

Table 1: Performance of ATE estimators under model misspecifications across mediator types.

|        |          | TMLEs                    |        |        |                              |        |        |                          |        |        | One-step estimators          |        |        |                              |        |        |                              |        |        |
|--------|----------|--------------------------|--------|--------|------------------------------|--------|--------|--------------------------|--------|--------|------------------------------|--------|--------|------------------------------|--------|--------|------------------------------|--------|--------|
|        |          | <i>Univariate Binary</i> |        |        | <i>Univariate Continuous</i> |        |        | <i>Univariate Binary</i> |        |        | <i>Univariate Continuous</i> |        |        | <i>Univariate Continuous</i> |        |        | <i>Univariate Continuous</i> |        |        |
|        |          | $\psi_1(\hat{Q}^*)$      |        |        | $\psi_{2a}(\hat{Q}^*)$       |        |        | $\psi_{2b}(\hat{Q}^*)$   |        |        | $\psi_1^+(\hat{Q})$          |        |        | $\psi_{2a}^+(\hat{Q})$       |        |        | $\psi_{2b}^+(\hat{Q})$       |        |        |
|        |          | Linear                   | SL     | CF     | Linear                       | SL     | CF     | Linear                   | SL     | CF     | Linear                       | SL     | CF     | Linear                       | SL     | CF     | Linear                       | SL     | CF     |
| n=500  | Bias     | -0.016                   | -0.001 | -0.01  | -0.081                       | -0.02  | -0.037 | -0.081                   | -0.016 | -0.038 | -0.017                       | -0.008 | -0.005 | -0.081                       | -0.021 | -0.039 | -0.081                       | -0.016 | -0.037 |
|        | SD       | 0.043                    | 0.05   | 0.071  | 0.099                        | 0.123  | 0.128  | 0.099                    | 0.116  | 0.123  | 0.043                        | 0.048  | 0.183  | 0.099                        | 0.128  | 0.133  | 0.099                        | 0.115  | 0.126  |
|        | MSE      | 0.002                    | 0.003  | 0.005  | 0.016                        | 0.016  | 0.018  | 0.016                    | 0.014  | 0.016  | 0.002                        | 0.002  | 0.033  | 0.016                        | 0.017  | 0.019  | 0.016                        | 0.014  | 0.017  |
|        | Coverage | 84.2%                    | 83.2%  | 82.8%  | 85.5%                        | 97%    | 96.8%  | 85.5%                    | 91.5%  | 91.8%  | 83.1%                        | 80%    | 81.5%  | 85.5%                        | 96.8%  | 96.5%  | 85.5%                        | 91.4%  | 91.4%  |
|        | CI width | 0.161                    | 0.154  | 0.172  | 0.398                        | 0.567  | 0.596  | 0.399                    | 0.398  | 0.444  | 0.158                        | 0.143  | 0.176  | 0.399                        | 0.56   | 0.589  | 0.399                        | 0.397  | 0.444  |
| n=1000 | Bias     | -0.018                   | -0.003 | -0.008 | -0.081                       | -0.012 | -0.027 | -0.081                   | -0.009 | -0.023 | -0.018                       | -0.006 | -0.008 | -0.081                       | -0.013 | -0.029 | -0.081                       | -0.009 | -0.023 |
|        | SD       | 0.03                     | 0.035  | 0.035  | 0.074                        | 0.088  | 0.089  | 0.074                    | 0.088  | 0.089  | 0.03                         | 0.034  | 0.035  | 0.074                        | 0.092  | 0.092  | 0.074                        | 0.087  | 0.089  |
|        | MSE      | 0.001                    | 0.001  | 0.001  | 0.012                        | 0.008  | 0.009  | 0.012                    | 0.008  | 0.008  | 0.001                        | 0.001  | 0.001  | 0.012                        | 0.009  | 0.009  | 0.012                        | 0.008  | 0.008  |
|        | Coverage | 81.5%                    | 87.3%  | 85.3%  | 74.6%                        | 98.2%  | 97.2%  | 74.6%                    | 90.1%  | 89.9%  | 80.8%                        | 83.6%  | 84.2%  | 74.6%                        | 96.8%  | 96.6%  | 74.6%                        | 90.3%  | 89.8%  |
|        | CI width | 0.111                    | 0.113  | 0.117  | 0.282                        | 0.403  | 0.416  | 0.282                    | 0.293  | 0.311  | 0.109                        | 0.106  | 0.11   | 0.282                        | 0.4    | 0.412  | 0.282                        | 0.292  | 0.31   |
| n=2000 | Bias     | -0.018                   | -0.002 | -0.005 | -0.084                       | -0.008 | -0.019 | -0.084                   | -0.005 | -0.016 | -0.018                       | -0.004 | -0.005 | -0.084                       | -0.008 | -0.018 | -0.084                       | -0.005 | -0.016 |
|        | SD       | 0.02                     | 0.023  | 0.024  | 0.05                         | 0.06   | 0.059  | 0.05                     | 0.06   | 0.059  | 0.02                         | 0.023  | 0.023  | 0.05                         | 0.062  | 0.061  | 0.05                         | 0.06   | 0.059  |
|        | MSE      | 0.001                    | 0.001  | 0.001  | 0.01                         | 0.004  | 0.004  | 0.01                     | 0.004  | 0.004  | 0.001                        | 0.001  | 0.001  | 0.01                         | 0.004  | 0.004  | 0.01                         | 0.004  | 0.004  |
|        | Coverage | 76.9%                    | 89.7%  | 88.4%  | 60.5%                        | 97.9%  | 98%    | 60.4%                    | 92.2%  | 92.5%  | 75.4%                        | 87.2%  | 87.4%  | 60.5%                        | 97.3%  | 97.6%  | 60.4%                        | 92.1%  | 92.3%  |
|        | CI width | 0.077                    | 0.083  | 0.084  | 0.198                        | 0.288  | 0.293  | 0.198                    | 0.214  | 0.222  | 0.076                        | 0.079  | 0.081  | 0.198                        | 0.286  | 0.291  | 0.198                        | 0.213  | 0.221  |