SD Ratio Comparison Across Models

Compiled: 2026-01-26 10:57:34

1 Overview

This report consolidates SD ratios (VB / Gibbs) across all models to identify under-dispersion patterns.

```
##
## Loaded SD ratio data:
```

	Model	Q	beta_0	beta_1	beta_2	tau_e	tau_u	sigma2_e	sigma2_u
1	M0_Q5	5	0.7223769	0.9941207	1.0129195	0.9967462	0.812173747	NA	NA
2	M0_Q10	10	0.8909052	0.9929773	0.9952892	0.9697457	0.845242901	NA	NA
3	M0_Q20	20	0.9623051	0.9943548	0.9854562	0.9626135	0.780612582	NA	NA
4	M0_Q50	50	0.9929612	0.9932348	0.9846066	0.9082864	0.665672557	NA	NA
5	M0_Q100	100	1.0006355	0.9988270	0.9839550	0.7973053	0.138197445	NA	NA
6	M1	NA	0.9997383	0.9934317	0.9884475	0.9938314	NA	NA	NA
7	M2_Q5	5	0.7230191	0.9916726	1.0136010	0.9957149	0.803179851	NA	NA
8	M2_Q10	10	0.8892603	0.9977013	0.9940343	0.9697752	0.849786661	NA	NA
9	M2_Q20	20	0.9605049	0.9927109	0.9878023	0.9618716	0.800732598	NA	NA
10	M2_Q50	50	0.9920305	0.9975943	0.9852410	0.9134392	0.657739736	NA	NA
11	M2_Q100	100	0.9941420	1.0004295	0.9855974	0.8025980	0.371653519	NA	NA
12	M3_Q5	5	1.1141307	1.0494022	1.0469197	NA	0.982063697	NA	NA
13	M3_Q10	10	1.2598482	0.8906916	0.8676154	NA	0.001820589	NA	NA
14	M3_Q20	20	0.9813171	0.9484389	0.8847091	NA	0.344224933	NA	NA
15	M3_Q50	50	1.0033412	0.8140315	0.7804136	NA	0.107785638	NA	NA
16	M3_Q100	100	0.9299259	0.7906772	0.8311730	NA	0.172263848	NA	NA

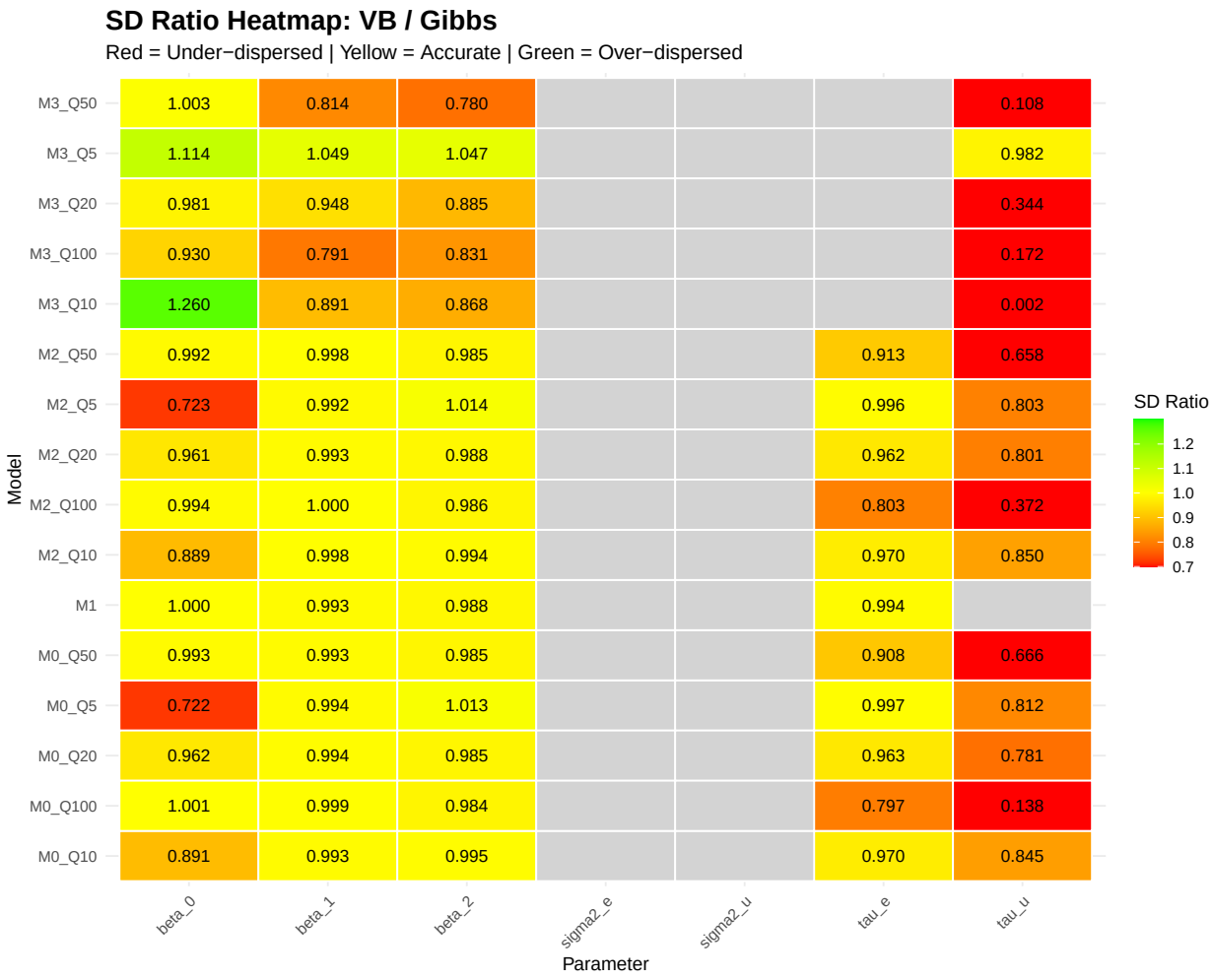
SD Ratios: VB / Gibbs

Values < 1 indicate under-dispersion

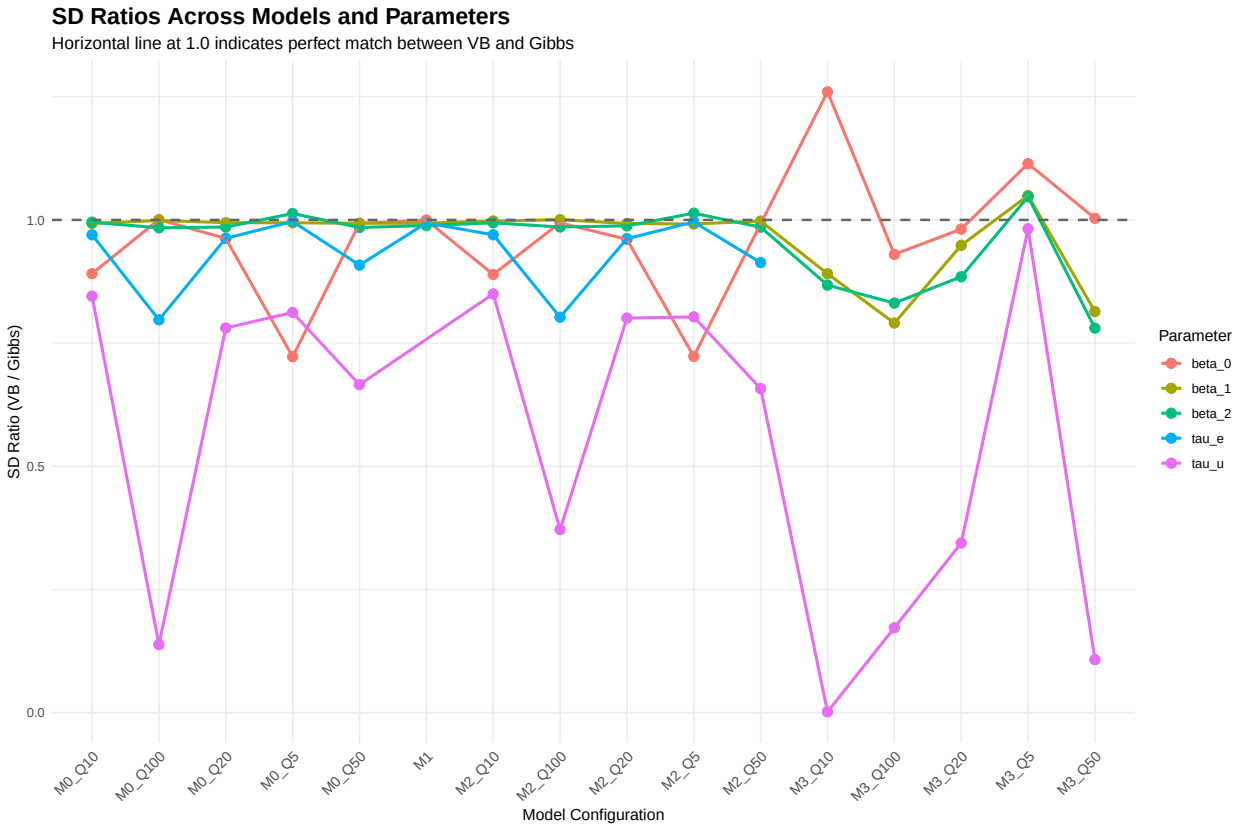
Model	Q	beta_0	beta_1	beta_2	tau_e	tau_u	sigma2_e	sigma2_u
M0_Q5	5	0.722	0.994	1.013	0.997	0.812	NA	NA
M0_Q10	10	0.891	0.993	0.995	0.970	0.845	NA	NA
M0_Q20	20	0.962	0.994	0.985	0.963	0.781	NA	NA
M0_Q50	50	0.993	0.993	0.985	0.908	0.666	NA	NA
M0_Q100	100	1.001	0.999	0.984	0.797	0.138	NA	NA
M1	NA	1.000	0.993	0.988	0.994	NA	NA	NA
M2_Q5	5	0.723	0.992	1.014	0.996	0.803	NA	NA
M2_Q10	10	0.889	0.998	0.994	0.970	0.850	NA	NA
M2_Q20	20	0.961	0.993	0.988	0.962	0.801	NA	NA
M2_Q50	50	0.992	0.998	0.985	0.913	0.658	NA	NA
M2_Q100	100	0.994	1.000	0.986	0.803	0.372	NA	NA
M3_Q5	5	1.114	1.049	1.047	NA	0.982	NA	NA
M3_Q10	10	1.260	0.891	0.868	NA	0.002	NA	NA
M3_Q20	20	0.981	0.948	0.885	NA	0.344	NA	NA
M3_Q50	50	1.003	0.814	0.780	NA	0.108	NA	NA
M3_Q100	100	0.930	0.791	0.831	NA	0.172	NA	NA

2 SD Ratio Table

3 SD Ratio Heatmap



4 SD Ratio Line Plot



5 Summary

```
##
## Summary Statistics Across All Models:
```

```
##   Parameter Mean_SD_Ratio Min_SD_Ratio Max_SD_Ratio N_Models
## 1    beta_0     0.9635276  0.722376863    1.2598482       16
## 2    beta_1     0.9650185  0.790677247    1.0494022       16
## 3    beta_2     0.9579863  0.780413557    1.0469197       16
## 4     tau_e           NaN          Inf         -Inf        0
## 5     tau_u           NaN          Inf         -Inf        0
## 6  sigma2_e     0.9338116  0.797305304    0.9967462       11
## 7  sigma2_u     0.5555434  0.001820589    0.9820637       15
```

```
##   Parameter Mean_SD_Ratio Min_SD_Ratio Max_SD_Ratio N_Models
## 1    beta_0         0.964        0.722        1.260       16
## 2    beta_1         0.965        0.791        1.049       16
## 3    beta_2         0.958        0.780        1.047       16
## 4     tau_e           NaN          Inf         -Inf        0
## 5     tau_u           NaN          Inf         -Inf        0
## 6  sigma2_e         0.934        0.797        0.997       11
## 7  sigma2_u         0.556        0.002        0.982       15
```

```
##
##
## Interpretation:
```

```
## - SD Ratio < 1.0: VB under-dispersed (narrower uncertainty)
```

```
## - SD Ratio  1.0: VB matches Gibbs
```

```
## - SD Ratio > 1.0: VB over-dispersed (wider uncertainty)
```