

Appendix A: MML Results from Simulation 1

Appendix A demonstrates Simulation 1 results when we fit models via MML, instead of PML. The figures are arranged in the same way as those in the Simulation 1 results section. Figures 1 and 2 display power differences among statistics. Figures 3 and 4 display power differences among sample sizes. Results are similar to those observed for PML.

Figure 1. Simulated power curves for $\max LM_o$, WDM_o , and LM_{uo} across three levels of the ordinal variable m and measurement invariance violations of 0–4 standard errors (scaled by \sqrt{n}), estimated by MML. The parameter violating measurement invariance is α_3 . $n = 960$. Panel labels denote the parameter(s) being tested and the number of levels of the ordinal variable m .

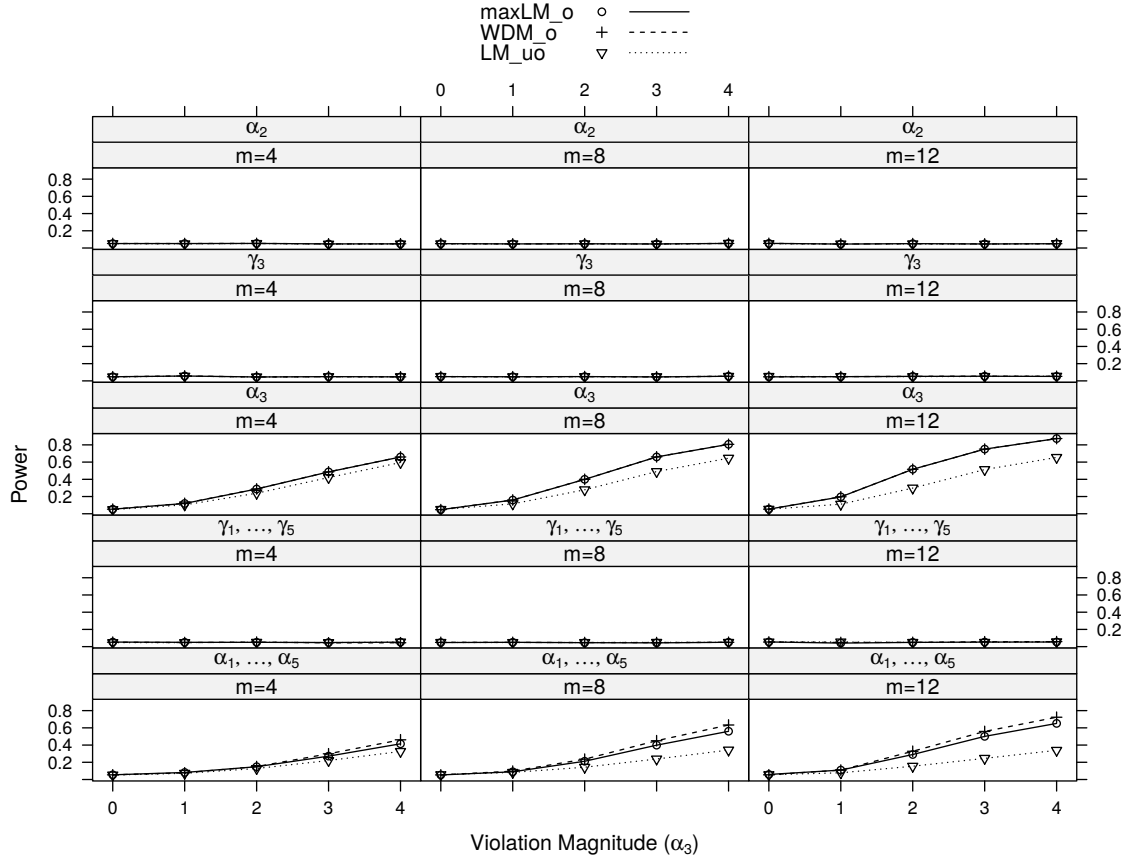


Figure 2. Simulated power curves for $\max LM_o$, WDM_o , and LM_{uo} across three levels of the ordinal variable m and measurement invariance violations of 0–4 standard errors (scaled by \sqrt{n}), estimated by MML. The parameter violating measurement invariance is γ_3 . $n = 960$. Panel labels denote the parameter(s) being tested and the number of levels of the ordinal variable m .

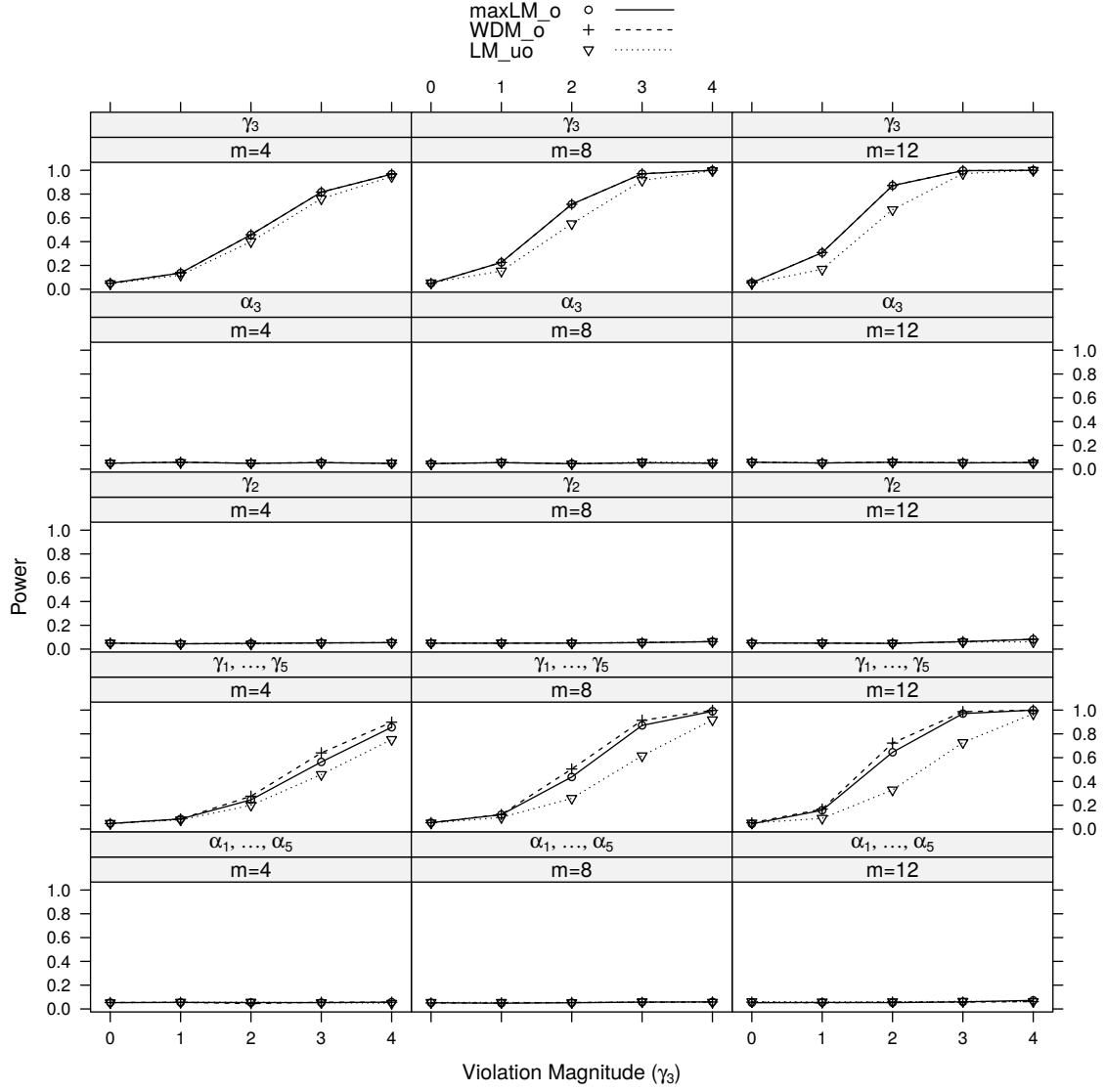


Figure 3. Simulated power curves for sample sizes $n = 120, 480$ and 960 of test statistic WDM_o , across three levels of the ordinal variable m and measurement invariance violations of 0–4 standard errors (scaled by \sqrt{n}), estimated by MML. The parameter violating measurement invariance is α_3 . Panel labels denote the parameter(s) being tested and the number of levels of the ordinal variable m .

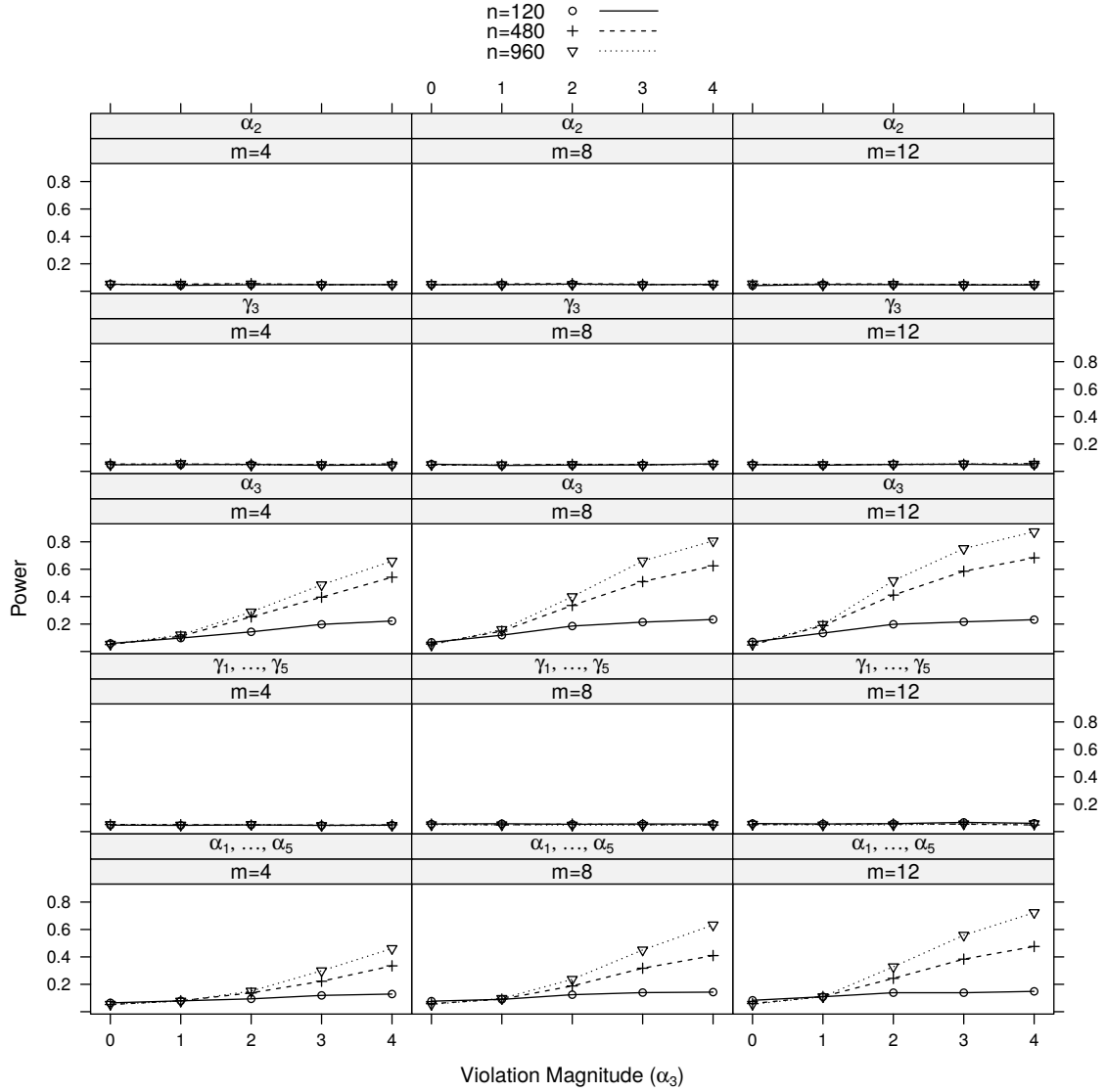
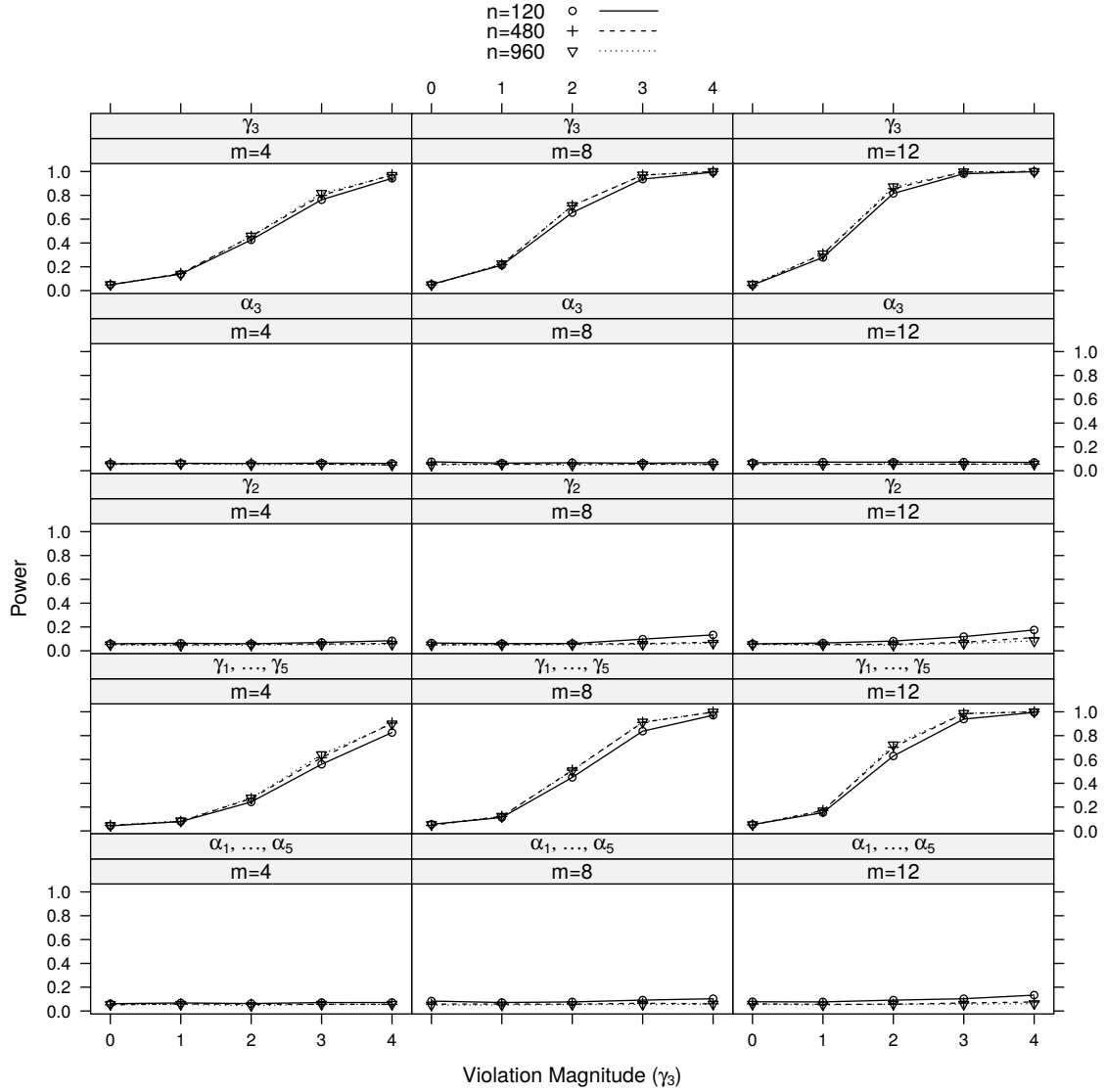


Figure 4. Simulated power curves for sample sizes $n = 120, 480$ and 960 of test statistic WDM_o , across three levels of the ordinal variable m and measurement invariance violations of 0–4 standard errors (scaled by \sqrt{n}), estimated by MML. The parameter violating measurement invariance is γ_3 . Panel labels denote the parameter(s) being tested and the number of levels of the ordinal variable m .



Appendix B: Simulation 2.2 Results

Appendix B demonstrates Simulation 2.2 results. The figures are arranged in the same way as those in the Simulation 2.1 results section. Figures 5 and 6 display power differences among statistics. Results are similar to those observed in Simulation 2.1.

Figure 5. Simulation 2.2. Simulated power curves for $\max LM_o$, WDM_o , and LM_{uo} across measurement invariance violations of 0–4 standard errors (scaled by \sqrt{n}), estimated by PML (fitting multiple-group two-parameter model, with person abilities change in the generation model). The parameter violating measurement invariance is α_3 . The number of categories is $m = 8$. Panel labels denote the parameter(s) being tested and sample size.

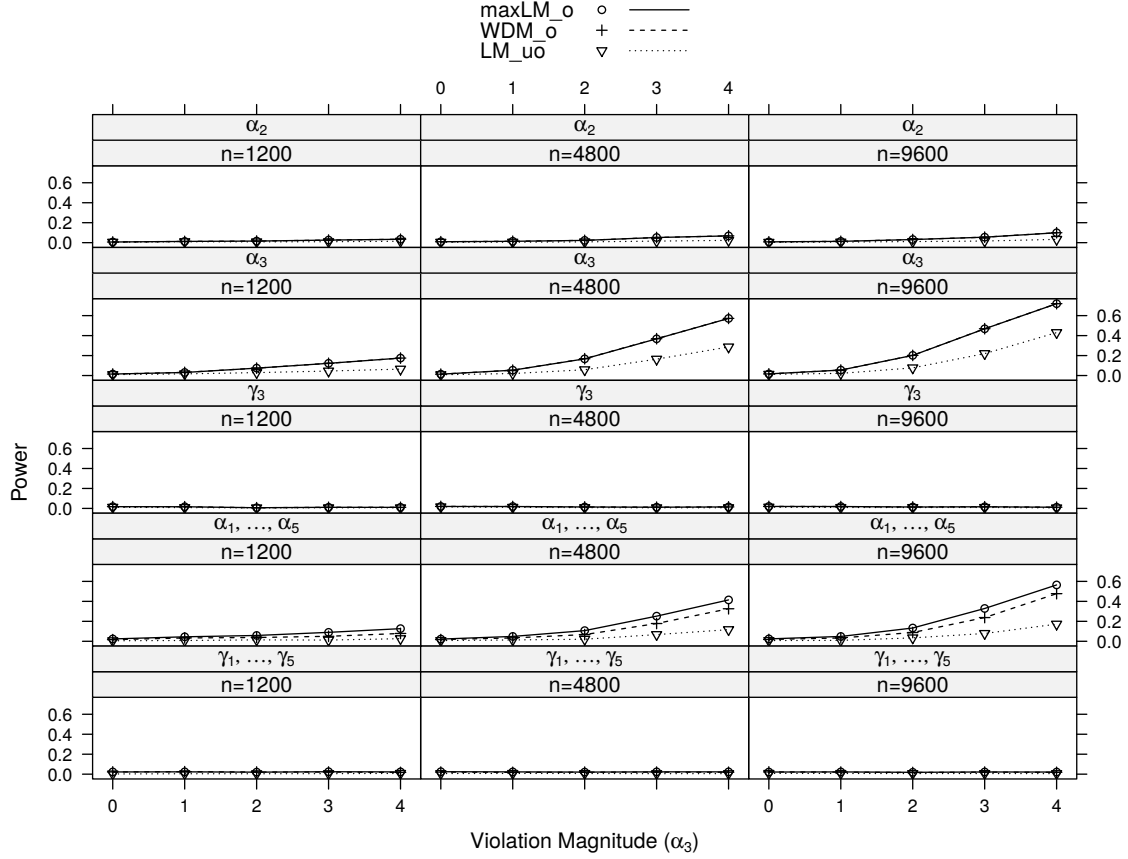


Figure 6. Simulation 2.2. Simulated power curves for $\max LM_o$, WDM_o , and LM_{uo} across measurement invariance violations of 0–4 standard errors (scaled by \sqrt{n}), estimated by PML (fitting multiple-group two-parameter model, with person abilities change in the generation model). The parameter violating measurement invariance is γ_3 . The number of categories is $m = 8$. Panel labels denote the parameter(s) being tested and sample size.

