**APPENDIX**

Table A1: The risks of the proposed estimators based on *m*=6, and *ni*=10.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *μ* | *τ* |  $R(G,\hat{γ}\_{m}^{B})$ | $R(G,\hat{γ}\_{m}^{EB})$  | $R(G,\tilde{γ}\_{m}^{B})$  | $$R(G,\tilde{γ}\_{m}^{EB})$$ | $R(G,\overbar{Y}\_{m})$  |
| 1 | 0.1 | 0.0726 | 0.2548 | 0.0433 | 0.3167 | 0.9539 |
| 1 | 0.5 | 0.2211 | 0.3227 | 0.2242 | 0.4818 | 0.8956 |
| 1 | 1 | 0.3316 | 0.4454 | 0.4884 | 0.6912 | 0.8558 |
| 1 | 1.5 | 0.3443 | 0.4617 | 0.6809 | 0.8507 | 0.9666 |
| 1 | 2 | 0.3464 | 0.4948 | 0.7275 | 0.9155 | 0.8620 |
| 3 | 0.1 | 0.0911 | 0.2353 | 0.0447 | 0.3491 | 0.9286 |
| 3 | 0.5 | 0.2235 | 0.2981 | 0.2287 | 0.4767 | 0.8978 |
| 3 | 1 | 0.3150 | 0.4161 | 0.5202 | 0.7373 | 0.9669 |
| 3 | 1.5 | 0.3634 | 0.4847 | 0.7087 | 0.8806 | 1.0015 |
| 3 | 2 | 0.3845 | 0.4775 | 0.7669 | 0.9049 | 0.9482 |
| 5 | 0.1 | 0.0906 | 0.2138 | 0.0442 | 0.3539 | 0.9718 |
| 5 | 0.5 | 0.2347 | 0.3184 | 0.2248 | 0.4462 | 0.9011 |
| 5 | 1 | 0.3833 | 0.5339 | 0.4637 | 0.7542 | 0.9566 |
| 5 | 1.5 | 0.3357 | 0.4562 | 0.5841 | 0.7813 | 0.8559 |
| 5 | 2 | 0.3447 | 0.4794 | 0.7120 | 0.8812 | 0.8818 |

Table A2: The risks of the proposed estimators based on *m*=12, and *ni*=5.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *μ* | *τ* |  $R(G,\hat{γ}\_{m}^{B})$ | $R(G,\hat{γ}\_{m}^{EB})$  | $R(G,\tilde{γ}\_{m}^{B})$  | $$R(G,\tilde{γ}\_{m}^{EB})$$ | $R(G,\overbar{Y}\_{m})$  |
| 1 | 0.1 | 0.0559 | 0.1879 | 0.0420 | 0.3245 | 1.8702 |
| 1 | 0.5 | 0.2273 | 0.3510 | 0.2566 | 0.5603 | 1.8074 |
| 1 | 1 | 0.4611 | 0.5754 | 0.6813 | 0.9397 | 1.8190 |
| 1 | 1.5 | 0.5641 | 0.7453 | 1.0230 | 1.3044 | 1.8057 |
| 1 | 2 | 0.5840 | 0.7241 | 1.1909 | 1.3396 | 1.7835 |
| 3 | 0.1 | 0.0562 | 0.2000 | 0.0410 | 0.3294 | 1.9052 |
| 3 | 0.5 | 0.2198 | 0.3286 | 0.2316 | 0.4698 | 1.7348 |
| 3 | 1 | 0.4407 | 0.5416 | 0.7294 | 0.9864 | 1.8375 |
| 3 | 1.5 | 0.5440 | 0.6751 | 0.9930 | 1.2299 | 1.8794 |
| 3 | 2 | 0.6372 | 0.7411 | 1.3185 | 1.4566 | 1.8817 |
| 5 | 0.1 | 0.0563 | 0.1997 | 0.0421 | 0.3418 | 1.8637 |
| 5 | 0.5 | 0.2179 | 0.3349 | 0.2379 | 0.4940 | 1.7021 |
| 5 | 1 | 0.4400 | 0.5680 | 0.6740 | 0.9119 | 1.8146 |
| 5 | 1.5 | 0.5927 | 0.7438 | 1.0047 | 1.2294 | 1.7135 |
| 5 | 2 | 0.5612 | 0.6988 | 1.3147 | 1.4841 | 1.9137 |

Table A3: The risks of the proposed estimators based on *m*=12, and *ni*=10.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *μ* | *τ* |  $R(G,\hat{γ}\_{m}^{B})$ | $R(G,\hat{γ}\_{m}^{EB})$  | $R(G,\tilde{γ}\_{m}^{B})$  | $$R(G,\tilde{γ}\_{m}^{EB})$$ | $R(G,\overbar{Y}\_{m})$  |
| 1 | 0.1 | 0.0921 | 0.1582 | 0.0457 | 0.1871 | 0.9228 |
| 1 | 0.5 | 0.2214 | 0.2898 | 0.2247 | 0.3415 | 0.9201 |
| 1 | 1 | 0.3139 | 0.3689 | 0.5154 | 0.6071 | 0.9107 |
| 1 | 1.5 | 0.3432 | 0.3919 | 0.7081 | 0.7797 | 0.9492 |
| 1 | 2 | 0.3568 | 0.3922 | 0.7567 | 0.8025 | 0.9145 |
| 3 | 0.1 | 0.0912 | 0.1617 | 0.0441 | 0.1811 | 0.9693 |
| 3 | 0.5 | 0.2321 | 0.2760 | 0.2410 | 0.3393 | 0.9300 |
| 3 | 1 | 0.3357 | 0.4205 | 0.4928 | 0.6078 | 0.8904 |
| 3 | 1.5 | 0.3682 | 0.4655 | 0.6224 | 0.7372 | 0.8659 |
| 3 | 2 | 0.3561 | 0.4017 | 0.7744 | 0.8327 | 0.9455 |
| 5 | 0.1 | 0.0904 | 0.1630 | 0.0430 | 0.1767 | 0.9013 |
| 5 | 0.5 | 0.2250 | 0.2823 | 0.2207 | 0.3562 | 0.9645 |
| 5 | 1 | 0.3307 | 0.3999 | 0.5128 | 0.6181 | 0.9500 |
| 5 | 1.5 | 0.3423 | 0.3938 | 0.6740 | 0.7384 | 0.9297 |
| 5 | 2 | 0.3307 | 0.3830 | 0.7389 | 0.8208 | 0.8870 |

Table A4: The risks of the proposed estimators based on *μ*=1, *τ* =0.1 and *ni*=5.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *m* |  $R(G,\hat{γ}\_{m}^{B})$ | $R(G,\hat{γ}\_{m}^{EB})$  | $R(G,\tilde{γ}\_{m}^{B})$  | $$R(G,\tilde{γ}\_{m}^{EB})$$ | $R(G,\overbar{Y}\_{m})$  |
| 10 | 0.0382 | 0.2173 | 0.0417 | 0.4507 | 1.9778 |
| 20 | 0.0378 | 0.1318 | 0.0416 | 0.2557 | 1.9694 |
| 30 | 0.0380 | 0.0972 | 0.0420 | 0.1750 | 1.8414 |
| 40 | 0.0382 | 0.0815 | 0.0389 | 0.1483 | 1.7510 |
| 50 | 0.0376 | 0.0754 | 0.0400 | 0.1158 | 1.8204 |
| 60 | 0.0382 | 0.0708 | 0.0393 | 0.1092 | 1.7804 |
| 70 | 0.0379 | 0.0654 | 0.0405 | 0.1038 | 1.8028 |
| 80 | 0.0379 | 0.0626 | 0.0406 | 0.1004 | 1.8369 |
| 90 | 0.0381 | 0.0601 | 0.0399 | 0.0911 | 1.7668 |
| 100 | 0.0379 | 0.0566 | 0.0390 | 0.0870 | 1.7617 |

Table A5: The risks of the proposed estimators based on *μ*=5, *τ* =1 and *ni*=10.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *m* |  $R(G,\hat{γ}\_{m}^{B})$ | $R(G,\hat{γ}\_{m}^{EB})$  | $R(G,\tilde{γ}\_{m}^{B})$  | $$R(G,\tilde{γ}\_{m}^{EB})$$ | $R(G,\overbar{Y}\_{m})$  |
| 10 | 0.3678 | 0.4682 | 0.5087 | 0.6482 | 0.9523 |
| 20 | 0.3489 | 0.4095 | 0.5282 | 0.6004 | 0.9639 |
| 30 | 0.4023 | 0.4488 | 0.5148 | 0.5574 | 0.9821 |
| 40 | 0.3730 | 0.3985 | 0.4690 | 0.4909 | 0.9272 |
| 50 | 0.3982 | 0.4166 | 0.5186 | 0.5429 | 0.8675 |
| 60 | 0.3812 | 0.3987 | 0.5348 | 0.5480 | 0.9781 |
| 70 | 0.4114 | 0.4260 | 0.5105 | 0.5318 | 0.9395 |
| 80 | 0.4011 | 0.4163 | 0.5238 | 0.5429 | 0.9764 |
| 90 | 0.3787 | 0.3909 | 0.4613 | 0.4712 | 0.8434 |
| 100 | 0.3720 | 0.3803 | 0.5087 | 0.5173 | 0.9522 |

Table A6: The risks of the proposed estimators based on *μ*=1, *τ* =0.1 and *ni*=10.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *m* |  $R(G,\hat{γ}\_{m}^{B})$ | $R(G,\hat{γ}\_{m}^{EB})$  | $R(G,\tilde{γ}\_{m}^{B})$  | $$R(G,\tilde{γ}\_{m}^{EB})$$ | $R(G,\overbar{Y}\_{m})$  |
| 10 | 0.0719 | 0.1859 | 0.0440 | 0.2168 | 0.9059 |
| 20 | 0.0699 | 0.1260 | 0.0440 | 0.1255 | 0.9268 |
| 30 | 0.0697 | 0.1102 | 0.0439 | 0.1081 | 0.9401 |
| 40 | 0.0705 | 0.1024 | 0.0431 | 0.0901 | 0.9384 |
| 50 | 0.0709 | 0.0978 | 0.0429 | 0.0859 | 0.9584 |
| 60 | 0.0707 | 0.0924 | 0.0433 | 0.0790 | 0.9524 |
| 70 | 0.0719 | 0.0939 | 0.0450 | 0.0763 | 0.9100 |
| 80 | 0.0696 | 0.0855 | 0.0437 | 0.0729 | 0.9241 |
| 90 | 0.0698 | 0.0835 | 0.0445 | 0.0714 | 0.9828 |
| 100 | 0.0705 | 0.0786 | 0.0450 | 0.0682 | 0.9359 |

Table A7: The risks of the proposed estimators based on *m*=6, *ni*=5 and a mis-speciﬁed *N* (*μ, μ*) priors.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *μ* | *τ* |  $R(G,\hat{γ}\_{m}^{B})$ | $R(G,\hat{γ}\_{m}^{EB})$  | $R(G,\tilde{γ}\_{m}^{B})$  | $$R(G,\tilde{γ}\_{m}^{EB})$$ | $R(G,\overbar{Y}\_{m})$  |
| 1 | 0.1 | 0.2669 | 0.2894 | 1.7804 | 0.6089 | 1.7364 |
| 1 | 0.5 | 0.5369 | 0.4188 | 1.9435 | 0.8008 | 1.7904 |
| 1 | 1 | 1.0349 | 0.6216 | 2.6412 | 1.1477 | 1.7533 |
| 1 | 1.5 | 2.5220 | 0.8316 | 3.9668 | 1.4988 | 1.7968 |
| 1 | 2 | 3.9254 | 0.9574 | 5.6008 | 1.6764 | 1.8256 |
| 3 | 0.1 | 0.2889 | 0.3092 | 1.7558 | 0.6162 | 1.7926 |
| 3 | 0.5 | 0.4791 | 0.3799 | 1.7680 | 0.7729 | 1.7522 |
| 3 | 1 | 1.1192 | 0.5947 | 2.5770 | 1.2212 | 1.8500 |
| 3 | 1.5 | 2.3525 | 0.7694 | 3.9087 | 1.4672 | 1.9137 |
| 3 | 2 | 3.7835 | 0.9600 | 5.1032 | 1.7779 | 1.8996 |
| 5 | 0.1 | 0.2611 | 0.3318 | 1.4875 | 0.6327 | 1.8053 |
| 5 | 0.5 | 0.5257 | 0.4270 | 1.9010 | 0.7526 | 1.7456 |
| 5 | 1 | 1.1488 | 0.5774 | 2.4000 | 1.0840 | 1.7650 |
| 5 | 1.5 | 2.1929 | 0.7770 | 3.8497 | 1.4520 | 1.9184 |
| 5 | 2 | 3.5395 | 0.8923 | 4.7688 | 1.6875 | 1.6982 |

Table A8: The risks of the proposed estimators based on m=6, ni=10 and a mis-speciﬁed N(μ, μ) priors.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *μ* | *τ* |  $R(G,\hat{γ}\_{m}^{B})$ | $R(G,\hat{γ}\_{m}^{EB})$  | $R(G,\tilde{γ}\_{m}^{B})$  | $$R(G,\tilde{γ}\_{m}^{EB})$$ | $R(G,\overbar{Y}\_{m})$  |
| 1 | 0.1 | 0.2772 | 0.2548 | 0.8585 | 0.3167 | 0.9539 |
| 1 | 0.5 | 0.5550 | 0.3227 | 1.1991 | 0.4818 | 0.8956 |
| 1 | 1 | 1.2651 | 0.4454 | 1.9606 | 0.6912 | 0.8558 |
| 1 | 1.5 | 2.4232 | 0.4617 | 2.9674 | 0.8507 | 0.9666 |
| 1 | 2 | 4.2037 | 0.4948 | 4.7730 | 0.9155 | 0.8620 |
| 3 | 0.1 | 0.3121 | 0.2353 | 0.8484 | 0.3491 | 0.9286 |
| 3 | 0.5 | 0.4633 | 0.2981 | 1.0655 | 0.4767 | 0.8978 |
| 3 | 1 | 1.1896 | 0.4161 | 1.7553 | 0.7373 | 0.9669 |
| 3 | 1.5 | 2.4059 | 0.4847 | 2.8660 | 0.8806 | 1.0015 |
| 3 | 2 | 4.1608 | 0.4775 | 4.8661 | 0.9049 | 0.9482 |
| 5 | 0.1 | 0.2689 | 0.2138 | 0.8852 | 0.3539 | 0.9718 |
| 5 | 0.5 | 0.5134 | 0.3184 | 1.0115 | 0.4462 | 0.9011 |
| 5 | 1 | 1.1784 | 0.5339 | 1.8607 | 0.7542 | 0.9566 |
| 5 | 1.5 | 2.4501 | 0.4562 | 2.8815 | 0.7813 | 0.8559 |
| 5 | 2 | 3.8035 | 0.4794 | 4.5418 | 0.8812 | 0.8818 |

Table A9: The risks of the proposed estimators based on *m*=12, *ni*=5 and a mis-speciﬁed *N* (*μ, μ*) priors.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *μ* | *τ* |  $R(G,\hat{γ}\_{m}^{B})$ | $R(G,\hat{γ}\_{m}^{EB})$  | $R(G,\tilde{γ}\_{m}^{B})$  | $$R(G,\tilde{γ}\_{m}^{EB})$$ | $R(G,\overbar{Y}\_{m})$  |
| 1 | 0.1 | 0.2595 | 0.1879 | 1.6787 | 0.3245 | 1.8702 |
| 1 | 0.5 | 0.5207 | 0.3510 | 1.9535 | 0.5603 | 1.8074 |
| 1 | 1 | 1.2714 | 0.5754 | 2.6946 | 0.9397 | 1.8190 |
| 1 | 1.5 | 2.4284 | 0.7453 | 3.9116 | 1.3044 | 1.8057 |
| 1 | 2 | 4.4157 | 0.7241 | 5.9305 | 1.3396 | 1.7835 |
| 3 | 0.1 | 0.2870 | 0.2000 | 1.6813 | 0.3294 | 1.9052 |
| 3 | 0.5 | 0.4572 | 0.3286 | 1.9085 | 0.4698 | 1.7348 |
| 3 | 1 | 1.1883 | 0.5416 | 2.5888 | 0.9864 | 1.8375 |
| 3 | 1.5 | 2.4156 | 0.6751 | 3.7815 | 1.2299 | 1.8794 |
| 3 | 2 | 3.9160 | 0.7411 | 5.3363 | 1.4566 | 1.8817 |
| 5 | 0.1 | 0.2536 | 0.1997 | 1.6471 | 0.3418 | 1.8637 |
| 5 | 0.5 | 0.5119 | 0.3349 | 1.6648 | 0.4940 | 1.7021 |
| 5 | 1 | 1.0977 | 0.5680 | 2.3343 | 0.9119 | 1.8146 |
| 5 | 1.5 | 2.2765 | 0.7438 | 3.6131 | 1.2294 | 1.7135 |
| 5 | 2 | 3.9439 | 0.6988 | 5.1419 | 1.4841 | 1.9137 |

Table A10: The risks of the proposed estimators based on m=12, ni=10 and a mis-speciﬁed N(μ, μ) priors.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *μ* | *τ* |  $R(G,\hat{γ}\_{m}^{B})$ | $R(G,\hat{γ}\_{m}^{EB})$  | $R(G,\tilde{γ}\_{m}^{B})$  | $$R(G,\tilde{γ}\_{m}^{EB})$$ | $R(G,\overbar{Y}\_{m})$  |
| 1 | 0.1 | 0.2840 | 0.1582 | 0.9026 | 0.1871 | 0.9228 |
| 1 | 0.5 | 0.5842 | 0.2898 | 1.2159 | 0.3415 | 0.9201 |
| 1 | 1 | 1.2170 | 0.3689 | 1.8324 | 0.6071 | 0.9107 |
| 1 | 1.5 | 2.3310 | 0.3919 | 2.9171 | 0.7797 | 0.9492 |
| 1 | 2 | 4.2496 | 0.3922 | 5.0723 | 0.8025 | 0.9145 |
| 3 | 0.1 | 0.3094 | 0.1617 | 0.9260 | 0.1811 | 0.9693 |
| 3 | 0.5 | 0.4569 | 0.2760 | 1.1826 | 0.3393 | 0.9300 |
| 3 | 1 | 1.2368 | 0.4205 | 1.8175 | 0.6078 | 0.8904 |
| 3 | 1.5 | 2.5663 | 0.4655 | 3.1388 | 0.7372 | 0.8659 |
| 3 | 2 | 3.9997 | 0.4017 | 4.4810 | 0.8327 | 0.9455 |
| 5 | 0.1 | 0.2743 | 0.1630 | 0.8609 | 0.1767 | 0.9013 |
| 5 | 0.5 | 0.5614 | 0.2823 | 1.1314 | 0.3562 | 0.9645 |
| 5 | 1 | 1.1034 | 0.3999 | 1.7366 | 0.6181 | 0.9500 |
| 5 | 1.5 | 2.3178 | 0.3938 | 2.8695 | 0.7384 | 0.9297 |
| 5 | 2 | 3.8600 | 0.3830 | 4.5637 | 0.8208 | 0.8870 |