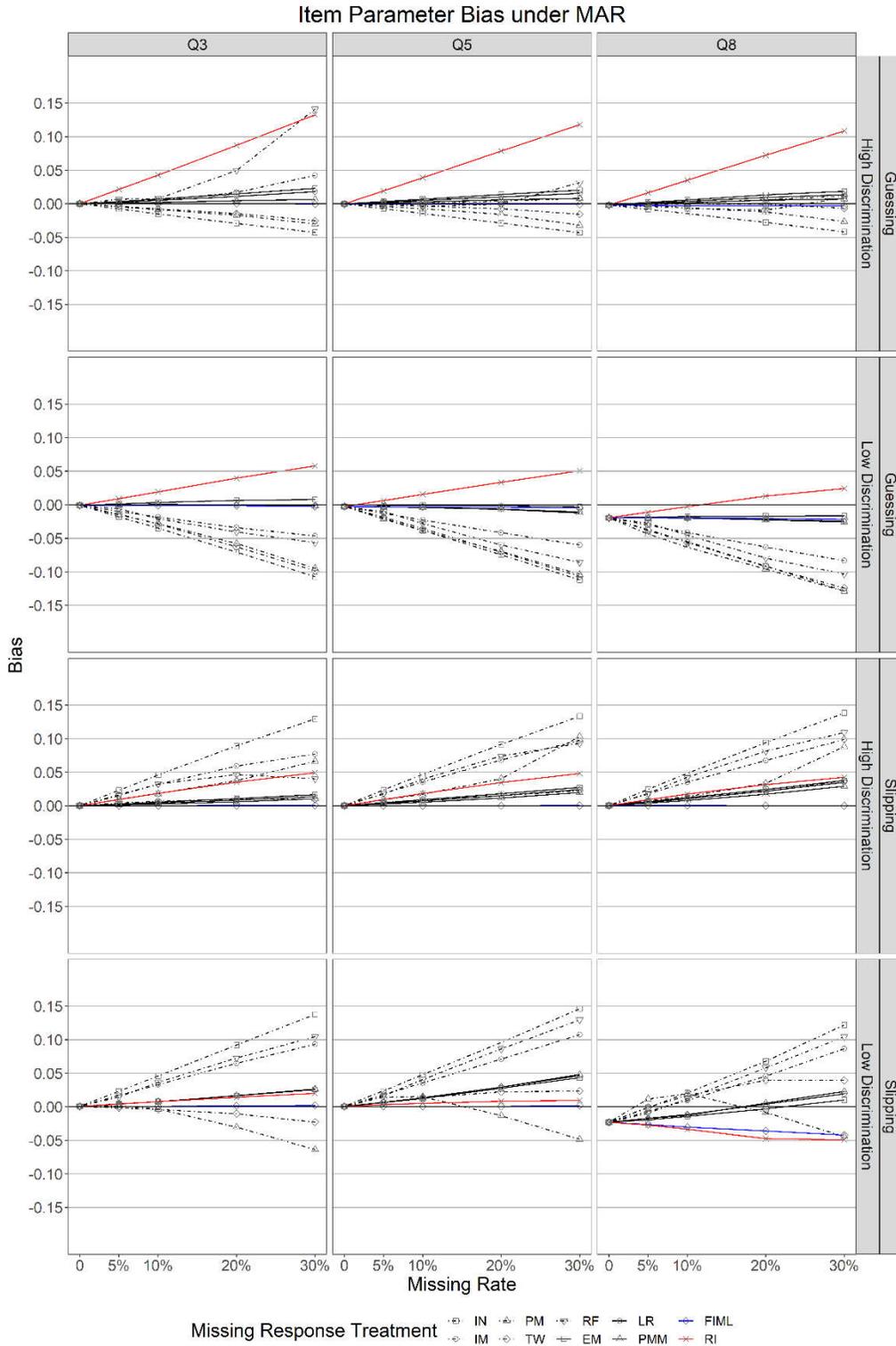


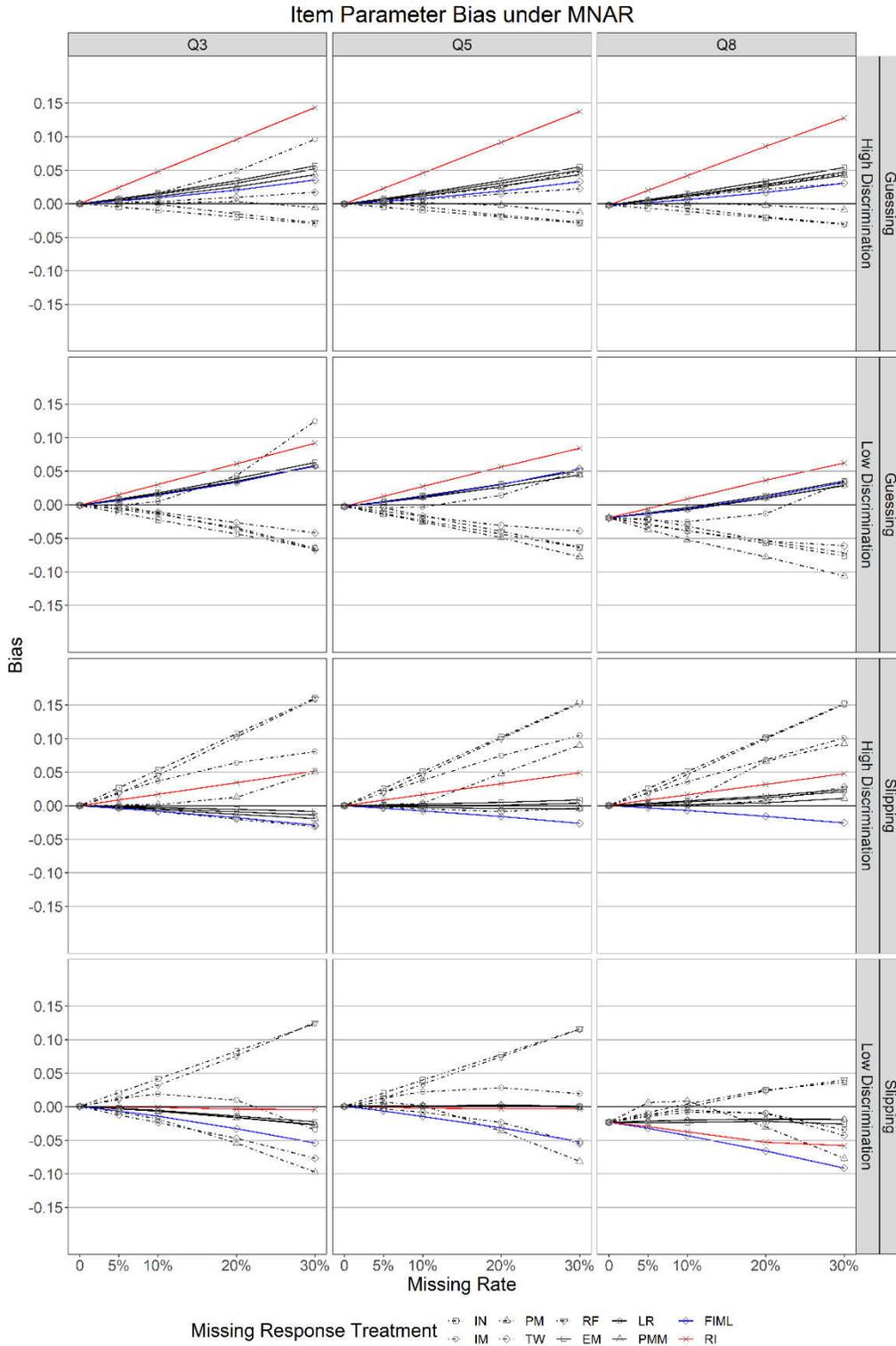
### Supplementary Materials

**Table S1.** Example Contingency Table of An Item for Generating the MIXED Type of Missingness

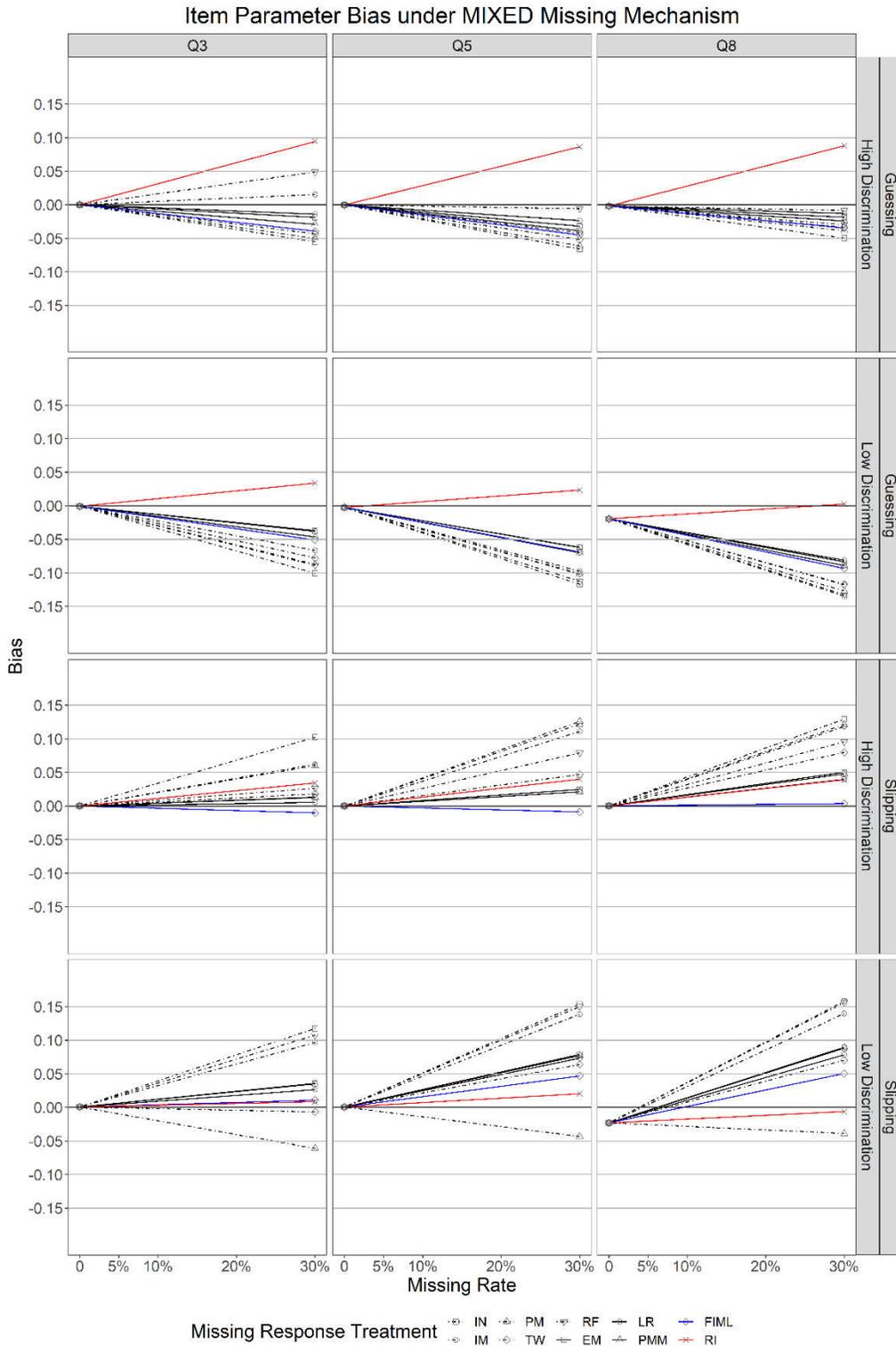
Ability Fractiles	Total Score Range	Contingency Table 1			Contingency Table 2		
		# Missing	# Incorrect	Relative Frequency of Missing	# Missing	# Correct	Relative Frequency of Missing
1	0-4	10	10	0.50	10	2	0.83
2	5-9	178	221	0.45	178	2	0.99
3	10-14	461	712	0.39	461	67	0.87
4	15-19	384	711	0.35	384	280	0.58
5	20-24	137	346	0.28	137	380	0.26
6	25-29	31	121	0.20	31	247	0.11
7	30-34	2	15	0.12	2	48	0.04



**Figure S1.** Bias of item parameter estimations under the MAR mechanism. Columns of Q3, Q5, and Q8 present results for Q-matrices with 3, 5, and 8 attributes, while rows refer to results across high and low discriminations for both guessing and slipping parameters.



**Figure S2.** Bias of item parameter estimations under the MNAR mechanism. Columns of Q3, Q5, and Q8 present results for Q-matrices with 3, 5, and 8 attributes, while rows refer to results across high and low discriminations for both guessing and slipping parameters.



**Figure S3.** Bias of item parameter estimations under the MIXED missing mechanism. Columns of Q3, Q5, and Q8 present results for Q-matrices with 3, 5, and 8 attributes, while rows refer to results across high and low discriminations for both guessing and slipping parameters.