log_basepop_m"          "log_fx"
## [9] "gx_f"                   "gx_m"                   "logit_rho_g_x_f"        "logit_rho_g_t_m"
## [13] "logit_rho_g_t_f"        "logit_rho_g_t_m"        "log_lambda_tp"          "log_phi"
## [17] "tp_params"              "log_dispersion_f"       "log_dispersion_m"       "log_phi"
## [21] "log_phi_innov_m"        "log_psi_innov_f"        "log_psi_innov_m"        "log_lambda"
## [25] "log_lambda_innov_m"     "log_delta_innov_f"      "log_delta_innov_m"      "log_epsilon"
## [29] "log_epsilon_innov_m"    "log_A_innov_f"          "log_A_innov_m"          "log_B_innov_m"
## [33] "log_B_innov_m"         "log_phi_f"              "log_phi_m"              "log_psi"
## [37] "log_psi_m"              "log_lambda_f"           "log_lambda_m"           "log_delta"
## [41] "log_delta_m"            "log_epsilon_f"          "log_epsilon_m"          "log_A_f"
## [45] "log_A_m"                "log_B_f"                "log_B_m"                "log_marginal_prec_phi_m"
## [49] "log_marginal_prec_phi_m" "log_marginal_prec_psi_f" "log_marginal_prec_psi_m" "log_marginal_prec_lambda_m"
## [53] "log_marginal_prec_lambda_m" "log_marginal_prec_delta_f" "log_marginal_prec_delta_m" "log_marginal_prec_A_f"
## [57] "log_marginal_prec_epsilon_m" "log_marginal_prec_A_f" "log_marginal_prec_A_m" "log_marginal_prec_B_m"
## [61] "log_marginal_prec_B_m"   "logit_rho_phi_f"        "logit_rho_phi_m"        "logit_rho_lambda_f"
## [65] "logit_rho_psi_m"         "logit_rho_lambda_f"     "logit_rho_lambda_m"     "logit_rho_epsilon_f"
## [69] "logit_rho_delta_m"       "logit_rho_epsilon_f"    "logit_rho_epsilon_m"    "logit_rho_B_f"
## [73] "logit_rho_A_m"          "logit_rho_B_f"         "logit_rho_B_m"         "log_tau2_logpop_f"
## Not matching template order:
## [1] "log_tau2_logpop_f"      "log_tau2_logpop_m"      "log_tau2_fx"            "log_tau2_gx_m"
## [5] "log_tau2_gx_m"          "logit_rho_g_x_f"        "logit_rho_g_t_f"        "logit_rho_g_t_m"
## [9] "logit_rho_g_t_m"        "log_basepop_f"          "log_basepop_m"          "log_fx"
## [13] "gx_f"                   "gx_m"                   "log_lambda_tp"          "log_lambda"
## [17] "log_dispersion_f"       "log_dispersion_m"       "tp_params"              "log_phi"
## [21] "log_psi_f"              "log_lambda_f"           "log_delta_f"            "log_epsilon"
## [25] "log_A_f"                "log_B_f"                "log_phi_m"              "log_psi"
## [29] "log_lambda_m"           "log_delta_m"            "log_epsilon_m"          "log_A_m"
## [33] "log_B_m"                "log_marginal_prec_phi_f" "log_marginal_prec_psi_f" "log_marginal_prec_A_f"
## [37] "log_marginal_prec_delta_f" "log_marginal_prec_epsilon_f" "log_marginal_prec_A_f" "log_marginal_prec_lambda_m"
## [41] "log_marginal_prec_phi_m" "log_marginal_prec_psi_m" "log_marginal_prec_lambda_m" "log_marginal_prec_B_m"
## [45] "log_marginal_prec_epsilon_m" "log_marginal_prec_A_m" "log_marginal_prec_B_m" "logit_rho_psi_f"
## [49] "logit_rho_psi_f"         "logit_rho_A_f"          "logit_rho_B_f"          "logit_rho_A_m"
## [53] "logit_rho_psi_m"         "logit_rho_A_m"          "logit_rho_B_m"          "log_tau2_logpop_f"
## Your parameter list has been re-ordered.
## (Disable this warning with checkParameterOrder=FALSE)

## user system elapsed
## 36.47 0.63 37.42

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

Thiele Normal Hump (Pop 5-9 to 70-74, DHS 15-19 to 45-49)

## user system elapsed
## 64.73 0.75 66.08

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

Thiele log-Normal Hump (Pop 5-9 to 70-74, DHS 15-19 to 45-49)

## user system elapsed
## 73.69 1.05 75.37

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

Thiele log-Normal Hump RW (Pop 5-9 to 70-74, DHS 15-19 to 45-49)

## Order of parameters:
## [1] "log_tau2_logpop_f"      "log_tau2_logpop_m"      "log_tau2_fx"            "log_tau2_gx_m"

```

```

## [5] "log_tau2_gx_m" "log_basepop_f" "log_basepop_m" "log_fx"
## [9] "gx_f" "gx_m" "logit_rho_g_x_f" "logit_rho_g_t_m"
## [13] "logit_rho_g_t_f" "logit_rho_g_t_m" "log_lambda_tp" "log_lambda_tp"
## [17] "tp_params" "log_dispersion_f" "log_dispersion_m" "log_phi_f"
## [21] "log_phi_innov_m" "log_psi_innov_f" "log_psi_innov_m" "log_psi_innov_m"
## [25] "log_lambda_innov_m" "log_delta_innov_f" "log_delta_innov_m" "log_epsilon_innov_m"
## [29] "log_epsilon_innov_m" "log_A_innov_f" "log_A_innov_m" "log_B_innov_m"
## [33] "log_B_innov_m" "log_phi_f" "log_phi_m" "log_psi_f"
## [37] "log_psi_m" "log_lambda_f" "log_lambda_m" "log_delta_f"
## [41] "log_delta_m" "log_epsilon_f" "log_epsilon_m" "log_A_f"
## [45] "log_A_m" "log_B_f" "log_B_m" "log_marginal_prec_phi_m"
## [49] "log_marginal_prec_phi_m" "log_marginal_prec_psi_f" "log_marginal_prec_psi_m" "log_marginal_prec_lambda_m"
## [53] "log_marginal_prec_lambda_m" "log_marginal_prec_delta_f" "log_marginal_prec_delta_m" "log_marginal_prec_epsilon_m"
## [57] "log_marginal_prec_epsilon_m" "log_marginal_prec_A_f" "log_marginal_prec_A_m" "log_marginal_prec_B_m"
## [61] "log_marginal_prec_B_m" "logit_rho_phi_f" "logit_rho_phi_m" "logit_rho_lambda_f"
## [65] "logit_rho_psi_m" "logit_rho_lambda_f" "logit_rho_lambda_m" "logit_rho_epsilon_f"
## [69] "logit_rho_delta_m" "logit_rho_epsilon_f" "logit_rho_epsilon_m" "logit_rho_A_m"
## [73] "logit_rho_A_m" "logit_rho_B_f" "logit_rho_B_m"

## Not matching template order:
## [1] "log_tau2_logpop_f" "log_tau2_logpop_m" "log_tau2_fx" "log_tau2_gx_m"
## [5] "log_tau2_gx_m" "logit_rho_g_x_f" "logit_rho_g_t_f" "logit_rho_g_t_m"
## [9] "logit_rho_g_t_m" "log_basepop_f" "log_basepop_m" "log_fx"
## [13] "gx_f" "gx_m" "log_lambda_tp" "log_lambda_tp"
## [17] "log_dispersion_f" "log_dispersion_m" "tp_params" "log_phi_f"
## [21] "log_psi_f" "log_lambda_f" "log_delta_f" "log_epsilon_f"
## [25] "log_A_f" "log_B_f" "log_phi_m" "log_psi_m"
## [29] "log_lambda_m" "log_delta_m" "log_epsilon_m" "log_A_m"
## [33] "log_B_m" "log_marginal_prec_phi_f" "log_marginal_prec_psi_f" "log_marginal_prec_lambda_m"
## [37] "log_marginal_prec_delta_f" "log_marginal_prec_epsilon_f" "log_marginal_prec_A_f" "log_marginal_prec_B_m"
## [41] "log_marginal_prec_phi_m" "log_marginal_prec_psi_m" "log_marginal_prec_lambda_m" "log_marginal_prec_epsilon_m"
## [45] "log_marginal_prec_epsilon_m" "log_marginal_prec_A_m" "log_marginal_prec_B_m" "logit_rho_psi_f"
## [49] "logit_rho_psi_f" "logit_rho_A_f" "logit_rho_B_f" "logit_rho_psi_m"
## [53] "logit_rho_psi_m" "logit_rho_A_m" "logit_rho_B_m"

## Your parameter list has been re-ordered.
## (Disable this warning with checkParameterOrder=FALSE)
## Optimizing tape... Done
## iter: 1 value: 1290.293 mgc: 125.731 ustep: 0.03522464
## iter: 2 value: 894.6024 mgc: 156.3292 ustep: 0.05065226
## iter: 3 value: 702.4149 mgc: 18.31375 ustep: 0.2251381
## iter: 4 value: 657.505 mgc: 41.85178 ustep: 0.4745397
## iter: 5 value: 654.7472 mgc: 10.25176 ustep: 0.6888995
## iter: 6 value: 649.2597 mgc: 82.56573 ustep: 0.3578201
## iter: 7 value: 648.4784 mgc: 14.05519 ustep: 0.5982208
## iter: 8 value: 647.9225 mgc: 11.71278 ustep: 0.77347
## iter: 9 value: 647.6388 mgc: 4.878627 ustep: 0.8794835
## iter: 10 value: 647.4667 mgc: 6.168235 ustep: 0.937814
## iter: 11 value: 647.391 mgc: 2.340258 ustep: 0.9684112
## iter: 12 value: 647.3546 mgc: 2.166201 ustep: 0.9840804
## iter: 13 value: 647.3402 mgc: 1.28233 ustep: 0.9920091
## iter: 14 value: 647.3337 mgc: 0.6152019 ustep: 0.9959969
## iter: 15 value: 647.3313 mgc: 0.5105211 ustep: 0.9979967
## iter: 16 value: 647.3307 mgc: 0.2862292 ustep: 0.9989979
## iter: 17 value: 647.3306 mgc: 0.1052636 ustep: 0.9994989
## iter: 18 value: 647.3306 mgc: 0.02121364 ustep: 0.9997494
## iter: 19 value: 647.3306 mgc: 0.0007793066 ustep: 0.9998747
## iter: 20 value: 647.3306 mgc: 1.78343e-06 ustep: 0.9999374

```

```

## iter: 21 mgc: 1.325167e-10
## iter: 1 mgc: 1.325167e-10
## Matching hessian patterns... Done
## outer mgc: 14.37119
## 0: 1577.0760: 2.00000 4.00000 2.00000 4.00000 3.00000 2.00000 2.00000 3.00000 2.00000 3
## iter: 1 mgc: 6.143424e-10
## iter: 1 mgc: 6.143424e-10
## outer mgc: 14.37119
## 1: 1577.0760: 2.00000 4.0000 2.00000 4.0000 3.00000 2.00000 2.00000 3.00000 2.00000 3
## iter: 1 mgc: 1.800717e-09
## iter: 1 mgc: 1.800717e-09
## outer mgc: 14.37119
## 2: 1577.0760: 2.00000 4.0000 2.00000 4.0000 3.00000 2.00000 2.00000 3.00000 2.00000 3
## iter: 1 mgc: 4.201621e-09
## iter: 1 mgc: 4.201621e-09
## outer mgc: 14.37119
## 3: 1577.0760: 2.00000 4.0000 2.00000 4.0000 3.00000 2.00000 2.00000 3.00000 2.00000 3
## iter: 1 mgc: 9.003426e-09
## iter: 1 mgc: 9.003426e-09
## outer mgc: 14.37119
## 4: 1577.0760: 2.00000 4.0000 2.00000 4.0000 3.00000 2.00000 2.00000 3.00000 2.00000 3
## iter: 1 value: 647.3306 mgc: 1.860704e-08 ustep: 1
## iter: 2 mgc: 3.548994e-11
## iter: 1 mgc: 3.548994e-11
## outer mgc: 14.37119
## 5: 1577.0760: 2.00000 4.0000 2.00000 4.0000 3.00000 2.00000 2.00000 3.00000 2.00000 3
## iter: 1 value: 647.3306 mgc: 1.920725e-08 ustep: 1
## mgc: 9.925477e-11
## iter: 1 mgc: 9.925477e-11
## outer mgc: 14.37119
## 6: 1577.0760: 2.00000 4.0000 2.00000 4.0000 3.00000 2.00000 2.00000 3.00000 2.00000 3
## iter: 1 value: 647.3306 mgc: 3.841448e-08 ustep: 1
## mgc: 5.820766e-11
## iter: 1 mgc: 5.820766e-11
## outer mgc: 14.37119
## 7: 1577.0760: 2.00000 4.0000 2.00000 4.0000 3.00000 2.00000 2.00000 3.00000 2.00000 3
## iter: 1 value: 647.3306 mgc: 7.682887e-08 ustep: 1
## mgc: 7.371803e-11
## iter: 1 value: 647.3306 mgc: 2.304867e-07 ustep: 1
## iter: 2 mgc: 5.820766e-11
## iter: 1 value: 647.3305 mgc: 9.219468e-07 ustep: 1
## iter: 2 mgc: 6.716055e-11
## iter: 1 value: 647.3305 mgc: 3.687788e-06 ustep: 1
## iter: 2 mgc: 1.164153e-10
## iter: 1 value: 647.3303 mgc: 1.475116e-05 ustep: 1
## iter: 2 mgc: 6.822976e-11
## iter: 1 value: 647.3294 mgc: 5.900479e-05 ustep: 1
## iter: 2 mgc: 6.275247e-11
## iter: 1 value: 647.326 mgc: 0.0002360214 ustep: 1
## iter: 2 mgc: 1.003782e-09
## iter: 1 value: 647.3122 mgc: 0.0009441222 ustep: 1
## iter: 2 value: 647.3122 mgc: 1.606401e-08 ustep: 1
## mgc: 1.013589e-10
## iter: 1 value: 647.257 mgc: 0.003777089 ustep: 1
## iter: 2 value: 647.257 mgc: 2.572897e-07 ustep: 1
## iter: 3 mgc: 5.820766e-11

```



```

## iter: 1 value: 647.0364 mgc: 0.01511791 ustep: 1
## iter: 2 value: 647.0364 mgc: 4.133564e-06 ustep: 1
## iter: 3 mgc: 1.622587e-10
## iter: 1 value: 646.1544 mgc: 0.06062473 ustep: 1
## iter: 2 value: 646.1544 mgc: 6.723448e-05 ustep: 1
## iter: 3 mgc: 4.161493e-09
## iter: 1 value: 642.6323 mgc: 0.2449688 ustep: 1
## iter: 2 value: 642.6323 mgc: 0.001149737 ustep: 1
## iter: 3 value: 642.6323 mgc: 1.133673e-06 ustep: 1
## iter: 4 mgc: 5.820766e-11
## iter: 1 value: 628.6357 mgc: 1.020718 ustep: 1
## iter: 2 value: 628.6356 mgc: 0.02429109 ustep: 1
## iter: 3 value: 628.6356 mgc: 0.0003608495 ustep: 1
## iter: 4 value: 628.6356 mgc: 5.562578e-07 ustep: 1
## iter: 5 mgc: 6.011602e-11
## iter: 1 value: 574.0797 mgc: 4.829746 ustep: 1
## iter: 2 value: 574.0479 mgc: 1.599155 ustep: 1
## iter: 3 value: 574.0471 mgc: 0.1889186 ustep: 1
## iter: 4 value: 574.047 mgc: 0.1903511 ustep: 1
## iter: 5 value: 574.047 mgc: 0.02587098 ustep: 1
## iter: 6 value: 574.0469 mgc: 0.04414174 ustep: 1
## iter: 7 value: 574.0469 mgc: 0.004453023 ustep: 1
## iter: 8 value: 574.0469 mgc: 0.001426716 ustep: 1
## iter: 9 value: 574.0469 mgc: 1.391277e-05 ustep: 1
## iter: 10 mgc: 7.232264e-09
## iter: 1 value: 380.7758 mgc: 40.16457 ustep: 0.008155295
## iter: 2 value: 376.5216 mgc: 50.71111 ustep: 0.02340389
## iter: 3 value: 375.6417 mgc: 8.549378 ustep: 0.153068
## iter: 4 value: 375.5604 mgc: 1.319296 ustep: 0.3912999
## iter: 5 value: 375.5508 mgc: 0.1623407 ustep: 0.6255772
## iter: 6 value: 375.5412 mgc: 0.01519751 ustep: 0.7909553
## iter: 7 value: 375.5151 mgc: 0.1780353 ustep: 0.8893677
## iter: 8 value: 375.4649 mgc: 1.320031 ustep: 0.9430686
## iter: 9 value: 375.3716 mgc: 4.743863 ustep: 0.9711201
## iter: 10 value: 375.35 mgc: 2.674608 ustep: 0.9854557
## iter: 11 value: 375.2443 mgc: 9.461825 ustep: 0.992702
## iter: 12 value: 375.2386 mgc: 0.4087036 ustep: 0.9963447
## iter: 13 value: 375.233 mgc: 1.508288 ustep: 0.9981708
## iter: 14 value: 375.2328 mgc: 0.08017072 ustep: 0.9990851
## iter: 15 value: 375.2328 mgc: 0.01784286 ustep: 0.9995425
## iter: 16 value: 375.2328 mgc: 5.536977e-05 ustep: 0.9997712
## iter: 17 value: 375.2328 mgc: 1.857302e-08 ustep: 0.9998856
## iter: 18 mgc: 6.217082e-11
## iter: 1 mgc: 6.217082e-11
## outer mgc: 20.19981
## 8: 1535.6180: 4.02447 3.38031 3.97151 3.39852 3.14863 2.67574 2.67565 3.23285 2.02303 3
## iter: 1 value: 348.4587 mgc: 458.9086 ustep: 0.002237842
## iter: 2 value: 322.6677 mgc: 1000.681 ustep: 0.0007580266
## iter: 3 value: 305.7969 mgc: 378.1509 ustep: 0.003495124
## iter: 4 value: 299.1689 mgc: 128.3578 ustep: 0.007598577
## iter: 5 value: 291.6703 mgc: 666.5195 ustep: 0.001424769
## iter: 6 value: 288.6884 mgc: 268.5914 ustep: 0.002407189
## iter: 7 value: 282.9088 mgc: 23.18111 ustep: 0.0491582
## iter: 8 value: 280.5233 mgc: 484.7565 ustep: 0.003908137
## iter: 9 value: 279.1317 mgc: 371.69 ustep: 0.002017403
## iter: 10 value: 277.5832 mgc: 37.53377 ustep: 0.04501102

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## iter: 11 value: 277.3061 mgc: 26.8699 ustep: 0.2122368
## iter: 12 value: 276.8022 mgc: 337.3827 ustep: 0.009597045
## iter: 13 value: 276.3467 mgc: 284.8769 ustep: 0.003218226
## iter: 14 value: 276.0583 mgc: 4.004656 ustep: 0.05682374
## iter: 15 value: 275.8922 mgc: 17.89888 ustep: 0.2384535
## iter: 16 value: 275.7284 mgc: 166.4589 ustep: 0.04100191
## iter: 17 value: 275.6327 mgc: 4.419487 ustep: 0.202569
## iter: 18 value: 275.5396 mgc: 3.038377 ustep: 0.4501317
## iter: 19 value: 275.4776 mgc: 1.457186 ustep: 0.6709514
## iter: 20 value: 275.3854 mgc: 1.25351 ustep: 0.8191343
## iter: 21 value: 275.1831 mgc: 0.7553019 ustep: 0.9050699
## iter: 22 value: 274.9671 mgc: 3.389379 ustep: 0.9513565
## iter: 23 value: 274.7077 mgc: 13.58208 ustep: 0.8430001
## iter: 24 value: 274.5566 mgc: 9.930169 ustep: 0.7138492
## iter: 25 value: 274.4294 mgc: 2.380814 ustep: 0.8449115
## iter: 26 value: 274.322 mgc: 5.59635 ustep: 0.9191987
## iter: 27 value: 274.2482 mgc: 8.899069 ustep: 0.9587527
## iter: 28 value: 274.2071 mgc: 7.26362 ustep: 0.9791612
## iter: 29 value: 274.1865 mgc: 6.951629 ustep: 0.9895268
## iter: 30 value: 274.1799 mgc: 2.435104 ustep: 0.9947501
## iter: 31 value: 274.1784 mgc: 2.086988 ustep: 0.9973719
## iter: 32 value: 274.1784 mgc: 0.1766643 ustep: 0.9986852
## iter: 33 value: 274.1784 mgc: 0.03225467 ustep: 0.9993425
## iter: 34 value: 274.1784 mgc: 6.969208e-05 ustep: 0.9996712
## iter: 35 value: 274.1784 mgc: 1.652577e-08 ustep: 0.9998356
## iter: 36 mgc: 4.102407e-11
## iter: 1 value: 326.7839 mgc: 20.9969 ustep: 1
## iter: 2 value: 326.6838 mgc: 7.583831 ustep: 1
## iter: 3 value: 326.6785 mgc: 0.4473334 ustep: 0.8994163
## iter: 4 value: 326.6735 mgc: 0.03878794 ustep: 0.9483808
## iter: 5 value: 326.6663 mgc: 0.1656394 ustep: 0.973851
## iter: 6 value: 326.6574 mgc: 0.4986629 ustep: 0.9868402
## iter: 7 value: 326.646 mgc: 1.250073 ustep: 0.993399
## iter: 8 value: 326.6323 mgc: 1.428399 ustep: 0.9966944
## iter: 9 value: 326.6137 mgc: 2.083763 ustep: 0.998346
## iter: 10 value: 326.6088 mgc: 1.059008 ustep: 0.9991727
## iter: 11 value: 326.5843 mgc: 3.700685 ustep: 0.9995863
## iter: 12 value: 326.5819 mgc: 0.4137866 ustep: 0.879577
## iter: 13 value: 326.58 mgc: 0.07256042 ustep: 0.9378639
## iter: 14 value: 326.5782 mgc: 0.05997832 ustep: 0.9684369
## iter: 15 value: 326.5771 mgc: 0.08442513 ustep: 0.9840935
## iter: 16 value: 326.5769 mgc: 0.05950419 ustep: 0.9920157
## iter: 17 value: 326.5769 mgc: 0.01668871 ustep: 0.9960002
## iter: 18 value: 326.5769 mgc: 0.001774082 ustep: 0.9979983
## iter: 19 value: 326.5769 mgc: 5.787537e-05 ustep: 0.9989988
## iter: 20 value: 326.5769 mgc: 5.026032e-07 ustep: 0.9994993
## iter: 21 mgc: 3.330481e-09
## iter: 1 mgc: 3.330481e-09
## outer mgc: 4.608838
## 9: 1516.8546: 4.23366 3.28816 4.16515 3.29256 3.20348 2.80295 2.77994 3.27421 2.02750 3
## iter: 1 value: 235.3656 mgc: 8.623868 ustep: 1
## iter: 2 value: 235.3067 mgc: 9.406993 ustep: 1
## iter: 3 value: 235.3054 mgc: 0.438313 ustep: 1
## iter: 4 value: 235.3045 mgc: 0.5758675 ustep: 1
## iter: 5 value: 235.3045 mgc: 0.0115064 ustep: 1
## iter: 6 value: 235.3044 mgc: 0.03949381 ustep: 1

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## iter: 7 value: 235.3044 mgc: 0.0001511328 ustep: 1
## iter: 8 value: 235.3044 mgc: 1.95537e-06 ustep: 1
## iter: 9 mgc: 7.459522e-11
## iter: 1 mgc: 7.459522e-11
## outer mgc: 7.804978
## 10: 1510.7277: 4.63522 3.06899 4.54481 3.03336 3.34981 3.11368 3.03113 3.37530 2.03691 3
## iter: 1 value: 147.5539 mgc: 10.14823 ustep: 0.989901
## iter: 2 value: 147.4084 mgc: 14.47663 ustep: 0.9949382
## iter: 3 value: 147.3984 mgc: 1.582923 ustep: 0.7753508
## iter: 4 value: 147.3935 mgc: 0.08379758 ustep: 0.880552
## iter: 5 value: 147.384 mgc: 0.141707 ustep: 0.9383835
## iter: 6 value: 147.3677 mgc: 0.5859335 ustep: 0.9687051
## iter: 7 value: 147.3476 mgc: 1.552032 ustep: 0.9842297
## iter: 8 value: 147.3322 mgc: 1.337855 ustep: 0.9920843
## iter: 9 value: 147.3252 mgc: 1.458014 ustep: 0.9960347
## iter: 10 value: 147.324 mgc: 0.3469429 ustep: 0.9980156
## iter: 11 value: 147.324 mgc: 0.1472962 ustep: 0.9990074
## iter: 12 value: 147.324 mgc: 0.003276144 ustep: 0.9995036
## iter: 13 value: 147.324 mgc: 4.078567e-05 ustep: 0.9997518
## iter: 14 value: 147.324 mgc: 3.154066e-08 ustep: 0.9998759
## iter: 15 mgc: 8.731149e-11
## iter: 1 mgc: 8.731149e-11
## outer mgc: 9.126684
## 11: 1509.1907: 4.79985 2.83516 4.71688 2.74452 3.52787 3.43760 3.27636 3.48164 2.04741 3
## iter: 1 value: 31.37381 mgc: 16.37399 ustep: 1
## iter: 2 value: 31.16913 mgc: 25.57526 ustep: 1
## iter: 3 value: 30.95361 mgc: 13.14962 ustep: 0.6827823
## iter: 4 value: 30.92919 mgc: 3.055684 ustep: 0.8263238
## iter: 5 value: 30.91907 mgc: 0.2718191 ustep: 0.9090326
## iter: 6 value: 30.90374 mgc: 0.2341178 ustep: 0.9534367
## iter: 7 value: 30.88727 mgc: 0.8674969 ustep: 0.9764432
## iter: 8 value: 30.87273 mgc: 1.598174 ustep: 0.9881526
## iter: 9 value: 30.86334 mgc: 0.8750045 ustep: 0.9940592
## iter: 10 value: 30.85771 mgc: 1.209964 ustep: 0.9970255
## iter: 11 value: 30.85624 mgc: 0.1671997 ustep: 0.9985118
## iter: 12 value: 30.85598 mgc: 0.3195855 ustep: 0.9992557
## iter: 13 value: 30.85597 mgc: 0.003155354 ustep: 0.9996278
## iter: 14 value: 30.85597 mgc: 0.0005844375 ustep: 0.9998139
## iter: 15 value: 30.85597 mgc: 2.473961e-08 ustep: 0.999907
## iter: 16 mgc: 5.397745e-11
## iter: 1 mgc: 5.397745e-11
## outer mgc: 7.05524
## 12: 1502.8519: 4.76134 2.54130 4.73357 2.44072 3.78085 3.81859 3.65500 3.60926 2.06611 3
## iter: 1 value: -62.39634 mgc: 12.32598 ustep: 1
## iter: 2 value: -62.62316 mgc: 14.83657 ustep: 0.8994163
## iter: 3 value: -63.34082 mgc: 26.34641 ustep: 0.523213
## iter: 4 value: -63.39898 mgc: 2.864963 ustep: 0.7233623
## iter: 5 value: -63.41007 mgc: 0.08640727 ustep: 0.850522
## iter: 6 value: -63.42249 mgc: 0.05308627 ustep: 0.9222453
## iter: 7 value: -63.43789 mgc: 0.2771178 ustep: 0.96034
## iter: 8 value: -63.44998 mgc: 0.6022851 ustep: 0.9799714
## iter: 9 value: -63.45551 mgc: 0.5916465 ustep: 0.989936
## iter: 10 value: -63.45678 mgc: 0.3229422 ustep: 0.9949558
## iter: 11 value: -63.45688 mgc: 0.09113478 ustep: 0.997475
## iter: 12 value: -63.45689 mgc: 0.009491241 ustep: 0.9987368
## iter: 13 value: -63.45689 mgc: 0.0002378148 ustep: 0.9993683

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## iter: 14 value: -63.45689 mgc: 1.227513e-06 ustep: 0.9996841
## iter: 15 mgc: 3.076777e-09
## iter: 1 value: 3.571908 mgc: 16.12915 ustep: 1
## iter: 2 value: 3.485481 mgc: 1.562281 ustep: 1
## iter: 3 value: 3.470603 mgc: 1.319507 ustep: 0.8994163
## iter: 4 value: 3.465556 mgc: 0.2047684 ustep: 0.9483808
## iter: 5 value: 3.457229 mgc: 0.3793635 ustep: 0.973851
## iter: 6 value: 3.445555 mgc: 1.160173 ustep: 0.9868402
## iter: 7 value: 3.433276 mgc: 1.228432 ustep: 0.993399
## iter: 8 value: 3.422378 mgc: 1.839839 ustep: 0.9966944
## iter: 9 value: 3.418212 mgc: 0.6596715 ustep: 0.998346
## iter: 10 value: 3.41699 mgc: 0.8760435 ustep: 0.9991727
## iter: 11 value: 3.416954 mgc: 0.0263084 ustep: 0.9995863
## iter: 12 value: 3.416954 mgc: 0.007904176 ustep: 0.9997932
## iter: 13 value: 3.416954 mgc: 2.778639e-06 ustep: 0.9998966
## iter: 14 mgc: 1.600868e-09
## iter: 1 value: 17.68806 mgc: 6.778199 ustep: 1
## iter: 2 value: 17.68611 mgc: 0.2576164 ustep: 1
## iter: 3 value: 17.68602 mgc: 0.03153816 ustep: 1
## iter: 4 value: 17.68601 mgc: 0.05110856 ustep: 1
## iter: 5 value: 17.68601 mgc: 0.0001472012 ustep: 1
## iter: 6 value: 17.68601 mgc: 1.669292e-06 ustep: 1
## iter: 7 mgc: 1.164153e-10
## iter: 1 mgc: 1.164153e-10
## outer mgc: 3.442981
## 13: 1501.6311: 4.75586 2.51137 4.72622 2.41564 3.81367 3.84641 3.69669 3.62272 2.06972 3
## iter: 1 value: 0.2013237 mgc: 5.20377 ustep: 1
## iter: 2 value: 0.1740858 mgc: 2.545201 ustep: 1
## iter: 3 value: 0.1717062 mgc: 0.1715877 ustep: 0.8994163
## iter: 4 value: 0.1688243 mgc: 0.04753541 ustep: 0.9483808
## iter: 5 value: 0.1633101 mgc: 0.2259192 ustep: 0.973851
## iter: 6 value: 0.1552863 mgc: 0.806238 ustep: 0.9868402
## iter: 7 value: 0.1459856 mgc: 1.091131 ustep: 0.993399
## iter: 8 value: 0.1381456 mgc: 1.293254 ustep: 0.9966944
## iter: 9 value: 0.1345481 mgc: 0.7875508 ustep: 0.998346
## iter: 10 value: 0.1337419 mgc: 0.5298103 ustep: 0.9991727
## iter: 11 value: 0.1336968 mgc: 0.07772105 ustep: 0.9995863
## iter: 12 value: 0.1336966 mgc: 0.009299442 ustep: 0.9997932
## iter: 13 value: 0.1336966 mgc: 3.400302e-05 ustep: 0.9998966
## iter: 14 value: 0.1336966 mgc: 1.828666e-08 ustep: 0.9999483
## iter: 15 mgc: 8.731149e-11
## iter: 1 value: 13.11622 mgc: 1.283965 ustep: 1
## iter: 2 value: 13.1161 mgc: 0.1734075 ustep: 1
## iter: 3 value: 13.1161 mgc: 0.01401764 ustep: 1
## iter: 4 value: 13.1161 mgc: 0.007421081 ustep: 1
## iter: 5 value: 13.1161 mgc: 3.944274e-05 ustep: 1
## iter: 6 value: 13.1161 mgc: 3.188628e-08 ustep: 1
## iter: 7 mgc: 5.820766e-11
## iter: 1 mgc: 5.820766e-11
## outer mgc: 9.009883
## 14: 1501.2975: 4.75455 2.49953 4.72393 2.40421 3.82725 3.85765 3.71050 3.62855 2.07121 3
## iter: 1 value: 10.09951 mgc: 3.681794 ustep: 0.989901
## iter: 2 value: 10.09353 mgc: 1.138267 ustep: 0.9949382
## iter: 3 value: 10.09139 mgc: 0.3505073 ustep: 0.9495676
## iter: 4 value: 10.08704 mgc: 0.156421 ustep: 0.9744601
## iter: 5 value: 10.08065 mgc: 0.6873221 ustep: 0.9871488

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## iter: 6 value: 10.07281 mgc: 0.988856 ustep: 0.9935542
## iter: 7 value: 10.06549 mgc: 1.222113 ustep: 0.9967722
## iter: 8 value: 10.06155 mgc: 0.8349715 ustep: 0.998385
## iter: 9 value: 10.06043 mgc: 0.6160074 ustep: 0.9991922
## iter: 10 value: 10.06034 mgc: 0.1152051 ustep: 0.9995961
## iter: 11 value: 10.06033 mgc: 0.02019416 ustep: 0.999798
## iter: 12 value: 10.06033 mgc: 0.0001235764 ustep: 0.999899
## iter: 13 value: 10.06033 mgc: 1.193973e-07 ustep: 0.9999495
## iter: 14 mgc: 5.820766e-11
## iter: 1 value: 12.43549 mgc: 0.7811611 ustep: 1
## iter: 2 value: 12.4352 mgc: 0.3611391 ustep: 1
## iter: 3 value: 12.43517 mgc: 0.01671261 ustep: 1
## iter: 4 value: 12.43513 mgc: 0.1642932 ustep: 1
## iter: 5 value: 12.43512 mgc: 0.00643156 ustep: 1
## iter: 6 value: 12.43511 mgc: 0.06919227 ustep: 1
## iter: 7 value: 12.43511 mgc: 0.004930888 ustep: 0.989901
## iter: 8 value: 12.43511 mgc: 0.0001206844 ustep: 0.9949382
## iter: 9 value: 12.43511 mgc: 0.000461228 ustep: 0.9974661
## iter: 10 value: 12.43511 mgc: 0.001764021 ustep: 0.9987324
## iter: 11 value: 12.4351 mgc: 0.007302336 ustep: 0.9993661
## Not improving much - will try early exit...PD hess?: TRUE
## mgc: 0.04258362
## iter: 1 value: 12.4351 mgc: 0.04258362 ustep: 0.989901
## iter: 2 value: 12.43509 mgc: 0.0003888515 ustep: 0.9949382
## iter: 3 value: 12.43508 mgc: 0.002324643 ustep: 0.9974661
## iter: 4 value: 12.43508 mgc: 0.01708739 ustep: 0.9987324
## iter: 5 value: 12.43495 mgc: 0.2122705 ustep: 0.9993661
## iter: 6 value: 12.43493 mgc: 0.05401902 ustep: 0.9820976
## iter: 7 value: 12.43488 mgc: 0.003710128 ustep: 0.9910093
## iter: 8 value: 12.43475 mgc: 0.0207033 ustep: 0.9954949
## iter: 9 value: 12.43455 mgc: 0.1137378 ustep: 0.9977452
## iter: 10 value: 12.43431 mgc: 0.2003415 ustep: 0.9988721
## iter: 11 value: 12.43413 mgc: 0.1569729 ustep: 0.9994359
## Not improving much - will try early exit...PD hess?: TRUE
## mgc: 0.1598798
## outer mgc: 25.66922
## 15: 1499.9493: 4.75433 2.49717 4.72312 2.40127 3.83010 3.86005 3.71175 3.62987 2.07156 3
## iter: 1 value: 10.23928 mgc: 0.7034035 ustep: 0.989901
## iter: 2 value: 10.23887 mgc: 0.1615521 ustep: 0.9949382
## iter: 3 value: 10.23856 mgc: 0.1890274 ustep: 0.9974661
## iter: 4 value: 10.2384 mgc: 0.1566232 ustep: 0.9987324
## iter: 5 value: 10.23835 mgc: 0.08056192 ustep: 0.9993661
## iter: 6 value: 10.23835 mgc: 0.02909132 ustep: 0.999683
## iter: 7 value: 10.23835 mgc: 0.003397832 ustep: 0.9998415
## iter: 8 value: 10.23835 mgc: 8.062022e-05 ustep: 0.9999208
## iter: 9 value: 10.23835 mgc: 1.230554e-07 ustep: 0.9999604
## iter: 10 mgc: 5.820766e-11
## iter: 1 value: 12.35309 mgc: 0.09701486 ustep: 0.989901
## iter: 2 value: 12.35306 mgc: 0.004326322 ustep: 0.9949382
## iter: 3 value: 12.35301 mgc: 0.02378995 ustep: 0.9974661
## iter: 4 value: 12.35298 mgc: 0.06903538 ustep: 0.9987324
## iter: 5 value: 12.35296 mgc: 0.04569759 ustep: 0.9993661
## iter: 6 value: 12.35295 mgc: 0.03504723 ustep: 0.999683
## iter: 7 value: 12.35295 mgc: 0.007946208 ustep: 0.9998415
## iter: 8 value: 12.35295 mgc: 0.001324986 ustep: 0.9999208
## iter: 9 value: 12.35295 mgc: 1.985839e-05 ustep: 0.9999604

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## iter: 10 value: 12.35295 mgc: 4.144494e-08 ustep: 0.9999802
## iter: 11 Not improving much - will try early exit...PD hess?: TRUE
## mgc: 1.74623e-10
## iter: 1 value: 12.42688 mgc: 0.03905959 ustep: 1
## iter: 2 value: 12.42683 mgc: 0.1248334 ustep: 1
## iter: 3 value: 12.42681 mgc: 0.07115714 ustep: 0.989901
## iter: 4 value: 12.42677 mgc: 0.004436186 ustep: 0.9949382
## iter: 5 value: 12.42666 mgc: 0.03623196 ustep: 0.9974661
## iter: 6 value: 12.42645 mgc: 0.2218833 ustep: 0.9987324
## iter: 7 value: 12.42641 mgc: 0.1094474 ustep: 0.9747243
## iter: 8 value: 12.42634 mgc: 0.003296361 ustep: 0.9872826
## iter: 9 value: 12.42622 mgc: 0.01572046 ustep: 0.9936216
## iter: 10 value: 12.42607 mgc: 0.05703932 ustep: 0.996806
## iter: 11 value: 12.42596 mgc: 0.1085796 ustep: 0.9984019
## Not improving much - will try early exit...PD hess?: TRUE
## mgc: 0.07120069
## iter: 1 value: 12.43428 mgc: 0.04223119 ustep: 0.989901
## iter: 2 value: 12.43427 mgc: 0.0003544355 ustep: 0.9949382
## iter: 3 value: 12.43426 mgc: 0.002118409 ustep: 0.9974661
## iter: 4 value: 12.43425 mgc: 0.01554357 ustep: 0.9987324
## iter: 5 value: 12.43414 mgc: 0.2028208 ustep: 0.9993661
## iter: 6 value: 12.43412 mgc: 0.05486033 ustep: 0.9820976
## iter: 7 value: 12.43407 mgc: 0.003506419 ustep: 0.9910093
## iter: 8 value: 12.43395 mgc: 0.01968536 ustep: 0.9954949
## iter: 9 value: 12.43375 mgc: 0.1100799 ustep: 0.9977452
## iter: 10 value: 12.43351 mgc: 0.2037635 ustep: 0.9988721
## iter: 11 value: 12.43333 mgc: 0.1542211 ustep: 0.9994359
## Not improving much - will try early exit...PD hess?: TRUE
## mgc: 0.1734163
## iter: 1 value: 12.43501 mgc: 0.04254837 ustep: 0.989901
## iter: 2 value: 12.43501 mgc: 0.0003853429 ustep: 0.9949382
## iter: 3 value: 12.435 mgc: 0.002303581 ustep: 0.9974661
## iter: 4 value: 12.43499 mgc: 0.01692971 ustep: 0.9987324
## iter: 5 value: 12.43487 mgc: 0.2113746 ustep: 0.9993661
## iter: 6 value: 12.43485 mgc: 0.05408116 ustep: 0.9820976
## iter: 7 value: 12.4348 mgc: 0.003689854 ustep: 0.9910093
## iter: 8 value: 12.43467 mgc: 0.02060169 ustep: 0.9954949
## iter: 9 value: 12.43447 mgc: 0.1133809 ustep: 0.9977452
## iter: 10 value: 12.43423 mgc: 0.2006755 ustep: 0.9988721
## iter: 11 value: 12.43405 mgc: 0.1567155 ustep: 0.9994359
## Not improving much - will try early exit...PD hess?: TRUE
## mgc: 0.1611499
## iter: 1 value: 12.43509 mgc: 0.04258009 ustep: 0.989901
## iter: 2 value: 12.43509 mgc: 0.0003885 ustep: 0.9949382
## iter: 3 value: 12.43508 mgc: 0.002322533 ustep: 0.9974661
## iter: 4 value: 12.43507 mgc: 0.01707159 ustep: 0.9987324
## iter: 5 value: 12.43495 mgc: 0.2121814 ustep: 0.9993661
## iter: 6 value: 12.43492 mgc: 0.05402502 ustep: 0.9820976
## iter: 7 value: 12.43487 mgc: 0.003708102 ustep: 0.9910093
## iter: 8 value: 12.43474 mgc: 0.02069314 ustep: 0.9954949
## iter: 9 value: 12.43454 mgc: 0.1137022 ustep: 0.9977452
## iter: 10 value: 12.4343 mgc: 0.2003748 ustep: 0.9988721
## iter: 11 value: 12.43413 mgc: 0.1569473 ustep: 0.9994359
## Not improving much - will try early exit...PD hess?: TRUE
## mgc: 0.160006
## iter: 1 value: 12.4351 mgc: 0.04258326 ustep: 0.989901

```

```

## iter: 2 value: 12.43509 mgc: 0.0003888164 ustep: 0.9949382
## iter: 3 value: 12.43508 mgc: 0.002324432 ustep: 0.9974661
## iter: 4 value: 12.43507 mgc: 0.01708581 ustep: 0.9987324
## iter: 5 value: 12.43495 mgc: 0.2122616 ustep: 0.9993661
## iter: 6 value: 12.43493 mgc: 0.05401962 ustep: 0.9820976
## iter: 7 value: 12.43488 mgc: 0.003709925 ustep: 0.9910093
## iter: 8 value: 12.43475 mgc: 0.02070229 ustep: 0.9954949
## iter: 9 value: 12.43455 mgc: 0.1137343 ustep: 0.9977452
## iter: 10 value: 12.43431 mgc: 0.2003448 ustep: 0.9988721
## iter: 11 value: 12.43413 mgc: 0.1569703 ustep: 0.9994359
## Not improving much - will try early exit...PD hess?: TRUE
## mgc: 0.1598924
## iter: 1 value: 12.4351 mgc: 0.04258358 ustep: 0.989901
## iter: 2 value: 12.43509 mgc: 0.000388848 ustep: 0.9949382
## iter: 3 value: 12.43508 mgc: 0.002324622 ustep: 0.9974661
## iter: 4 value: 12.43508 mgc: 0.01708723 ustep: 0.9987324
## iter: 5 value: 12.43495 mgc: 0.2122696 ustep: 0.9993661
## iter: 6 value: 12.43493 mgc: 0.05401908 ustep: 0.9820976
## iter: 7 value: 12.43488 mgc: 0.003710108 ustep: 0.9910093
## iter: 8 value: 12.43475 mgc: 0.0207032 ustep: 0.9954949
## iter: 9 value: 12.43455 mgc: 0.1137375 ustep: 0.9977452
## iter: 10 value: 12.43431 mgc: 0.2003418 ustep: 0.9988721
## iter: 11 value: 12.43413 mgc: 0.1569726 ustep: 0.9994359
## Not improving much - will try early exit...PD hess?: TRUE
## mgc: 0.159881
## iter: 1 value: 12.4351 mgc: 0.04258361 ustep: 0.989901
## iter: 2 value: 12.43509 mgc: 0.0003888512 ustep: 0.9949382
## iter: 3 value: 12.43508 mgc: 0.002324641 ustep: 0.9974661
## iter: 4 value: 12.43508 mgc: 0.01708738 ustep: 0.9987324
## iter: 5 value: 12.43495 mgc: 0.2122704 ustep: 0.9993661
## iter: 6 value: 12.43493 mgc: 0.05401903 ustep: 0.9820976
## iter: 7 value: 12.43488 mgc: 0.003710126 ustep: 0.9910093
## iter: 8 value: 12.43475 mgc: 0.02070329 ustep: 0.9954949
## iter: 9 value: 12.43455 mgc: 0.1137378 ustep: 0.9977452
## iter: 10 value: 12.43431 mgc: 0.2003415 ustep: 0.9988721
## iter: 11 value: 12.43413 mgc: 0.1569728 ustep: 0.9994359
## Not improving much - will try early exit...PD hess?: TRUE
## mgc: 0.1598799
## iter: 1 value: 12.4351 mgc: 0.04258362 ustep: 0.989901
## iter: 2 value: 12.43509 mgc: 0.0003888515 ustep: 0.9949382
## iter: 3 value: 12.43508 mgc: 0.002324643 ustep: 0.9974661
## iter: 4 value: 12.43508 mgc: 0.01708739 ustep: 0.9987324
## iter: 5 value: 12.43495 mgc: 0.2122705 ustep: 0.9993661
## iter: 6 value: 12.43493 mgc: 0.05401902 ustep: 0.9820976
## iter: 7 value: 12.43488 mgc: 0.003710128 ustep: 0.9910093
## iter: 8 value: 12.43475 mgc: 0.0207033 ustep: 0.9954949
## iter: 9 value: 12.43455 mgc: 0.1137378 ustep: 0.9977452
## iter: 10 value: 12.43431 mgc: 0.2003415 ustep: 0.9988721
## iter: 11 value: 12.43413 mgc: 0.1569728 ustep: 0.9994359
## Not improving much - will try early exit...PD hess?: TRUE
## mgc: 0.1598798
## iter: 1 value: 12.4351 mgc: 0.04258362 ustep: 0.989901
## iter: 2 value: 12.43509 mgc: 0.0003888515 ustep: 0.9949382
## iter: 3 value: 12.43508 mgc: 0.002324643 ustep: 0.9974661
## iter: 4 value: 12.43508 mgc: 0.01708739 ustep: 0.9987324
## iter: 5 value: 12.43495 mgc: 0.2122705 ustep: 0.9993661

```

```

## iter: 6 value: 12.43493 mgc: 0.05401902 ustep: 0.9820976
## iter: 7 value: 12.43488 mgc: 0.003710128 ustep: 0.9910093
## iter: 8 value: 12.43475 mgc: 0.0207033 ustep: 0.9954949
## iter: 9 value: 12.43455 mgc: 0.1137378 ustep: 0.9977452
## iter: 10 value: 12.43431 mgc: 0.2003415 ustep: 0.9988721
## iter: 11 value: 12.43413 mgc: 0.1569729 ustep: 0.9994359
## Not improving much - will try early exit...PD hess?: TRUE
## mgc: 0.1598798
## iter: 1 value: 12.4351 mgc: 0.04258362 ustep: 0.989901
## iter: 2 value: 12.43509 mgc: 0.0003888515 ustep: 0.9949382
## iter: 3 value: 12.43508 mgc: 0.002324643 ustep: 0.9974661
## iter: 4 value: 12.43508 mgc: 0.01708739 ustep: 0.9987324
## iter: 5 value: 12.43495 mgc: 0.2122705 ustep: 0.9993661
## iter: 6 value: 12.43493 mgc: 0.05401902 ustep: 0.9820976
## iter: 7 value: 12.43488 mgc: 0.003710128 ustep: 0.9910093
## iter: 8 value: 12.43475 mgc: 0.0207033 ustep: 0.9954949
## iter: 9 value: 12.43455 mgc: 0.1137378 ustep: 0.9977452
## iter: 10 value: 12.43431 mgc: 0.2003415 ustep: 0.9988721
## iter: 11 value: 12.43413 mgc: 0.1569729 ustep: 0.9994359
## Not improving much - will try early exit...PD hess?: TRUE
## mgc: 0.1598798
## iter: 1 value: 12.4351 mgc: 0.04258362 ustep: 0.989901
## iter: 2 value: 12.43509 mgc: 0.0003888515 ustep: 0.9949382
## iter: 3 value: 12.43508 mgc: 0.002324643 ustep: 0.9974661
## iter: 4 value: 12.43508 mgc: 0.01708739 ustep: 0.9987324
## iter: 5 value: 12.43495 mgc: 0.2122705 ustep: 0.9993661
## iter: 6 value: 12.43493 mgc: 0.05401902 ustep: 0.9820976
## iter: 7 value: 12.43488 mgc: 0.003710128 ustep: 0.9910093
## iter: 8 value: 12.43475 mgc: 0.0207033 ustep: 0.9954949
## iter: 9 value: 12.43455 mgc: 0.1137378 ustep: 0.9977452
## iter: 10 value: 12.43431 mgc: 0.2003415 ustep: 0.9988721
## iter: 11 value: 12.43413 mgc: 0.1569729 ustep: 0.9994359
## Not improving much - will try early exit...PD hess?: TRUE
## mgc: 0.1598798
## 16: 1499.9493: 4.75433 2.49717 4.72312 2.40127 3.83010 3.86005 3.71175 3.62987 2.07156 3
## iter: 1 value: 12.4351 mgc: 0.04258362 ustep: 0.989901
## iter: 2 value: 12.43509 mgc: 0.0003888515 ustep: 0.9949382
## iter: 3 value: 12.43508 mgc: 0.002324643 ustep: 0.9974661
## iter: 4 value: 12.43508 mgc: 0.01708739 ustep: 0.9987324
## iter: 5 value: 12.43495 mgc: 0.2122705 ustep: 0.9993661
## iter: 6 value: 12.43493 mgc: 0.05401902 ustep: 0.9820976
## iter: 7 value: 12.43488 mgc: 0.003710128 ustep: 0.9910093
## iter: 8 value: 12.43475 mgc: 0.0207033 ustep: 0.9954949
## iter: 9 value: 12.43455 mgc: 0.1137378 ustep: 0.9977452
## iter: 10 value: 12.43431 mgc: 0.2003415 ustep: 0.9988721
## iter: 11 value: 12.43413 mgc: 0.1569729 ustep: 0.9994359
## Not improving much - will try early exit...PD hess?: TRUE
## mgc: 0.1598798

## Warning in fit_tmb(input.thiele.loghump.oag.vec.RW.re, inner_verbose = TRUE, : convergence error: false
## converged: false convergence (8)

## Order of parameters:
## [1] "log_tau2_logpop_f" "log_tau2_logpop_m" "log_tau2_fx" "log_tau2_gx_f"
## [5] "log_tau2_gx_m" "log_basepop_f" "log_basepop_m" "log_fx"
## [9] "gx_f" "gx_m" "logit_rho_g_x_f" "logit_rho_g_x_m"
## [13] "logit_rho_g_t_f" "logit_rho_g_t_m" "log_lambda_tp" "log_lambda_tp_m"

```



```

## [17] "tp_params"          "log_dispersion_f"      "log_dispersion_m"      "log_phi"
## [21] "log_phi_innov_m"     "log_psi_innov_f"       "log_psi_innov_m"       "log_lambda"
## [25] "log_lambda_innov_m"  "log_delta_innov_f"     "log_delta_innov_m"     "log_epsilon"
## [29] "log_epsilon_innov_m" "log_A_innov_f"         "log_A_innov_m"         "log_B_innov_m"
## [33] "log_B_innov_m"       "log_phi_f"             "log_phi_m"             "log_psi_innov_m"
## [37] "log_psi_m"           "log_lambda_f"          "log_lambda_m"          "log_delta_innov_m"
## [41] "log_delta_m"         "log_epsilon_f"         "log_epsilon_m"         "log_A_innov_f"
## [45] "log_A_m"             "log_B_f"              "log_B_m"              "log_B_innov_f"
## [49] "log_marginal_prec_phi_m" "log_marginal_prec_psi_f" "log_marginal_prec_psi_m" "log_marginal_prec_phi_f"
## [53] "log_marginal_prec_lambda_m" "log_marginal_prec_delta_f" "log_marginal_prec_delta_m" "log_marginal_prec_lambda_f"
## [57] "log_marginal_prec_epsilon_m" "log_marginal_prec_A_f" "log_marginal_prec_A_m" "log_marginal_prec_epsilon_f"
## [61] "log_marginal_prec_B_m" "logit_rho_phi_f" "logit_rho_phi_m" "logit_rho_phi_f"
## [65] "logit_rho_psi_m" "logit_rho_lambda_f" "logit_rho_lambda_m" "logit_rho_lambda_f"
## [69] "logit_rho_delta_m" "logit_rho_epsilon_f" "logit_rho_epsilon_m" "logit_rho_delta_f"
## [73] "logit_rho_A_m" "logit_rho_B_f" "logit_rho_B_m" "logit_rho_A_f"

## Not matching template order:
## [1] "log_tau2_logpop_f" "log_tau2_logpop_m" "log_tau2_fx" "log_tau2_logpop_f"
## [5] "log_tau2_gx_m" "logit_rho_g_x_f" "logit_rho_g_t_f" "logit_rho_g_x_f"
## [9] "logit_rho_g_t_m" "log_basepop_f" "log_basepop_m" "log_basepop_f"
## [13] "gx_f" "gx_m" "log_lambda_tp" "log_lambda_tp"
## [17] "log_dispersion_f" "log_dispersion_m" "tp_params" "log_phi"
## [21] "log_psi_f" "log_lambda_f" "log_delta_f" "log_epsilon"
## [25] "log_A_f" "log_B_f" "log_phi_m" "log_psi"
## [29] "log_lambda_m" "log_delta_m" "log_epsilon_m" "log_A_m"
## [33] "log_B_m" "log_marginal_prec_phi_f" "log_marginal_prec_psi_f" "log_marginal_prec_phi_f"
## [37] "log_marginal_prec_delta_f" "log_marginal_prec_epsilon_f" "log_marginal_prec_A_f" "log_marginal_prec_delta_f"
## [41] "log_marginal_prec_phi_m" "log_marginal_prec_psi_m" "log_marginal_prec_lambda_m" "log_marginal_prec_phi_m"
## [45] "log_marginal_prec_epsilon_m" "log_marginal_prec_A_m" "log_marginal_prec_B_m" "logit_rho"
## [49] "logit_rho_psi_f" "logit_rho_A_f" "logit_rho_B_f" "logit_rho_psi_f"
## [53] "logit_rho_psi_m" "logit_rho_A_m" "logit_rho_B_m" "logit_rho_psi_m"

## Your parameter list has been re-ordered.
## (Disable this warning with checkParameterOrder=FALSE)

## user system elapsed
## 27.75 0.32 28.36

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

```

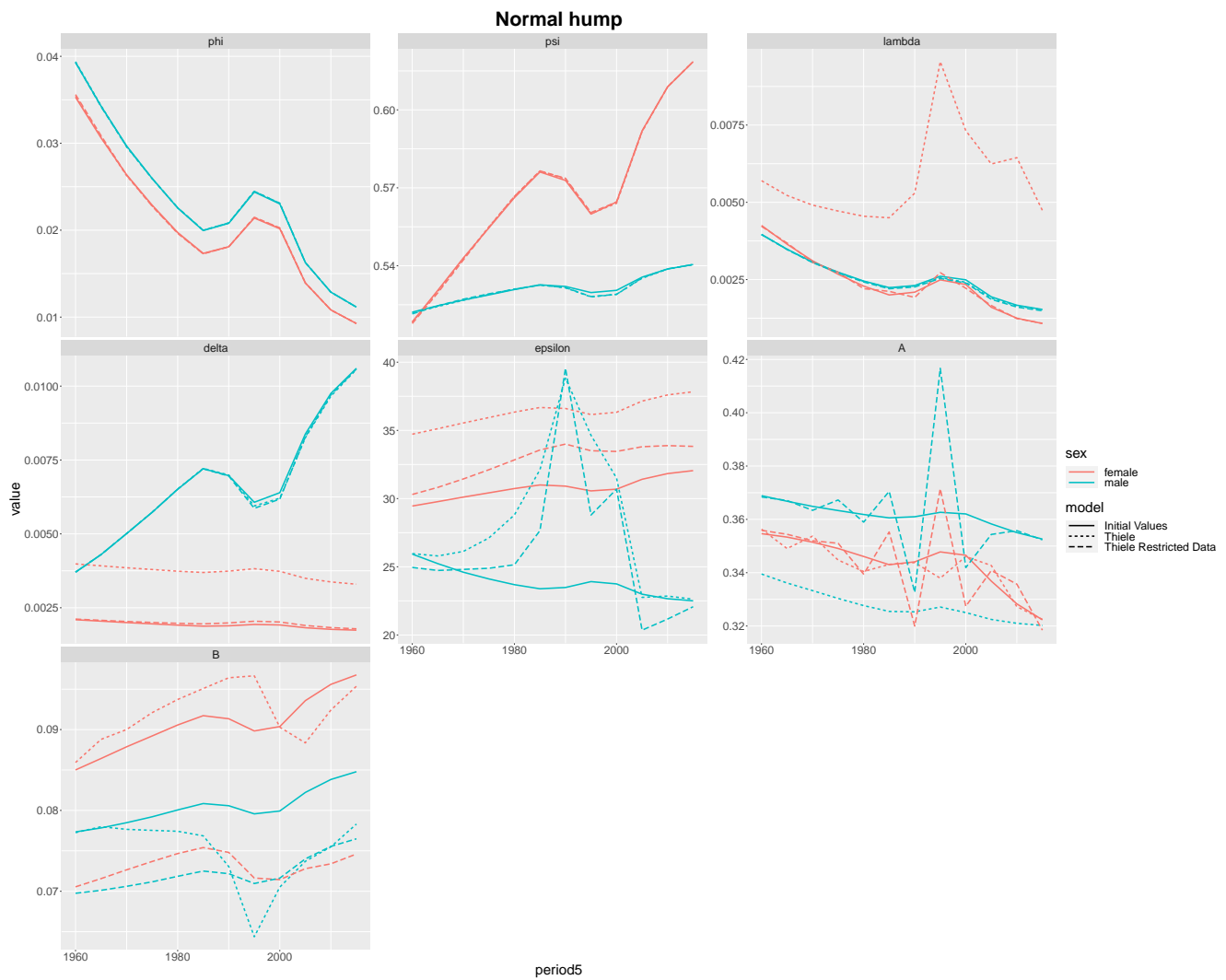


Figure 1: Estimated parameters

```
## Using Sex as id variables
## Using Sex as id variables

## Warning: Removed 4 rows containing missing values (geom_point).
## Warning: Removed 4 rows containing missing values (geom_point).
## Warning: Removed 4 rows containing missing values (geom_point).
## Warning: Removed 4 rows containing missing values (geom_point).
## Warning: Removed 4 rows containing missing values (geom_point).
```

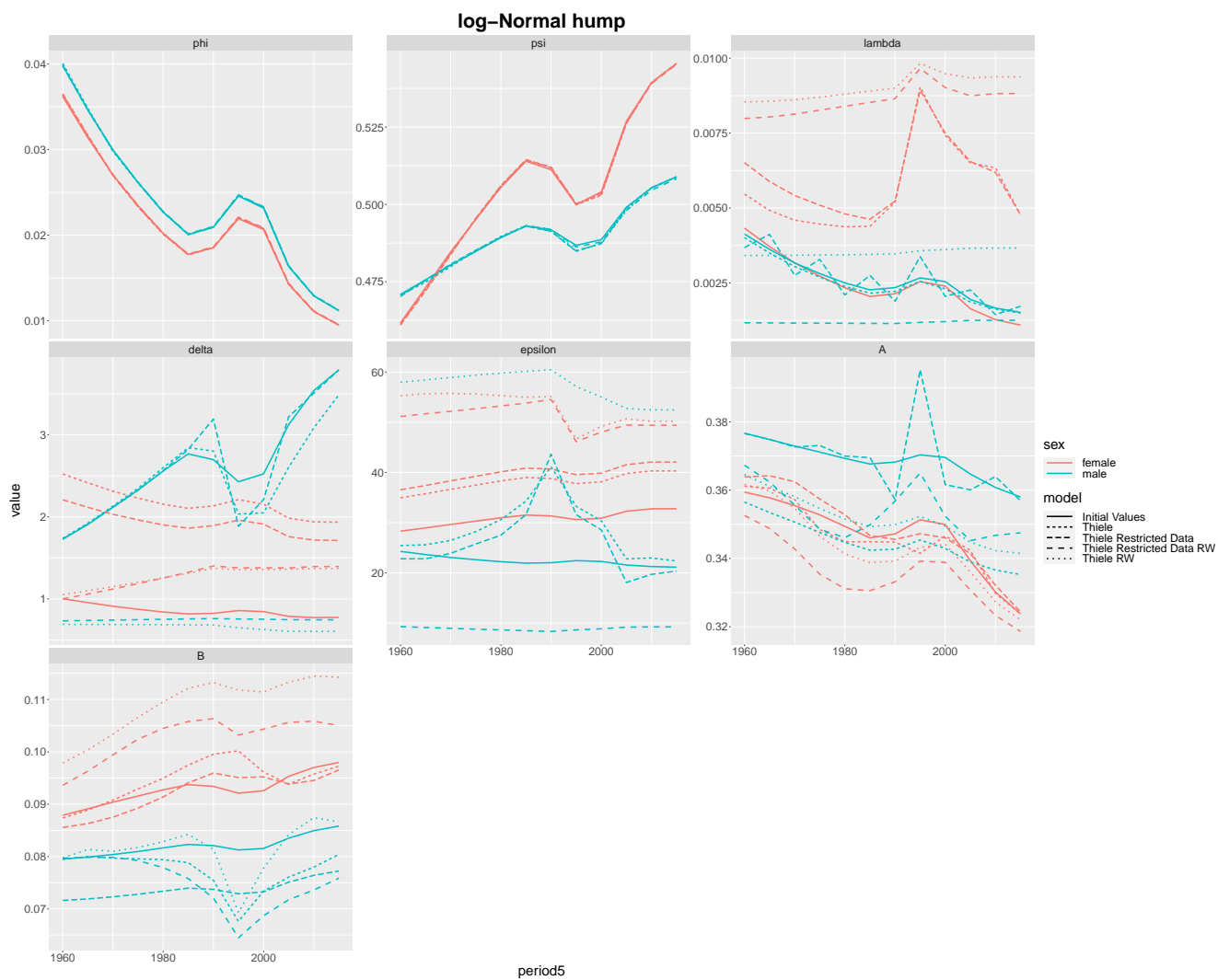


Figure 2: Estimated parameters

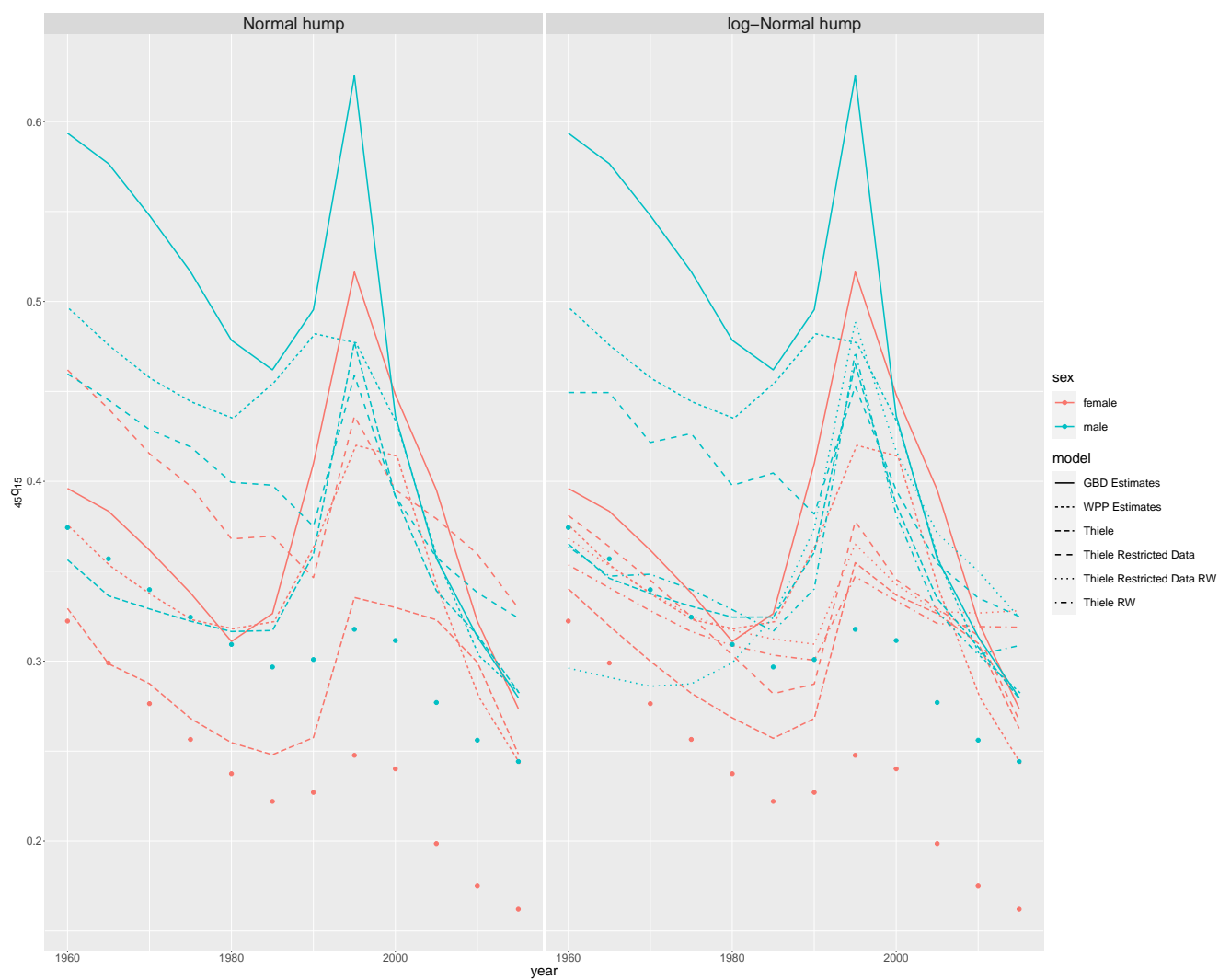


Figure 3: Estimated  $_{45}q_{15}$

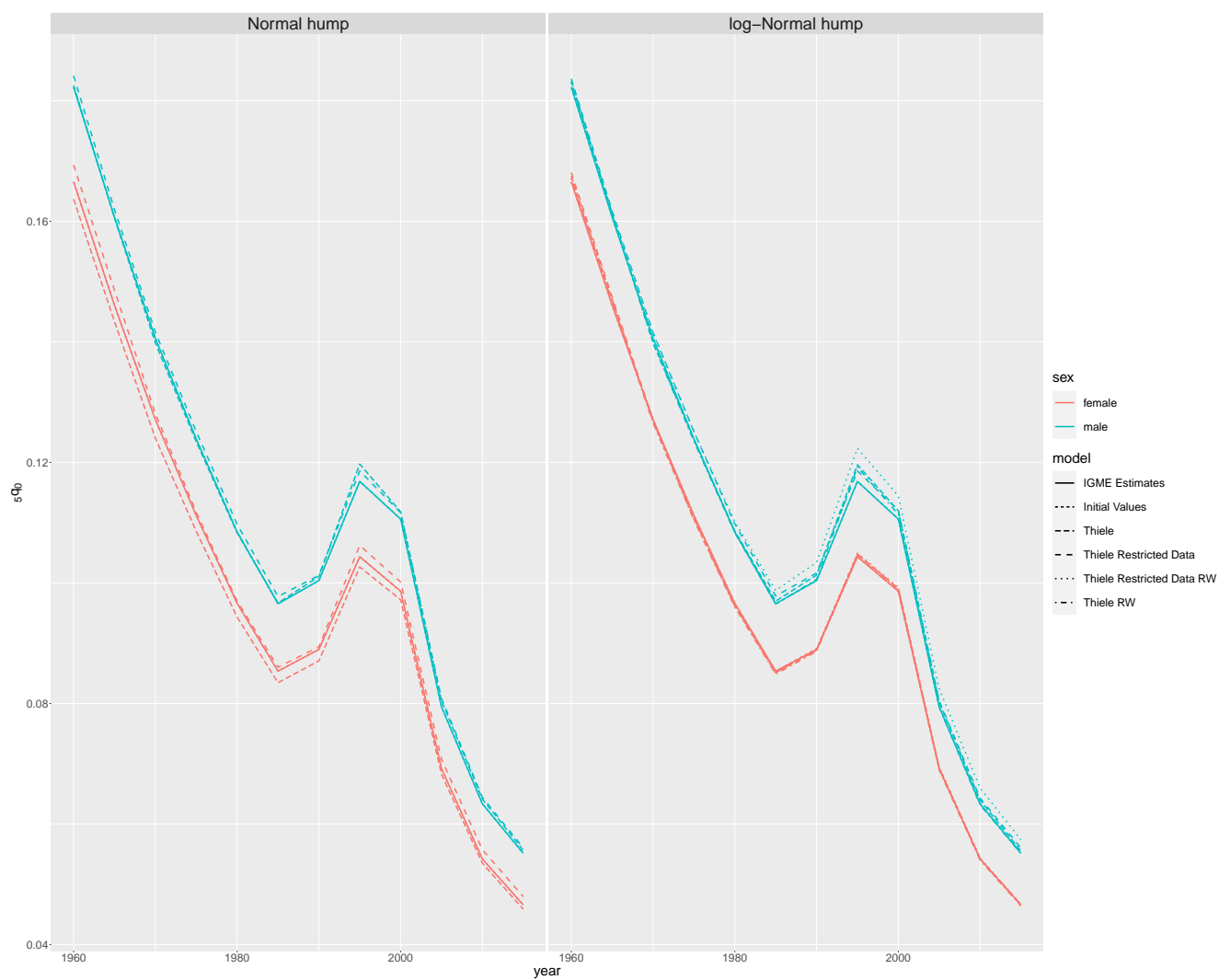


Figure 4: Estimated  ${}_5q_0$

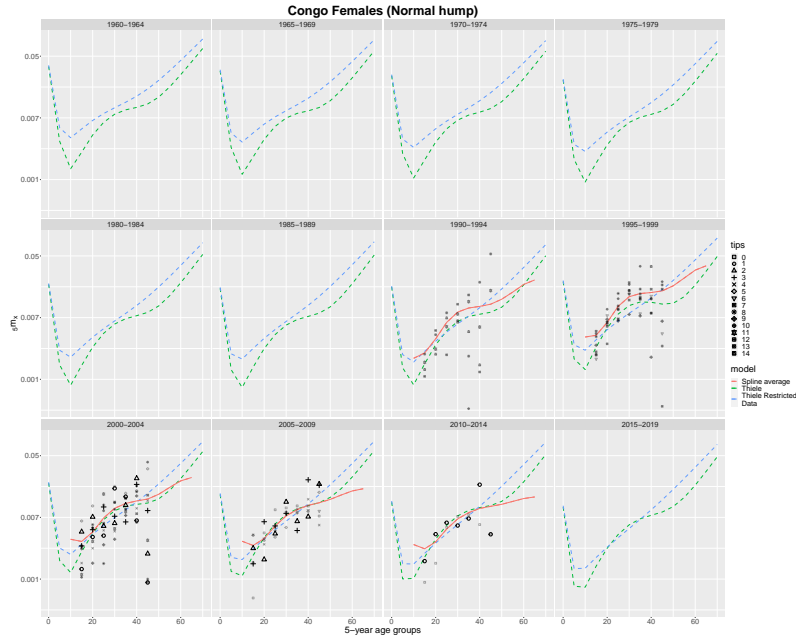


Figure 5: Mortality Schedules

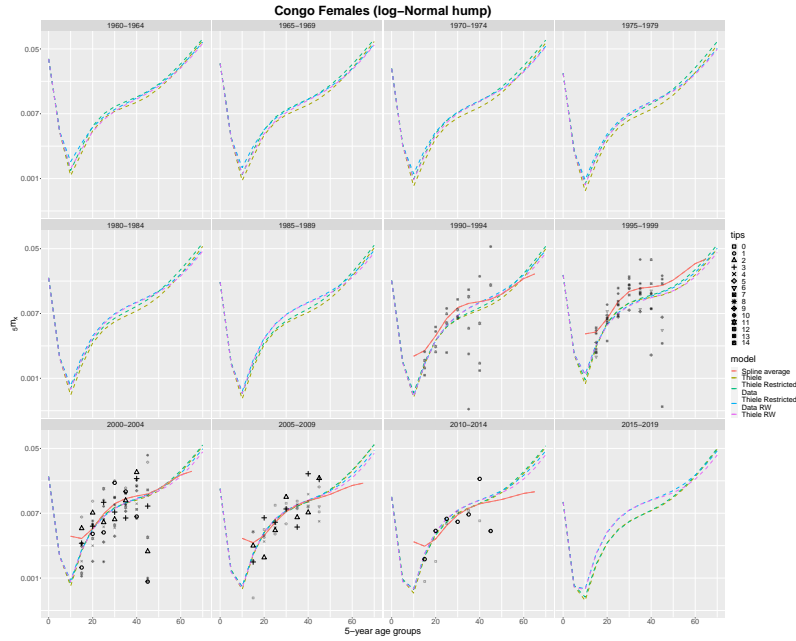


Figure 6: Mortality Schedules

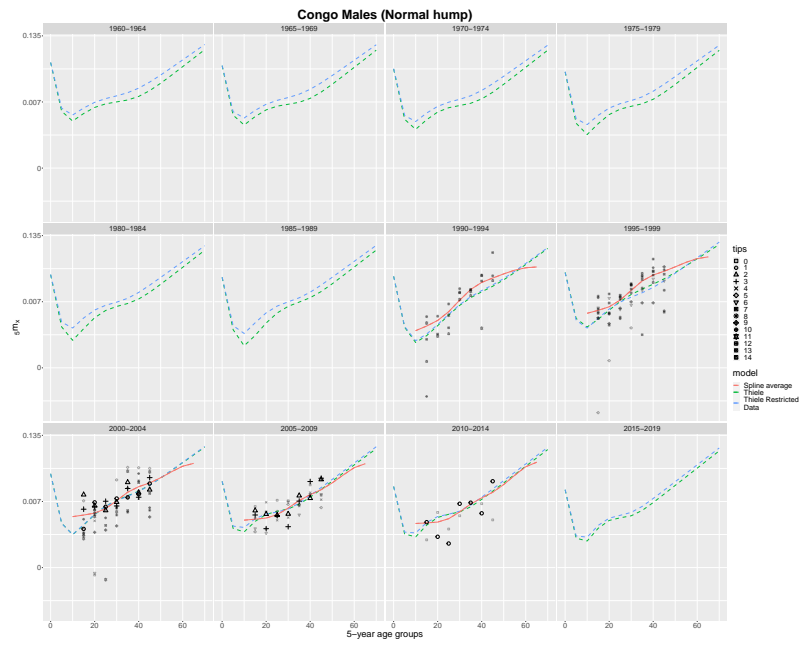


Figure 7: Mortality Schedules

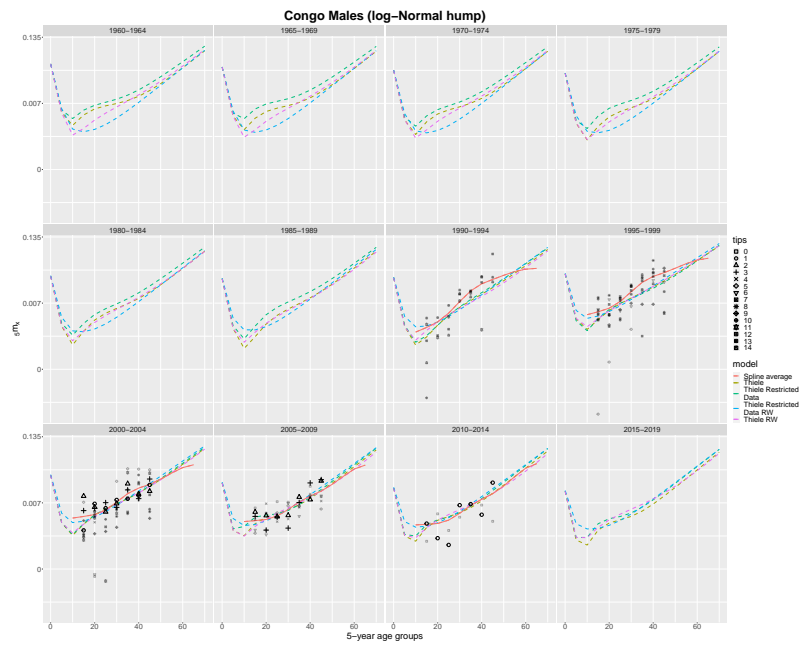


Figure 8: Mortality Schedules

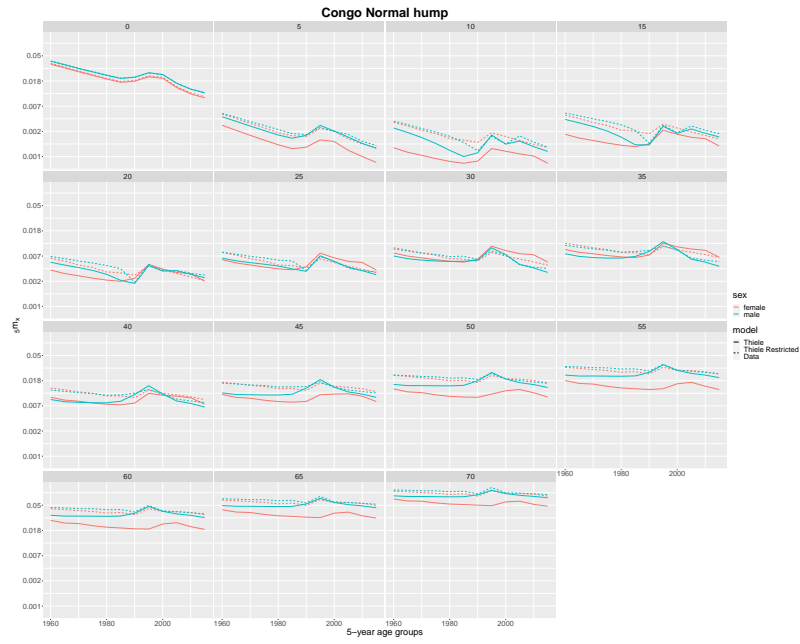


Figure 9: Mortality Schedules

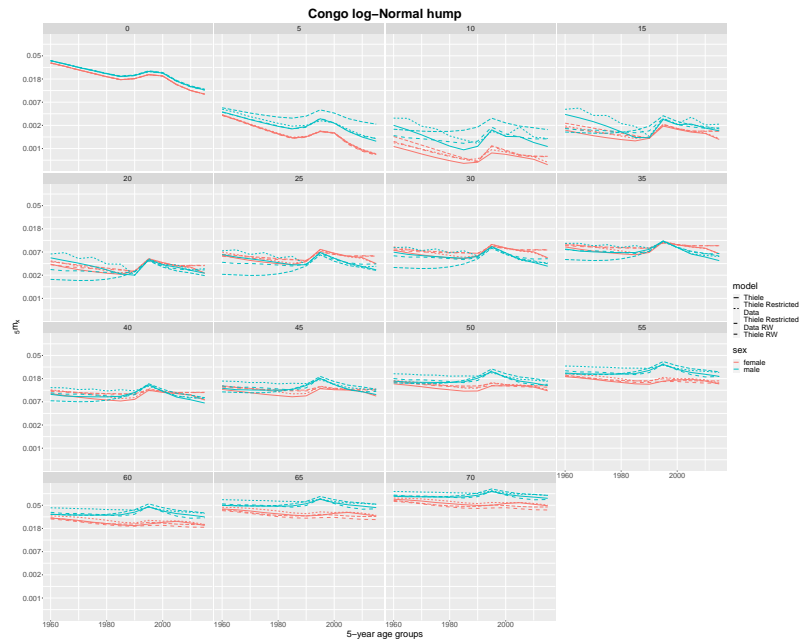


Figure 10: Mortality Schedules



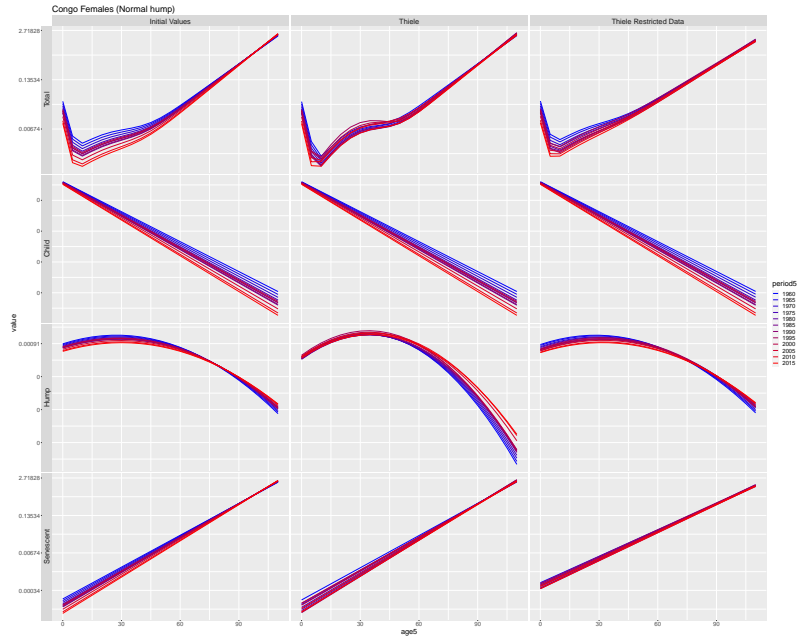


Figure 11: Thiele Decomposed

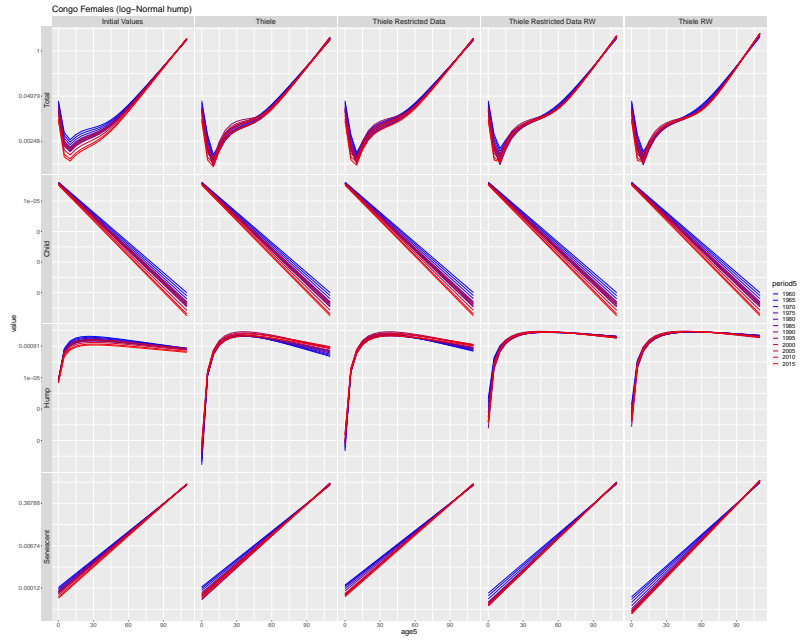


Figure 12: Thiele Decomposed

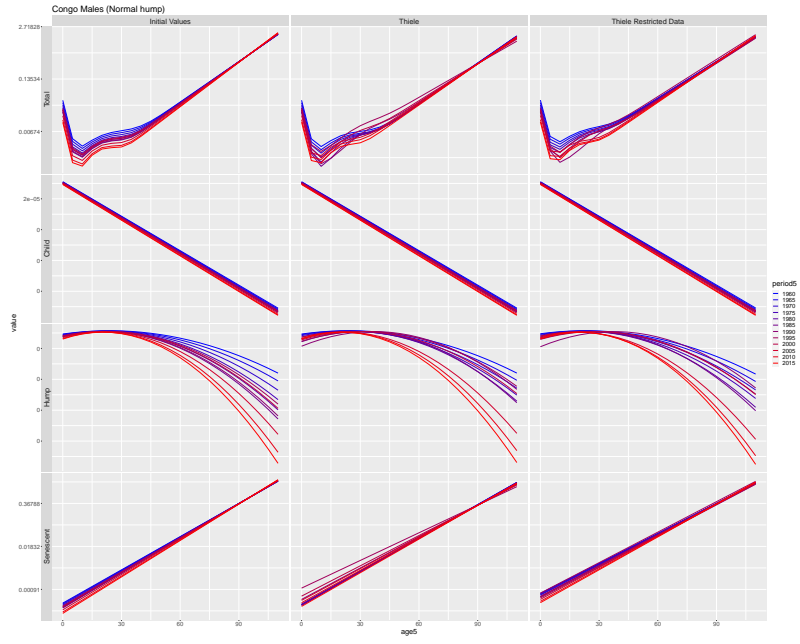


Figure 13: Thiele Decomposed

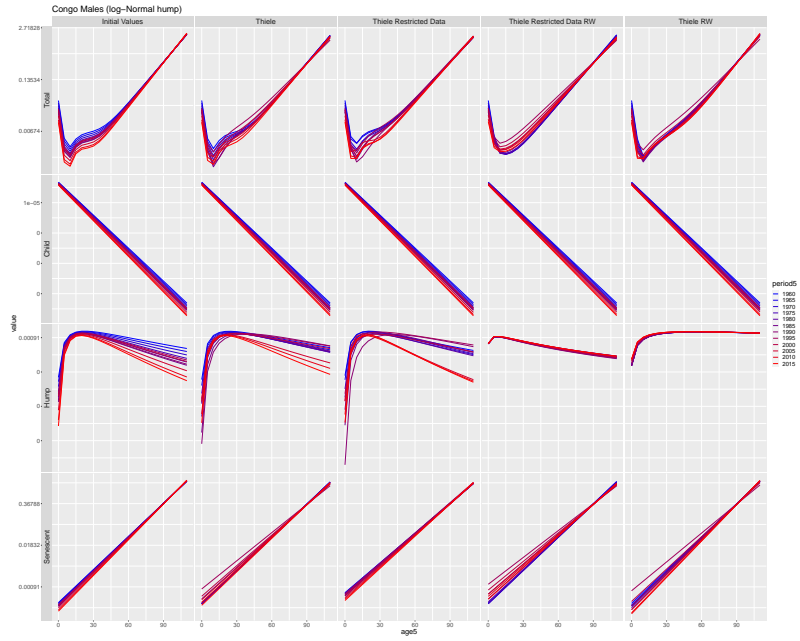


Figure 14: Thiele Decomposed

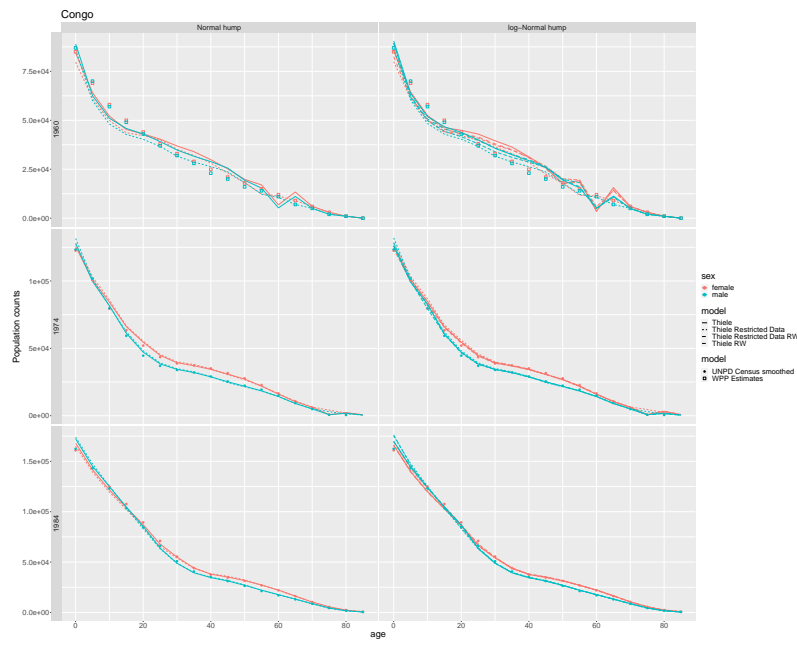


Figure 15: Population

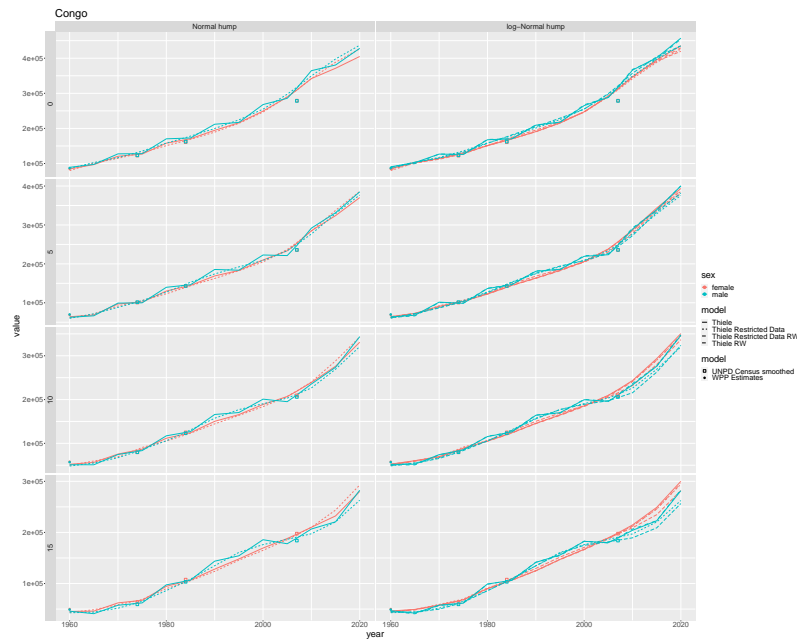


Figure 16: Population

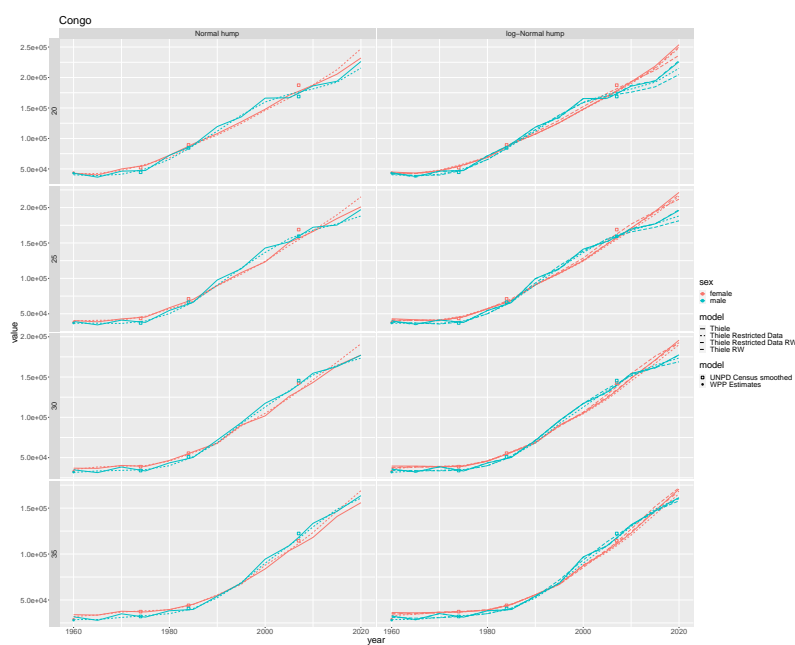


Figure 17: Population

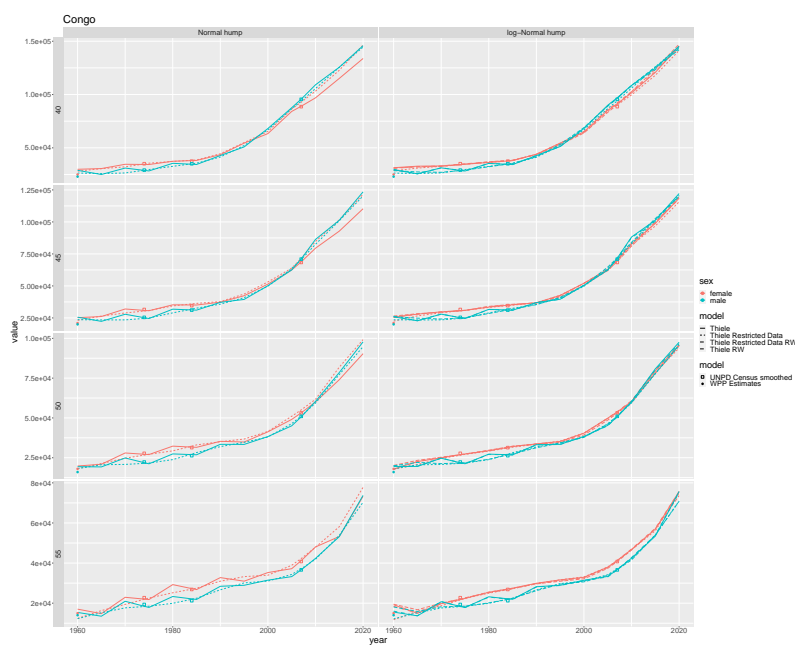


Figure 18: Population



Figure 19: Population

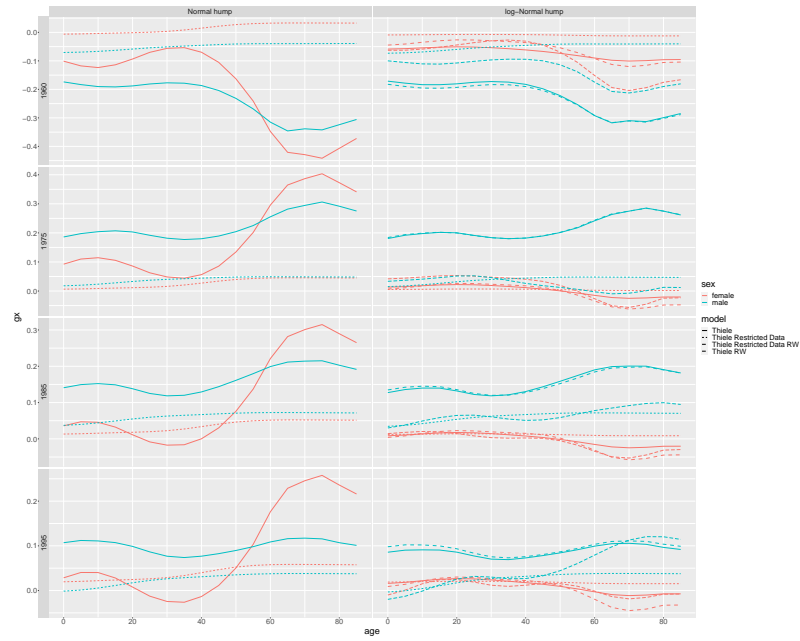


Figure 20: Migration

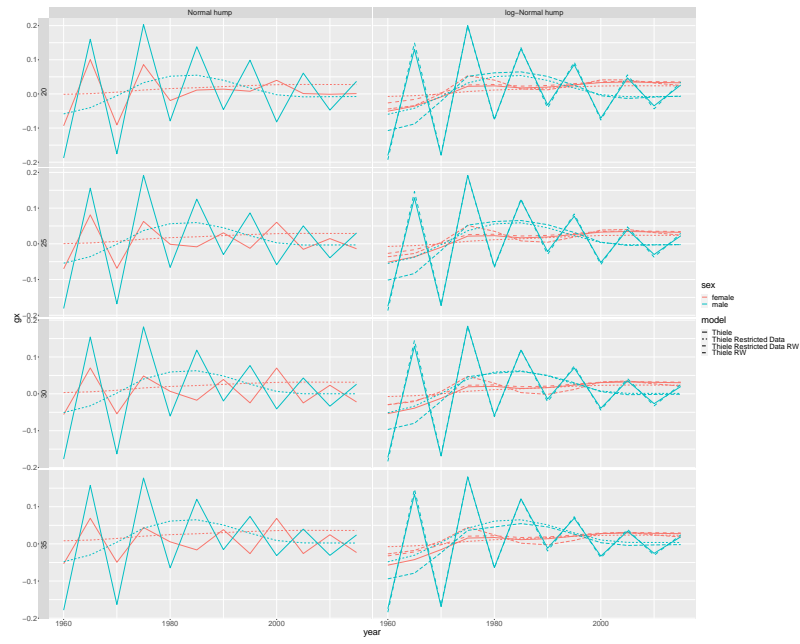


Figure 21: Migration

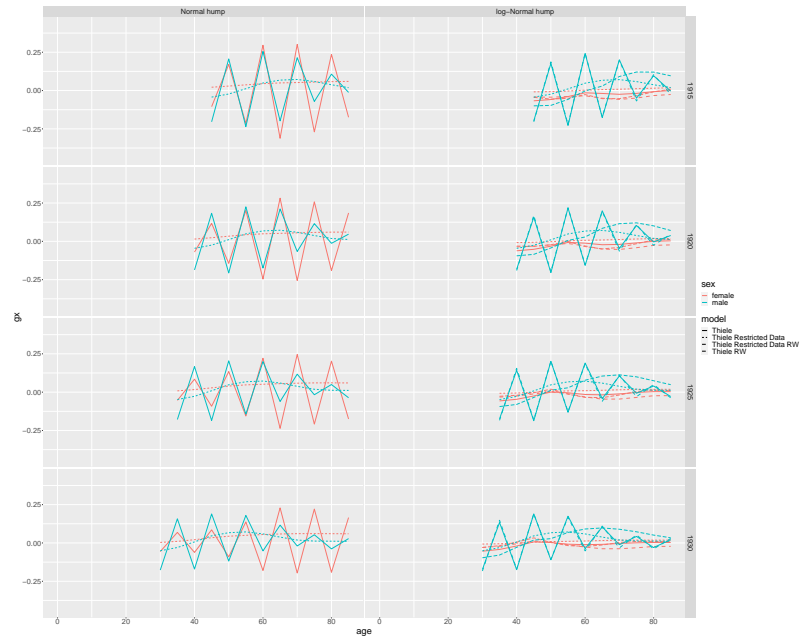


Figure 22: Migration

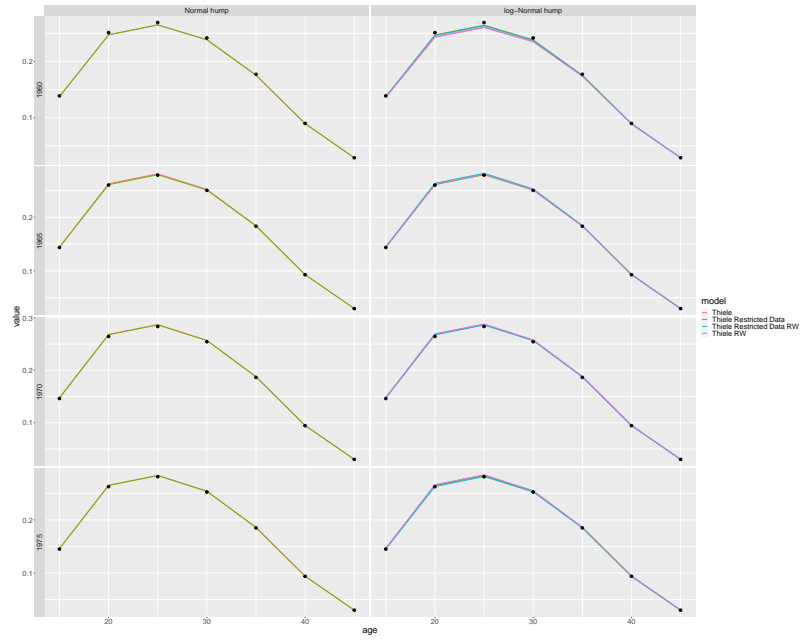


Figure 23: Fertility

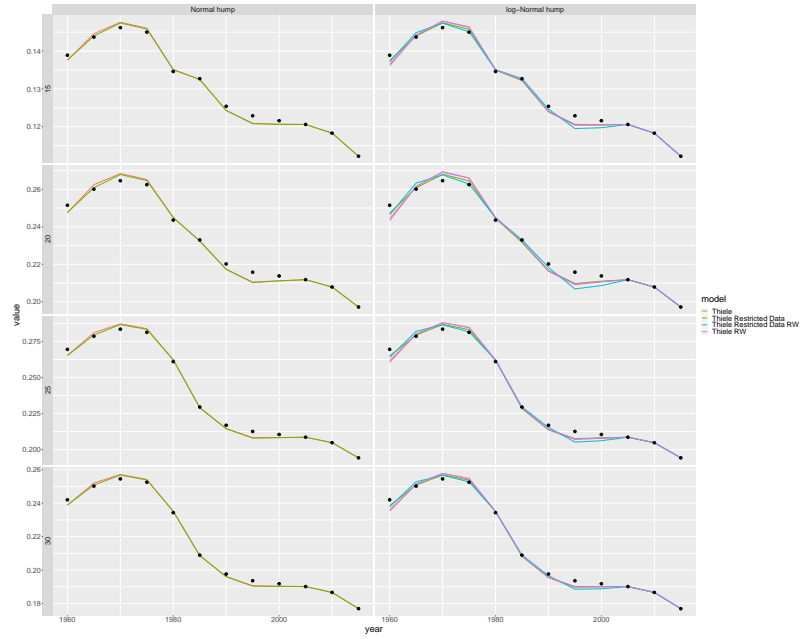


Figure 24: Fertility