# Appendix B: Critical values and supplemental tables

TABLE B1

*Critical values of the BCIPS test with m=1 – with an intercept only*

| | | $\kappa$ =1 | | | | | $\kappa$ =2 | | | | | $\kappa$ =3 | | | | | $\kappa$ =4 | | | | | $\kappa$ =5 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *p* | *T* \ *N* | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 |
| | | | | | | | | | | | | | | 1% | | | | | | | | | | | | |
| 0 | 50 | -3.22 | -3.14 | -3.07 | -3.03 | -3.00 | -2.75 | -2.65 | -2.59 | -2.52 | -2.48 | -2.50 | -2.43 | -2.35 | -2.28 | -2.25 | -2.40 | -2.33 | -2.25 | -2.19 | -2.16 | -2.36 | -2.29 | -2.21 | -2.15 | -2.12 |
| | 70 | -3.20 | -3.13 | -3.08 | -3.02 | -3.00 | -2.75 | -2.66 | -2.59 | -2.53 | -2.49 | -2.51 | -2.44 | -2.37 | -2.30 | -2.27 | -2.42 | -2.35 | -2.28 | -2.22 | -2.19 | -2.38 | -2.31 | -2.24 | -2.18 | -2.15 |
| | 100 | -3.20 | -3.13 | -3.07 | -3.03 | -3.00 | -2.75 | -2.67 | -2.59 | -2.53 | -2.49 | -2.52 | -2.45 | -2.38 | -2.31 | -2.29 | -2.44 | -2.36 | -2.30 | -2.24 | -2.21 | -2.40 | -2.32 | -2.26 | -2.20 | -2.17 |
| | 200 | -3.19 | -3.13 | -3.07 | -3.03 | -3.00 | -2.75 | -2.67 | -2.60 | -2.53 | -2.50 | -2.54 | -2.46 | -2.39 | -2.34 | -2.30 | -2.45 | -2.38 | -2.32 | -2.26 | -2.22 | -2.41 | -2.34 | -2.29 | -2.22 | -2.19 |
| 1 | 50 | -3.22 | -3.15 | -3.08 | -3.04 | -3.01 | -2.73 | -2.63 | -2.57 | -2.50 | -2.46 | -2.44 | -2.36 | -2.28 | -2.21 | -2.17 | -2.32 | -2.25 | -2.17 | -2.11 | -2.07 | -2.27 | -2.20 | -2.12 | -2.07 | -2.03 |
| | 70 | -3.20 | -3.14 | -3.08 | -3.03 | -3.00 | -2.74 | -2.64 | -2.57 | -2.51 | -2.47 | -2.47 | -2.39 | -2.32 | -2.25 | -2.22 | -2.36 | -2.29 | -2.22 | -2.16 | -2.12 | -2.32 | -2.24 | -2.18 | -2.12 | -2.09 |
| | 100 | -3.21 | -3.13 | -3.07 | -3.03 | -3.00 | -2.73 | -2.65 | -2.58 | -2.52 | -2.48 | -2.49 | -2.42 | -2.35 | -2.28 | -2.25 | -2.41 | -2.32 | -2.26 | -2.20 | -2.17 | -2.36 | -2.28 | -2.22 | -2.16 | -2.12 |
| | 200 | -3.19 | -3.13 | -3.07 | -3.03 | -3.00 | -2.74 | -2.66 | -2.59 | -2.53 | -2.49 | -2.52 | -2.45 | -2.38 | -2.32 | -2.29 | -2.43 | -2.36 | -2.30 | -2.24 | -2.21 | -2.39 | -2.32 | -2.26 | -2.20 | -2.17 |
| 2 | 50 | -3.15 | -3.08 | -3.02 | -2.97 | -2.94 | -2.66 | -2.56 | -2.49 | -2.42 | -2.38 | -2.33 | -2.25 | -2.16 | -2.09 | -2.05 | -2.20 | -2.13 | -2.05 | -1.99 | -1.96 | -2.17 | -2.10 | -2.02 | -1.96 | -1.93 |
| | 70 | -3.16 | -3.10 | -3.04 | -2.98 | -2.96 | -2.69 | -2.59 | -2.52 | -2.45 | -2.41 | -2.39 | -2.31 | -2.24 | -2.17 | -2.13 | -2.28 | -2.20 | -2.13 | -2.07 | -2.04 | -2.24 | -2.15 | -2.10 | -2.04 | -2.00 |
| | 100 | -3.17 | -3.10 | -3.04 | -3.00 | -2.97 | -2.69 | -2.61 | -2.54 | -2.48 | -2.44 | -2.44 | -2.37 | -2.29 | -2.22 | -2.19 | -2.35 | -2.26 | -2.19 | -2.14 | -2.10 | -2.30 | -2.22 | -2.15 | -2.10 | -2.06 |
| | 200 | -3.17 | -3.11 | -3.05 | -3.02 | -2.99 | -2.72 | -2.64 | -2.58 | -2.51 | -2.47 | -2.50 | -2.43 | -2.35 | -2.29 | -2.26 | -2.41 | -2.34 | -2.27 | -2.21 | -2.18 | -2.37 | -2.29 | -2.23 | -2.17 | -2.14 |
| 3 | 50 | -3.16 | -3.08 | -3.01 | -2.96 | -2.93 | -2.63 | -2.53 | -2.46 | -2.39 | -2.36 | -2.27 | -2.17 | -2.09 | -2.02 | -1.98 | -2.15 | -2.08 | -2.00 | -1.93 | -1.90 | -2.16 | -2.08 | -2.01 | -1.95 | -1.91 |
| | 70 | -3.16 | -3.10 | -3.04 | -2.98 | -2.96 | -2.67 | -2.57 | -2.50 | -2.43 | -2.39 | -2.35 | -2.26 | -2.18 | -2.11 | -2.08 | -2.23 | -2.16 | -2.08 | -2.02 | -1.98 | -2.20 | -2.11 | -2.06 | -2.00 | -1.96 |
| | 100 | -3.18 | -3.10 | -3.05 | -3.00 | -2.97 | -2.68 | -2.61 | -2.53 | -2.46 | -2.42 | -2.40 | -2.33 | -2.25 | -2.19 | -2.15 | -2.30 | -2.22 | -2.15 | -2.09 | -2.06 | -2.26 | -2.18 | -2.11 | -2.06 | -2.02 |
| | 200 | -3.17 | -3.12 | -3.06 | -3.02 | -2.99 | -2.72 | -2.63 | -2.57 | -2.50 | -2.46 | -2.48 | -2.41 | -2.34 | -2.28 | -2.24 | -2.39 | -2.32 | -2.25 | -2.19 | -2.16 | -2.34 | -2.27 | -2.21 | -2.15 | -2.12 |
| 4 | 50 | -3.07 | -3.00 | -2.93 | -2.87 | -2.85 | -2.57 | -2.47 | -2.38 | -2.32 | -2.27 | -2.16 | -2.08 | -1.99 | -1.92 | -1.88 | -2.11 | -2.02 | -1.94 | -1.88 | -1.84 | -2.16 | -2.07 | -2.00 | -1.94 | -1.90 |
| | 70 | -3.12 | -3.04 | -2.98 | -2.94 | -2.91 | -2.61 | -2.52 | -2.45 | -2.37 | -2.34 | -2.27 | -2.18 | -2.10 | -2.04 | -1.99 | -2.17 | -2.09 | -2.01 | -1.95 | -1.91 | -2.16 | -2.08 | -2.01 | -1.95 | -1.91 |
| | 100 | -3.14 | -3.07 | -3.01 | -2.97 | -2.94 | -2.66 | -2.58 | -2.50 | -2.42 | -2.39 | -2.36 | -2.27 | -2.20 | -2.13 | -2.10 | -2.24 | -2.17 | -2.10 | -2.03 | -2.00 | -2.21 | -2.13 | -2.06 | -2.01 | -1.97 |
| | 200 | -3.17 | -3.10 | -3.04 | -3.00 | -2.97 | -2.69 | -2.62 | -2.55 | -2.48 | -2.45 | -2.46 | -2.37 | -2.31 | -2.24 | -2.20 | -2.35 | -2.29 | -2.22 | -2.16 | -2.12 | -2.32 | -2.24 | -2.18 | -2.12 | -2.08 |
| | | | | | | | | | | | | | | 5% | | | | | | | | | | | | |
| 0 | 50 | -3.04 | -2.99 | -2.95 | -2.92 | -2.91 | -2.55 | -2.49 | -2.44 | -2.40 | -2.38 | -2.32 | -2.27 | -2.22 | -2.18 | -2.16 | -2.23 | -2.18 | -2.13 | -2.09 | -2.08 | -2.18 | -2.14 | -2.09 | -2.06 | -2.04 |
| | 70 | -3.03 | -2.99 | -2.95 | -2.92 | -2.91 | -2.55 | -2.50 | -2.45 | -2.41 | -2.39 | -2.33 | -2.28 | -2.24 | -2.20 | -2.18 | -2.25 | -2.20 | -2.16 | -2.12 | -2.10 | -2.21 | -2.16 | -2.12 | -2.09 | -2.07 |
| | 100 | -3.03 | -2.98 | -2.95 | -2.92 | -2.91 | -2.55 | -2.50 | -2.46 | -2.42 | -2.40 | -2.34 | -2.30 | -2.25 | -2.22 | -2.20 | -2.27 | -2.22 | -2.18 | -2.14 | -2.12 | -2.23 | -2.18 | -2.14 | -2.11 | -2.09 |
| | 200 | -3.02 | -2.98 | -2.95 | -2.92 | -2.91 | -2.56 | -2.50 | -2.46 | -2.43 | -2.41 | -2.36 | -2.31 | -2.27 | -2.23 | -2.22 | -2.29 | -2.24 | -2.20 | -2.16 | -2.15 | -2.25 | -2.20 | -2.17 | -2.13 | -2.11 |
| 1 | 50 | -3.04 | -2.99 | -2.95 | -2.92 | -2.91 | -2.52 | -2.45 | -2.41 | -2.37 | -2.35 | -2.25 | -2.19 | -2.14 | -2.10 | -2.08 | -2.15 | -2.09 | -2.04 | -2.00 | -1.99 | -2.10 | -2.05 | -2.00 | -1.97 | -1.95 |
| | 70 | -3.03 | -2.99 | -2.95 | -2.92 | -2.91 | -2.53 | -2.47 | -2.43 | -2.39 | -2.37 | -2.28 | -2.23 | -2.19 | -2.15 | -2.13 | -2.19 | -2.14 | -2.10 | -2.06 | -2.04 | -2.15 | -2.10 | -2.06 | -2.02 | -2.00 |
| | 100 | -3.03 | -2.98 | -2.95 | -2.93 | -2.91 | -2.54 | -2.48 | -2.44 | -2.41 | -2.38 | -2.31 | -2.26 | -2.22 | -2.18 | -2.16 | -2.23 | -2.18 | -2.14 | -2.10 | -2.08 | -2.19 | -2.14 | -2.10 | -2.06 | -2.04 |
| | 200 | -3.02 | -2.99 | -2.95 | -2.92 | -2.91 | -2.55 | -2.50 | -2.46 | -2.42 | -2.40 | -2.35 | -2.30 | -2.25 | -2.22 | -2.20 | -2.27 | -2.22 | -2.18 | -2.14 | -2.13 | -2.23 | -2.18 | -2.14 | -2.11 | -2.09 |
| 2 | 50 | -2.97 | -2.92 | -2.88 | -2.85 | -2.83 | -2.44 | -2.37 | -2.32 | -2.28 | -2.25 | -2.13 | -2.07 | -2.02 | -1.98 | -1.95 | -2.03 | -1.97 | -1.93 | -1.88 | -1.86 | -2.00 | -1.94 | -1.90 | -1.86 | -1.84 |
| | 70 | -2.99 | -2.94 | -2.91 | -2.88 | -2.86 | -2.47 | -2.41 | -2.36 | -2.32 | -2.30 | -2.20 | -2.15 | -2.10 | -2.06 | -2.04 | -2.10 | -2.06 | -2.00 | -1.97 | -1.95 | -2.07 | -2.01 | -1.97 | -1.93 | -1.92 |
| | 100 | -3.00 | -2.95 | -2.92 | -2.89 | -2.88 | -2.49 | -2.45 | -2.40 | -2.36 | -2.34 | -2.25 | -2.21 | -2.16 | -2.12 | -2.10 | -2.17 | -2.11 | -2.07 | -2.04 | -2.02 | -2.13 | -2.08 | -2.03 | -2.00 | -1.98 |
| | 200 | -3.01 | -2.97 | -2.93 | -2.91 | -2.90 | -2.53 | -2.48 | -2.43 | -2.40 | -2.38 | -2.32 | -2.27 | -2.22 | -2.19 | -2.17 | -2.24 | -2.19 | -2.15 | -2.11 | -2.09 | -2.20 | -2.15 | -2.11 | -2.07 | -2.06 |
| 3 | 50 | -2.96 | -2.91 | -2.87 | -2.83 | -2.82 | -2.40 | -2.33 | -2.28 | -2.23 | -2.21 | -2.07 | -2.00 | -1.95 | -1.90 | -1.87 | -1.97 | -1.92 | -1.87 | -1.82 | -1.80 | -1.98 | -1.93 | -1.87 | -1.83 | -1.81 |
| | 70 | -2.99 | -2.94 | -2.90 | -2.87 | -2.85 | -2.45 | -2.38 | -2.34 | -2.29 | -2.27 | -2.15 | -2.09 | -2.04 | -2.00 | -1.98 | -2.05 | -2.00 | -1.95 | -1.91 | -1.89 | -2.03 | -1.97 | -1.93 | -1.89 | -1.87 |
| | 100 | -3.00 | -2.95 | -2.91 | -2.89 | -2.87 | -2.48 | -2.43 | -2.38 | -2.34 | -2.32 | -2.22 | -2.17 | -2.12 | -2.08 | -2.06 | -2.13 | -2.07 | -2.03 | -1.99 | -1.97 | -2.09 | -2.04 | -1.99 | -1.96 | -1.94 |
| | 200 | -3.01 | -2.97 | -2.93 | -2.91 | -2.90 | -2.53 | -2.47 | -2.43 | -2.39 | -2.37 | -2.30 | -2.25 | -2.21 | -2.17 | -2.15 | -2.22 | -2.17 | -2.12 | -2.09 | -2.07 | -2.18 | -2.13 | -2.09 | -2.05 | -2.03 |
| 4 | 50 | -2.87 | -2.82 | -2.78 | -2.74 | -2.73 | -2.31 | -2.25 | -2.19 | -2.14 | -2.11 | -1.96 | -1.90 | -1.84 | -1.79 | -1.77 | -1.92 | -1.86 | -1.81 | -1.76 | -1.74 | -1.96 | -1.91 | -1.86 | -1.82 | -1.80 |
| | 70 | -2.93 | -2.88 | -2.84 | -2.81 | -2.80 | -2.38 | -2.33 | -2.27 | -2.23 | -2.20 | -2.07 | -2.02 | -1.96 | -1.92 | -1.89 | -1.99 | -1.93 | -1.88 | -1.84 | -1.82 | -1.98 | -1.93 | -1.88 | -1.84 | -1.82 |
| | 100 | -2.96 | -2.92 | -2.88 | -2.85 | -2.84 | -2.44 | -2.39 | -2.34 | -2.29 | -2.27 | -2.16 | -2.11 | -2.06 | -2.02 | -2.00 | -2.07 | -2.01 | -1.97 | -1.93 | -1.91 | -2.04 | -1.99 | -1.94 | -1.91 | -1.88 |
| | 200 | -3.00 | -2.96 | -2.92 | -2.89 | -2.88 | -2.50 | -2.45 | -2.41 | -2.37 | -2.35 | -2.27 | -2.23 | -2.18 | -2.14 | -2.12 | -2.19 | -2.14 | -2.10 | -2.06 | -2.04 | -2.15 | -2.10 | -2.06 | -2.02 | -2.00 |
| | | | | | | | | | | | | | | 10% | | | | | | | | | | | | |
| 0 | 50 | -2.94 | -2.90 | -2.87 | -2.86 | -2.84 | -2.44 | -2.39 | -2.36 | -2.33 | -2.32 | -2.22 | -2.18 | -2.14 | -2.11 | -2.10 | -2.13 | -2.10 | -2.06 | -2.03 | -2.02 | -2.09 | -2.06 | -2.02 | -2.00 | -1.99 |
| | 70 | -2.94 | -2.90 | -2.87 | -2.85 | -2.85 | -2.44 | -2.40 | -2.37 | -2.35 | -2.33 | -2.23 | -2.20 | -2.16 | -2.14 | -2.13 | -2.15 | -2.12 | -2.09 | -2.06 | -2.05 | -2.12 | -2.08 | -2.05 | -2.03 | -2.02 |
| | 100 | -2.94 | -2.90 | -2.87 | -2.86 | -2.85 | -2.44 | -2.41 | -2.37 | -2.35 | -2.34 | -2.25 | -2.21 | -2.18 | -2.15 | -2.14 | -2.17 | -2.13 | -2.11 | -2.08 | -2.07 | -2.14 | -2.10 | -2.07 | -2.05 | -2.03 |
| | 200 | -2.93 | -2.90 | -2.87 | -2.86 | -2.85 | -2.45 | -2.41 | -2.38 | -2.36 | -2.35 | -2.26 | -2.23 | -2.20 | -2.17 | -2.16 | -2.19 | -2.16 | -2.12 | -2.10 | -2.09 | -2.16 | -2.12 | -2.10 | -2.07 | -2.06 |
| 1 | 50 | -2.94 | -2.90 | -2.87 | -2.85 | -2.84 | -2.40 | -2.35 | -2.32 | -2.29 | -2.28 | -2.14 | -2.10 | -2.06 | -2.03 | -2.02 | -2.05 | -2.01 | -1.97 | -1.94 | -1.93 | -2.00 | -1.97 | -1.93 | -1.91 | -1.89 |
| | 70 | -2.94 | -2.90 | -2.87 | -2.85 | -2.85 | -2.42 | -2.38 | -2.34 | -2.32 | -2.30 | -2.18 | -2.14 | -2.11 | -2.08 | -2.07 | -2.10 | -2.06 | -2.02 | -2.00 | -1.99 | -2.05 | -2.01 | -1.99 | -1.96 | -1.95 |
| | 100 | -2.94 | -2.90 | -2.87 | -2.86 | -2.85 | -2.42 | -2.39 | -2.36 | -2.33 | -2.32 | -2.21 | -2.18 | -2.14 | -2.12 | -2.11 | -2.14 | -2.10 | -2.06 | -2.04 | -2.03 | -2.10 | -2.06 | -2.03 | -2.00 | -1.99 |
| | 200 | -2.93 | -2.90 | -2.87 | -2.86 | -2.85 | -2.44 | -2.41 | -2.38 | -2.35 | -2.34 | -2.25 | -2.21 | -2.18 | -2.15 | -2.14 | -2.17 | -2.14 | -2.11 | -2.08 | -2.07 | -2.14 | -2.10 | -2.07 | -2.05 | -2.04 |
| 2 | 50 | -2.87 | -2.83 | -2.80 | -2.78 | -2.77 | -2.31 | -2.26 | -2.23 | -2.19 | -2.18 | -2.02 | -1.98 | -1.94 | -1.91 | -1.89 | -1.93 | -1.89 | -1.85 | -1.82 | -1.81 | -1.90 | -1.86 | -1.83 | -1.80 | -1.79 |
| | 70 | -2.89 | -2.85 | -2.83 | -2.81 | -2.80 | -2.36 | -2.31 | -2.28 | -2.25 | -2.23 | -2.10 | -2.06 | -2.02 | -2.00 | -1.98 | -2.01 | -1.97 | -1.93 | -1.91 | -1.89 | -1.97 | -1.93 | -1.90 | -1.87 | -1.86 |
| | 100 | -2.91 | -2.87 | -2.84 | -2.83 | -2.81 | -2.39 | -2.35 | -2.31 | -2.29 | -2.28 | -2.16 | -2.12 | -2.09 | -2.06 | -2.04 | -2.07 | -2.03 | -2.00 | -1.98 | -1.96 | -2.04 | -2.00 | -1.96 | -1.94 | -1.92 |
| | 200 | -2.91 | -2.89 | -2.86 | -2.84 | -2.83 | -2.43 | -2.39 | -2.35 | -2.33 | -2.32 | -2.22 | -2.18 | -2.15 | -2.13 | -2.11 | -2.14 | -2.11 | -2.07 | -2.05 | -2.04 | -2.11 | -2.07 | -2.04 | -2.01 | -2.00 |
| 3 | 50 | -2.85 | -2.81 | -2.78 | -2.76 | -2.74 | -2.27 | -2.21 | -2.18 | -2.14 | -2.13 | -1.95 | -1.91 | -1.86 | -1.83 | -1.81 | -1.87 | -1.83 | -1.79 | -1.76 | -1.75 | -1.88 | -1.84 | -1.80 | -1.77 | -1.76 |
| | 70 | -2.88 | -2.85 | -2.82 | -2.80 | -2.79 | -2.33 | -2.28 | -2.24 | -2.22 | -2.20 | -2.04 | -2.00 | -1.97 | -1.94 | -1.92 | -1.95 | -1.91 | -1.88 | -1.85 | -1.84 | -1.93 | -1.89 | -1.86 | -1.83 | -1.82 |
| | 100 | -2.90 | -2.87 | -2.84 | -2.82 | -2.81 | -2.37 | -2.33 | -2.29 | -2.27 | -2.25 | -2.12 | -2.08 | -2.05 | -2.02 | -2.00 | -2.03 | -1.99 | -1.96 | -1.93 | -1.92 | -2.00 | -1.96 | -1.92 | -1.90 | -1.88 |
| | 200 | -2.92 | -2.89 | -2.86 | -2.84 | -2.83 | -2.42 | -2.38 | -2.34 | -2.32 | -2.31 | -2.20 | -2.17 | -2.13 | -2.11 | -2.10 | -2.12 | -2.09 | -2.05 | -2.03 | -2.02 | -2.09 | -2.05 | -2.02 | -1.99 | -1.98 |
| 4 | 50 | -2.76 | -2.73 | -2.69 | -2.66 | -2.65 | -2.18 | -2.13 | -2.08 | -2.04 | -2.03 | -1.85 | -1.80 | -1.76 | -1.72 | -1.70 | -1.81 | -1.77 | -1.73 | -1.69 | -1.68 | -1.86 | -1.81 | -1.78 | -1.75 | -1.73 |
| | 70 | -2.83 | -2.79 | -2.76 | -2.74 | -2.73 | -2.26 | -2.22 | -2.18 | -2.14 | -2.13 | -1.96 | -1.92 | -1.88 | -1.85 | -1.83 | -1.89 | -1.85 | -1.81 | -1.78 | -1.76 | -1.88 | -1.84 | -1.81 | -1.78 | -1.76 |
| | 100 | -2.86 | -2.83 | -2.80 | -2.78 | -2.77 | -2.33 | -2.29 | -2.25 | -2.21 | -2.20 | -2.06 | -2.02 | -1.98 | -1.96 | -1.94 | -1.98 | -1.93 | -1.90 | -1.87 | -1.86 | -1.94 | -1.91 | -1.87 | -1.85 | -1.83 |
| | 200 | -2.90 | -2.87 | -2.84 | -2.83 | -2.82 | -2.40 | -2.36 | -2.32 | -2.30 | -2.28 | -2.18 | -2.14 | -2.10 | -2.08 | -2.07 | -2.09 | -2.06 | -2.03 | -2.00 | -1.98 | -2.06 | -2.02 | -1.99 | -1.96 | -1.95 |

*Notes:* m indicates the number of factors. Numbers in the table are critical values of the *BCIPS* statistics. The data generating process is: $y_{it} = y_{i,t-1} + \quad f_t + \varepsilon_{it}$, for *i*=1,…, *N* and *t*=1,…, *T*, with $y_{i0}$ and $\varepsilon_{it}$ as i.i.d.*N*(0,1). The *BCIPS* statistics are obtained from the following OLS regression: $\Delta y_{it} = \mathbf{c}'_{i,0}\mathbf{h}_t + c_{i,1}\sin(2\pi\kappa t/T) + c_{i,2}\cos(2\pi\kappa t/T) + c_{i,3}\bar{y}_{t-1} + c_{i,4}\Delta\bar{y}_t + \sum_{j=1}^{p} c_{i,5,j}\Delta\bar{y}_{i,t-j} + \sum_{j=1}^{p} c_{i,6,j}\Delta y_{i,t-j} + b_i y_{i,t-1} + e_{it}$, over the frequency component $\kappa = 1,\dots,5$ and the sample *t*=1, …, *T*, where $\mathbf{h}_t$ =[1], and $\bar{y}_t = N^{-1}\sum_{j=1}^{N} y_{jt}$. (100 ×α )% critical values are obtained as the $\alpha$ quantiles of the *BCIPS* statistic for $\alpha$ = 0.01, 0.05, 0.1. Critical values are simulated with 10,000 replications.

TABLE B2

Critical values of the *BCIPS* test with $m$=1 – with an intercept and a linear trend

| | | $\kappa$ =1 | | | | | $\kappa$ =2 | | | | | $\kappa$ =3 | | | | | $\kappa$ =4 | | | | | $\kappa$ =5 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $p$ | $T \setminus N$ | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 |
| 1% | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 50 | -3.69 | -3.63 | -3.55 | -3.48 | -3.44 | -3.42 | -3.35 | -3.29 | -3.23 | -3.20 | -3.11 | -3.02 | -2.94 | -2.88 | -2.84 | -2.96 | -2.88 | -2.80 | -2.73 | -2.70 | -2.88 | -2.80 | -2.73 | -2.66 | -2.63 |
| | 70 | -3.68 | -3.60 | -3.53 | -3.47 | -3.43 | -3.42 | -3.35 | -3.28 | -3.22 | -3.19 | -3.12 | -3.04 | -2.96 | -2.89 | -2.85 | -2.98 | -2.90 | -2.82 | -2.76 | -2.72 | -2.90 | -2.83 | -2.76 | -2.69 | -2.65 |
| | 100 | -3.67 | -3.60 | -3.52 | -3.46 | -3.42 | -3.40 | -3.34 | -3.27 | -3.22 | -3.19 | -3.12 | -3.04 | -2.96 | -2.90 | -2.86 | -2.98 | -2.91 | -2.84 | -2.77 | -2.74 | -2.92 | -2.84 | -2.77 | -2.71 | -2.67 |
| | 200 | -3.66 | -3.58 | -3.52 | -3.45 | -3.41 | -3.40 | -3.32 | -3.27 | -3.21 | -3.18 | -3.13 | -3.04 | -2.97 | -2.91 | -2.87 | -3.00 | -2.93 | -2.85 | -2.79 | -2.75 | -2.93 | -2.87 | -2.80 | -2.74 | -2.70 |
| 1 | 50 | -3.72 | -3.64 | -3.57 | -3.51 | -3.47 | -3.45 | -3.37 | -3.31 | -3.25 | -3.22 | -3.06 | -2.97 | -2.90 | -2.83 | -2.79 | -2.88 | -2.79 | -2.72 | -2.65 | -2.62 | -2.79 | -2.71 | -2.63 | -2.57 | -2.53 |
| | 70 | -3.70 | -3.62 | -3.55 | -3.49 | -3.45 | -3.43 | -3.36 | -3.30 | -3.24 | -3.20 | -3.08 | -3.00 | -2.93 | -2.86 | -2.82 | -2.93 | -2.85 | -2.77 | -2.70 | -2.66 | -2.83 | -2.76 | -2.69 | -2.63 | -2.59 |
| | 100 | -3.68 | -3.60 | -3.54 | -3.47 | -3.43 | -3.41 | -3.35 | -3.28 | -3.22 | -3.20 | -3.09 | -3.02 | -2.94 | -2.88 | -2.84 | -2.95 | -2.88 | -2.80 | -2.74 | -2.70 | -2.88 | -2.80 | -2.73 | -2.66 | -2.63 |
| | 200 | -3.66 | -3.59 | -3.52 | -3.46 | -3.42 | -3.40 | -3.33 | -3.27 | -3.21 | -3.19 | -3.12 | -3.03 | -2.96 | -2.90 | -2.86 | -2.98 | -2.91 | -2.83 | -2.77 | -2.74 | -2.91 | -2.84 | -2.78 | -2.71 | -2.68 |
| 2 | 50 | -3.66 | -3.58 | -3.51 | -3.46 | -3.42 | -3.38 | -3.31 | -3.25 | -3.19 | -3.15 | -2.95 | -2.85 | -2.78 | -2.71 | -2.67 | -2.74 | -2.66 | -2.58 | -2.51 | -2.48 | -2.65 | -2.57 | -2.50 | -2.44 | -2.40 |
| | 70 | -3.65 | -3.58 | -3.51 | -3.46 | -3.42 | -3.39 | -3.32 | -3.25 | -3.20 | -3.16 | -2.99 | -2.93 | -2.85 | -2.78 | -2.74 | -2.83 | -2.75 | -2.66 | -2.60 | -2.56 | -2.74 | -2.66 | -2.59 | -2.53 | -2.49 |
| | 100 | -3.65 | -3.58 | -3.51 | -3.45 | -3.41 | -3.39 | -3.32 | -3.25 | -3.20 | -3.17 | -3.04 | -2.96 | -2.88 | -2.82 | -2.79 | -2.89 | -2.81 | -2.73 | -2.67 | -2.63 | -2.80 | -2.72 | -2.65 | -2.59 | -2.56 |
| | 200 | -3.65 | -3.57 | -3.50 | -3.45 | -3.41 | -3.39 | -3.31 | -3.26 | -3.20 | -3.17 | -3.09 | -3.00 | -2.93 | -2.87 | -2.84 | -2.95 | -2.87 | -2.80 | -2.74 | -2.71 | -2.88 | -2.81 | -2.74 | -2.68 | -2.64 |
| 3 | 50 | -3.66 | -3.59 | -3.52 | -3.47 | -3.43 | -3.39 | -3.31 | -3.25 | -3.18 | -3.15 | -2.91 | -2.81 | -2.73 | -2.66 | -2.62 | -2.67 | -2.58 | -2.50 | -2.44 | -2.41 | -2.61 | -2.54 | -2.47 | -2.41 | -2.37 |
| | 70 | -3.66 | -3.59 | -3.52 | -3.47 | -3.44 | -3.40 | -3.32 | -3.26 | -3.20 | -3.16 | -2.97 | -2.89 | -2.81 | -2.74 | -2.70 | -2.76 | -2.69 | -2.61 | -2.54 | -2.50 | -2.68 | -2.60 | -2.54 | -2.47 | -2.44 |
| | 100 | -3.66 | -3.59 | -3.52 | -3.46 | -3.43 | -3.39 | -3.32 | -3.26 | -3.21 | -3.17 | -3.02 | -2.94 | -2.86 | -2.79 | -2.76 | -2.85 | -2.77 | -2.69 | -2.63 | -2.59 | -2.76 | -2.69 | -2.61 | -2.55 | -2.51 |
| | 200 | -3.65 | -3.58 | -3.51 | -3.45 | -3.42 | -3.40 | -3.32 | -3.26 | -3.21 | -3.18 | -3.08 | -2.99 | -2.92 | -2.86 | -2.82 | -2.94 | -2.86 | -2.78 | -2.72 | -2.68 | -2.85 | -2.78 | -2.72 | -2.65 | -2.62 |
| 4 | 50 | -3.57 | -3.50 | -3.43 | -3.38 | -3.35 | -3.30 | -3.22 | -3.15 | -3.09 | -3.05 | -2.80 | -2.71 | -2.62 | -2.55 | -2.50 | -2.58 | -2.49 | -2.41 | -2.34 | -2.30 | -2.59 | -2.50 | -2.44 | -2.37 | -2.34 |
| | 70 | -3.61 | -3.54 | -3.47 | -3.43 | -3.39 | -3.34 | -3.27 | -3.21 | -3.15 | -3.11 | -2.90 | -2.81 | -2.72 | -2.65 | -2.62 | -2.69 | -2.59 | -2.52 | -2.45 | -2.42 | -2.62 | -2.54 | -2.47 | -2.41 | -2.38 |
| | 100 | -3.63 | -3.56 | -3.48 | -3.44 | -3.40 | -3.36 | -3.28 | -3.23 | -3.17 | -3.15 | -2.98 | -2.88 | -2.81 | -2.74 | -2.70 | -2.78 | -2.70 | -2.62 | -2.56 | -2.52 | -2.70 | -2.62 | -2.55 | -2.49 | -2.45 |
| | 200 | -3.64 | -3.57 | -3.50 | -3.44 | -3.41 | -3.38 | -3.31 | -3.25 | -3.19 | -3.16 | -3.06 | -2.98 | -2.89 | -2.84 | -2.80 | -2.91 | -2.82 | -2.75 | -2.69 | -2.65 | -2.83 | -2.75 | -2.68 | -2.62 | -2.58 |
| 5% | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 50 | -3.55 | -3.50 | -3.44 | -3.40 | -3.37 | -3.24 | -3.18 | -3.14 | -3.11 | -3.10 | -2.92 | -2.86 | -2.81 | -2.77 | -2.75 | -2.79 | -2.73 | -2.68 | -2.64 | -2.61 | -2.72 | -2.66 | -2.61 | -2.57 | -2.55 |
| | 70 | -3.54 | -3.49 | -3.44 | -3.39 | -3.37 | -3.24 | -3.19 | -3.14 | -3.11 | -3.09 | -2.95 | -2.89 | -2.83 | -2.79 | -2.77 | -2.82 | -2.75 | -2.71 | -2.66 | -2.64 | -2.75 | -2.69 | -2.65 | -2.60 | -2.58 |
| | 100 | -3.53 | -3.48 | -3.43 | -3.39 | -3.36 | -3.23 | -3.18 | -3.14 | -3.11 | -3.09 | -2.94 | -2.89 | -2.84 | -2.80 | -2.78 | -2.83 | -2.77 | -2.72 | -2.68 | -2.66 | -2.77 | -2.71 | -2.67 | -2.62 | -2.60 |
| | 200 | -3.53 | -3.48 | -3.43 | -3.39 | -3.36 | -3.23 | -3.17 | -3.13 | -3.11 | -3.09 | -2.96 | -2.90 | -2.85 | -2.81 | -2.79 | -2.84 | -2.79 | -2.74 | -2.70 | -2.68 | -2.78 | -2.74 | -2.69 | -2.64 | -2.62 |
| 1 | 50 | -3.56 | -3.51 | -3.46 | -3.41 | -3.39 | -3.24 | -3.19 | -3.15 | -3.12 | -3.10 | -2.87 | -2.81 | -2.76 | -2.71 | -2.68 | -2.70 | -2.64 | -2.59 | -2.54 | -2.52 | -2.61 | -2.56 | -2.51 | -2.47 | -2.44 |
| | 70 | -3.55 | -3.50 | -3.45 | -3.40 | -3.38 | -3.24 | -3.19 | -3.15 | -3.12 | -3.09 | -2.90 | -2.85 | -2.79 | -2.75 | -2.72 | -2.75 | -2.69 | -2.64 | -2.60 | -2.58 | -2.68 | -2.62 | -2.57 | -2.53 | -2.51 |
| | 100 | -3.54 | -3.49 | -3.44 | -3.40 | -3.37 | -3.23 | -3.18 | -3.14 | -3.11 | -3.09 | -2.92 | -2.87 | -2.82 | -2.77 | -2.75 | -2.79 | -2.73 | -2.68 | -2.64 | -2.62 | -2.72 | -2.66 | -2.62 | -2.58 | -2.55 |
| | 200 | -3.53 | -3.48 | -3.43 | -3.39 | -3.36 | -3.23 | -3.18 | -3.14 | -3.11 | -3.09 | -2.95 | -2.89 | -2.84 | -2.80 | -2.78 | -2.82 | -2.77 | -2.72 | -2.68 | -2.66 | -2.76 | -2.71 | -2.67 | -2.62 | -2.60 |
| 2 | 50 | -3.49 | -3.43 | -3.38 | -3.35 | -3.32 | -3.17 | -3.12 | -3.08 | -3.04 | -3.03 | -2.75 | -2.68 | -2.63 | -2.58 | -2.56 | -2.55 | -2.49 | -2.44 | -2.40 | -2.37 | -2.48 | -2.42 | -2.37 | -2.33 | -2.31 |
| | 70 | -3.50 | -3.44 | -3.40 | -3.36 | -3.34 | -3.19 | -3.14 | -3.10 | -3.07 | -3.05 | -2.82 | -2.76 | -2.70 | -2.66 | -2.63 | -2.65 | -2.59 | -2.54 | -2.49 | -2.47 | -2.57 | -2.51 | -2.47 | -2.42 | -2.40 |
| | 100 | -3.51 | -3.45 | -3.41 | -3.37 | -3.34 | -3.20 | -3.15 | -3.11 | -3.08 | -3.06 | -2.86 | -2.81 | -2.76 | -2.71 | -2.69 | -2.72 | -2.66 | -2.61 | -2.57 | -2.55 | -2.65 | -2.59 | -2.54 | -2.50 | -2.48 |
| | 200 | -3.52 | -3.46 | -3.42 | -3.38 | -3.35 | -3.22 | -3.16 | -3.12 | -3.09 | -3.07 | -2.92 | -2.86 | -2.81 | -2.77 | -2.75 | -2.79 | -2.74 | -2.69 | -2.65 | -2.63 | -2.73 | -2.68 | -2.63 | -2.59 | -2.57 |
| 3 | 50 | -3.48 | -3.43 | -3.38 | -3.35 | -3.32 | -3.16 | -3.10 | -3.06 | -3.03 | -3.01 | -2.68 | -2.61 | -2.56 | -2.51 | -2.48 | -2.47 | -2.41 | -2.36 | -2.32 | -2.29 | -2.43 | -2.38 | -2.33 | -2.29 | -2.27 |
| | 70 | -3.50 | -3.45 | -3.40 | -3.36 | -3.34 | -3.19 | -3.14 | -3.10 | -3.06 | -3.04 | -2.77 | -2.71 | -2.65 | -2.61 | -2.58 | -2.59 | -2.52 | -2.48 | -2.43 | -2.41 | -2.51 | -2.46 | -2.41 | -2.37 | -2.35 |
| | 100 | -3.51 | -3.46 | -3.41 | -3.37 | -3.35 | -3.20 | -3.15 | -3.11 | -3.08 | -3.06 | -2.83 | -2.78 | -2.72 | -2.68 | -2.66 | -2.68 | -2.62 | -2.56 | -2.52 | -2.50 | -2.60 | -2.54 | -2.49 | -2.45 | -2.43 |
| | 200 | -3.52 | -3.47 | -3.42 | -3.38 | -3.35 | -3.22 | -3.16 | -3.12 | -3.10 | -3.08 | -2.91 | -2.85 | -2.80 | -2.76 | -2.74 | -2.77 | -2.72 | -2.67 | -2.63 | -2.60 | -2.70 | -2.65 | -2.61 | -2.56 | -2.54 |
| 4 | 50 | -3.38 | -3.33 | -3.28 | -3.24 | -3.22 | -3.07 | -3.01 | -2.96 | -2.92 | -2.90 | -2.56 | -2.50 | -2.44 | -2.39 | -2.36 | -2.38 | -2.32 | -2.26 | -2.22 | -2.19 | -2.40 | -2.34 | -2.29 | -2.25 | -2.23 |
| | 70 | -3.44 | -3.39 | -3.34 | -3.31 | -3.29 | -3.12 | -3.08 | -3.04 | -3.00 | -2.98 | -2.68 | -2.62 | -2.56 | -2.52 | -2.49 | -2.49 | -2.43 | -2.38 | -2.34 | -2.31 | -2.44 | -2.39 | -2.34 | -2.30 | -2.28 |
| | 100 | -3.47 | -3.42 | -3.38 | -3.34 | -3.32 | -3.17 | -3.12 | -3.07 | -3.04 | -3.03 | -2.78 | -2.72 | -2.66 | -2.62 | -2.59 | -2.60 | -2.55 | -2.49 | -2.45 | -2.42 | -2.53 | -2.47 | -2.43 | -2.39 | -2.36 |
| | 200 | -3.50 | -3.45 | -3.40 | -3.36 | -3.34 | -3.20 | -3.16 | -3.11 | -3.08 | -3.06 | -2.89 | -2.82 | -2.77 | -2.73 | -2.71 | -2.74 | -2.68 | -2.63 | -2.59 | -2.57 | -2.67 | -2.61 | -2.56 | -2.53 | -2.50 |
| 10% | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 50 | -3.47 | -3.43 | -3.39 | -3.36 | -3.33 | -3.13 | -3.09 | -3.06 | -3.04 | -3.03 | -2.83 | -2.78 | -2.75 | -2.71 | -2.70 | -2.70 | -2.65 | -2.61 | -2.58 | -2.56 | -2.63 | -2.59 | -2.55 | -2.52 | -2.50 |
| | 70 | -3.47 | -3.43 | -3.39 | -3.35 | -3.33 | -3.14 | -3.10 | -3.06 | -3.04 | -3.02 | -2.85 | -2.81 | -2.76 | -2.73 | -2.71 | -2.72 | -2.68 | -2.64 | -2.61 | -2.59 | -2.66 | -2.62 | -2.58 | -2.55 | -2.53 |
| | 100 | -3.46 | -3.43 | -3.39 | -3.35 | -3.33 | -3.13 | -3.09 | -3.06 | -3.04 | -3.03 | -2.85 | -2.82 | -2.78 | -2.74 | -2.73 | -2.74 | -2.70 | -2.66 | -2.63 | -2.61 | -2.68 | -2.64 | -2.61 | -2.57 | -2.55 |
| | 200 | -3.46 | -3.42 | -3.38 | -3.35 | -3.33 | -3.13 | -3.09 | -3.06 | -3.04 | -3.02 | -2.87 | -2.83 | -2.79 | -2.76 | -2.74 | -2.76 | -2.72 | -2.68 | -2.65 | -2.63 | -2.71 | -2.67 | -2.63 | -2.60 | -2.58 |
| 1 | 50 | -3.48 | -3.43 | -3.40 | -3.36 | -3.34 | -3.13 | -3.09 | -3.06 | -3.04 | -3.03 | -2.76 | -2.72 | -2.68 | -2.65 | -2.63 | -2.60 | -2.56 | -2.52 | -2.48 | -2.47 | -2.52 | -2.48 | -2.44 | -2.41 | -2.39 |
| | 70 | -3.47 | -3.43 | -3.39 | -3.36 | -3.34 | -3.13 | -3.10 | -3.06 | -3.04 | -3.02 | -2.81 | -2.76 | -2.72 | -2.69 | -2.67 | -2.66 | -2.61 | -2.58 | -2.54 | -2.53 | -2.59 | -2.54 | -2.51 | -2.48 | -2.46 |
| | 100 | -3.47 | -3.42 | -3.39 | -3.35 | -3.33 | -3.13 | -3.09 | -3.06 | -3.04 | -3.03 | -2.83 | -2.79 | -2.75 | -2.71 | -2.70 | -2.70 | -2.66 | -2.62 | -2.58 | -2.57 | -2.64 | -2.59 | -2.56 | -2.52 | -2.50 |
| | 200 | -3.46 | -3.42 | -3.39 | -3.35 | -3.33 | -3.13 | -3.09 | -3.06 | -3.04 | -3.02 | -2.86 | -2.81 | -2.78 | -2.74 | -2.73 | -2.74 | -2.70 | -2.66 | -2.63 | -2.61 | -2.68 | -2.64 | -2.61 | -2.57 | -2.56 |
| 2 | 50 | -3.39 | -3.35 | -3.32 | -3.29 | -3.27 | -3.05 | -3.01 | -2.98 | -2.96 | -2.95 | -2.64 | -2.59 | -2.54 | -2.51 | -2.49 | -2.46 | -2.41 | -2.37 | -2.33 | -2.32 | -2.38 | -2.34 | -2.30 | -2.27 | -2.25 |
| | 70 | -3.41 | -3.38 | -3.34 | -3.31 | -3.29 | -3.08 | -3.04 | -3.01 | -2.99 | -2.97 | -2.72 | -2.67 | -2.63 | -2.59 | -2.58 | -2.55 | -2.51 | -2.47 | -2.44 | -2.42 | -2.48 | -2.43 | -2.40 | -2.37 | -2.35 |
| | 100 | -3.43 | -3.39 | -3.35 | -3.32 | -3.30 | -3.09 | -3.06 | -3.03 | -3.00 | -2.99 | -2.77 | -2.73 | -2.68 | -2.65 | -2.64 | -2.63 | -2.58 | -2.54 | -2.51 | -2.50 | -2.56 | -2.51 | -2.48 | -2.45 | -2.43 |
| | 200 | -3.45 | -3.41 | -3.37 | -3.34 | -3.32 | -3.12 | -3.08 | -3.05 | -3.03 | -3.01 | -2.83 | -2.78 | -2.75 | -2.72 | -2.70 | -2.71 | -2.67 | -2.63 | -2.60 | -2.58 | -2.64 | -2.60 | -2.57 | -2.53 | -2.52 |
| 3 | 50 | -3.38 | -3.34 | -3.30 | -3.27 | -3.25 | -3.03 | -2.99 | -2.96 | -2.93 | -2.93 | -2.56 | -2.51 | -2.47 | -2.43 | -2.41 | -2.37 | -2.32 | -2.29 | -2.25 | -2.23 | -2.33 | -2.30 | -2.26 | -2.23 | -2.21 |
| | 70 | -3.41 | -3.37 | -3.34 | -3.31 | -3.29 | -3.07 | -3.03 | -3.00 | -2.98 | -2.96 | -2.66 | -2.62 | -2.57 | -2.54 | -2.52 | -2.49 | -2.44 | -2.40 | -2.37 | -2.35 | -2.42 | -2.38 | -2.34 | -2.31 | -2.29 |
| | 100 | -3.43 | -3.39 | -3.35 | -3.32 | -3.30 | -3.09 | -3.05 | -3.02 | -3.00 | -2.99 | -2.73 | -2.69 | -2.65 | -2.62 | -2.60 | -2.58 | -2.54 | -2.49 | -2.46 | -2.45 | -2.51 | -2.46 | -2.43 | -2.40 | -2.38 |
| | 200 | -3.45 | -3.41 | -3.37 | -3.34 | -3.32 | -3.12 | -3.08 | -3.05 | -3.03 | -3.01 | -2.81 | -2.77 | -2.73 | -2.70 | -2.68 | -2.68 | -2.65 | -2.61 | -2.57 | -2.56 | -2.62 | -2.58 | -2.54 | -2.51 | -2.49 |
| 4 | 50 | -3.27 | -3.24 | -3.20 | -3.17 | -3.15 | -2.93 | -2.89 | -2.85 | -2.83 | -2.81 | -2.44 | -2.39 | -2.34 | -2.30 | -2.28 | -2.27 | -2.23 | -2.18 | -2.15 | -2.12 | -2.30 | -2.25 | -2.21 | -2.18 | -2.17 |
| | 70 | -3.35 | -3.31 | -3.28 | -3.25 | -3.23 | -3.01 | -2.97 | -2.94 | -2.91 | -2.90 | -2.57 | -2.52 | -2.48 | -2.44 | -2.42 | -2.39 | -2.35 | -2.31 | -2.27 | -2.26 | -2.35 | -2.31 | -2.27 | -2.24 | -2.22 |
| | 100 | -3.39 | -3.35 | -3.31 | -3.29 | -3.27 | -3.05 | -3.02 | -2.98 | -2.96 | -2.95 | -2.67 | -2.62 | -2.58 | -2.55 | -2.53 | -2.51 | -2.46 | -2.42 | -2.39 | -2.37 | -2.44 | -2.40 | -2.36 | -2.33 | -2.31 |
| | 200 | -3.43 | -3.39 | -3.35 | -3.32 | -3.30 | -3.09 | -3.06 | -3.03 | -3.01 | -3.00 | -2.79 | -2.74 | -2.70 | -2.67 | -2.66 | -2.65 | -2.61 | -2.57 | -2.54 | -2.52 | -2.58 | -2.54 | -2.50 | -2.47 | -2.46 |

*Notes:* Same as those in Table B1 except that $\mathbf{h}_t$ in regression is set to $\mathbf{h}_t = [1, t]$.

TABLE B3

Critical values of the *BCIPS* test with *m*=2 –with an intercept only

| $p$ | $T \setminus N$ | $\kappa$ =1 | | | | | $\kappa$ =2 | | | | | $\kappa$ =3 | | | | | $\kappa$ =4 | | | | | $\kappa$ =5 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 |
| | | | | | | | | | | | | | | 1% | | | | | | | | | | | | |
| 0 | 50 | -3.41 | -3.34 | -3.27 | -3.21 | -3.17 | -3.15 | -3.09 | -3.00 | -2.99 | -2.93 | -2.84 | -2.77 | -2.70 | -2.65 | -2.61 | -2.72 | -2.64 | -2.56 | -2.51 | -2.48 | -2.65 | -2.58 | -2.51 | -2.45 | -2.42 |
| | 70 | -3.39 | -3.34 | -3.27 | -3.21 | -3.19 | -3.16 | -3.06 | -3.00 | -2.99 | -2.95 | -2.85 | -2.78 | -2.72 | -2.67 | -2.63 | -2.72 | -2.65 | -2.61 | -2.54 | -2.52 | -2.67 | -2.60 | -2.53 | -2.48 | -2.46 |
| | 100 | -3.40 | -3.32 | -3.27 | -3.21 | -3.18 | -3.15 | -3.09 | -3.02 | -2.96 | -2.97 | -2.87 | -2.80 | -2.73 | -2.67 | -2.65 | -2.76 | -2.67 | -2.60 | -2.57 | -2.53 | -2.70 | -2.61 | -2.55 | -2.51 | -2.48 |
| | 200 | -3.39 | -3.32 | -3.27 | -3.21 | -3.19 | -3.15 | -3.08 | -3.03 | -2.97 | -2.96 | -2.88 | -2.82 | -2.75 | -2.70 | -2.68 | -2.77 | -2.70 | -2.64 | -2.58 | -2.57 | -2.72 | -2.64 | -2.59 | -2.53 | -2.51 |
| 1 | 50 | -3.41 | -3.31 | -3.28 | -3.20 | -3.17 | -3.13 | -3.08 | -2.98 | -2.96 | -2.92 | -2.77 | -2.71 | -2.63 | -2.57 | -2.54 | -2.63 | -2.53 | -2.46 | -2.41 | -2.37 | -2.54 | -2.46 | -2.39 | -2.33 | -2.30 |
| | 70 | -3.38 | -3.33 | -3.26 | -3.20 | -3.18 | -3.17 | -3.06 | -3.00 | -2.97 | -2.94 | -2.81 | -2.74 | -2.66 | -2.61 | -2.58 | -2.65 | -2.60 | -2.53 | -2.47 | -2.45 | -2.61 | -2.52 | -2.45 | -2.41 | -2.37 |
| | 100 | -3.39 | -3.32 | -3.26 | -3.21 | -3.18 | -3.14 | -3.07 | -3.01 | -2.96 | -2.96 | -2.84 | -2.77 | -2.70 | -2.64 | -2.61 | -2.71 | -2.63 | -2.56 | -2.53 | -2.48 | -2.64 | -2.55 | -2.50 | -2.45 | -2.42 |
| | 200 | -3.38 | -3.33 | -3.26 | -3.21 | -3.18 | -3.14 | -3.08 | -3.03 | -2.97 | -2.95 | -2.86 | -2.80 | -2.74 | -2.68 | -2.66 | -2.75 | -2.68 | -2.63 | -2.57 | -2.55 | -2.70 | -2.62 | -2.56 | -2.50 | -2.49 |
| 2 | 50 | -3.31 | -3.22 | -3.16 | -3.11 | -3.06 | -3.07 | -2.98 | -2.89 | -2.86 | -2.83 | -2.65 | -2.57 | -2.48 | -2.42 | -2.40 | -2.48 | -2.38 | -2.31 | -2.26 | -2.22 | -2.41 | -2.32 | -2.25 | -2.20 | -2.15 |
| | 70 | -3.33 | -3.28 | -3.19 | -3.13 | -3.12 | -3.09 | -2.99 | -2.94 | -2.90 | -2.87 | -2.72 | -2.65 | -2.57 | -2.51 | -2.48 | -2.57 | -2.49 | -2.41 | -2.35 | -2.34 | -2.49 | -2.40 | -2.33 | -2.29 | -2.26 |
| | 100 | -3.36 | -3.28 | -3.22 | -3.16 | -3.14 | -3.10 | -3.03 | -2.97 | -2.93 | -2.92 | -2.78 | -2.71 | -2.64 | -2.57 | -2.55 | -2.64 | -2.56 | -2.49 | -2.45 | -2.41 | -2.56 | -2.48 | -2.42 | -2.37 | -2.34 |
| | 200 | -3.37 | -3.31 | -3.24 | -3.18 | -3.16 | -3.13 | -3.06 | -3.01 | -2.95 | -2.93 | -2.83 | -2.77 | -2.72 | -2.65 | -2.62 | -2.71 | -2.65 | -2.59 | -2.53 | -2.51 | -2.66 | -2.58 | -2.53 | -2.47 | -2.45 |
| 3 | 50 | -3.27 | -3.20 | -3.13 | -3.07 | -3.02 | -3.01 | -2.94 | -2.85 | -2.82 | -2.78 | -2.58 | -2.50 | -2.41 | -2.34 | -2.31 | -2.38 | -2.30 | -2.23 | -2.16 | -2.13 | -2.35 | -2.28 | -2.21 | -2.14 | -2.09 |
| | 70 | -3.29 | -3.27 | -3.17 | -3.12 | -3.11 | -3.06 | -2.96 | -2.91 | -2.89 | -2.84 | -2.67 | -2.61 | -2.52 | -2.45 | -2.42 | -2.50 | -2.43 | -2.34 | -2.29 | -2.26 | -2.43 | -2.34 | -2.26 | -2.23 | -2.20 |
| | 100 | -3.35 | -3.27 | -3.21 | -3.15 | -3.13 | -3.08 | -3.01 | -2.96 | -2.92 | -2.91 | -2.75 | -2.68 | -2.59 | -2.53 | -2.50 | -2.59 | -2.51 | -2.43 | -2.39 | -2.35 | -2.51 | -2.44 | -2.37 | -2.32 | -2.29 |
| | 200 | -3.37 | -3.30 | -3.24 | -3.19 | -3.16 | -3.12 | -3.06 | -3.00 | -2.95 | -2.93 | -2.82 | -2.76 | -2.70 | -2.63 | -2.61 | -2.70 | -2.63 | -2.56 | -2.50 | -2.48 | -2.64 | -2.56 | -2.49 | -2.44 | -2.42 |
| 4 | 50 | -3.13 | -3.07 | -3.00 | -2.93 | -2.87 | -2.89 | -2.83 | -2.73 | -2.68 | -2.66 | -2.46 | -2.35 | -2.28 | -2.22 | -2.18 | -2.31 | -2.18 | -2.11 | -2.04 | -2.01 | -2.30 | -2.23 | -2.14 | -2.08 | -2.03 |
| | 70 | -3.24 | -3.19 | -3.09 | -3.04 | -3.03 | -3.01 | -2.89 | -2.84 | -2.83 | -2.77 | -2.59 | -2.50 | -2.42 | -2.35 | -2.32 | -2.40 | -2.34 | -2.25 | -2.19 | -2.16 | -2.35 | -2.27 | -2.19 | -2.15 | -2.12 |
| | 100 | -3.31 | -3.21 | -3.16 | -3.11 | -3.08 | -3.05 | -2.99 | -2.90 | -2.86 | -2.86 | -2.70 | -2.61 | -2.53 | -2.46 | -2.43 | -2.52 | -2.44 | -2.37 | -2.32 | -2.27 | -2.46 | -2.37 | -2.31 | -2.25 | -2.22 |
| | 200 | -3.35 | -3.27 | -3.22 | -3.16 | -3.13 | -3.08 | -3.03 | -2.98 | -2.93 | -2.91 | -2.80 | -2.72 | -2.66 | -2.60 | -2.57 | -2.66 | -2.60 | -2.52 | -2.46 | -2.44 | -2.60 | -2.52 | -2.46 | -2.41 | -2.38 |
| | | | | | | | | | | | | | | 5% | | | | | | | | | | | | |
| 0 | 50 | -3.24 | -3.17 | -3.14 | -3.10 | -3.08 | -2.92 | -2.87 | -2.83 | -2.80 | -2.79 | -2.64 | -2.59 | -2.55 | -2.51 | -2.48 | -2.52 | -2.47 | -2.43 | -2.38 | -2.37 | -2.47 | -2.41 | -2.37 | -2.33 | -2.31 |
| | 70 | -3.23 | -3.19 | -3.14 | -3.10 | -3.09 | -2.93 | -2.88 | -2.83 | -2.81 | -2.79 | -2.66 | -2.61 | -2.56 | -2.53 | -2.51 | -2.55 | -2.49 | -2.45 | -2.42 | -2.41 | -2.49 | -2.44 | -2.40 | -2.36 | -2.34 |
| | 100 | -3.23 | -3.19 | -3.15 | -3.11 | -3.09 | -2.94 | -2.89 | -2.84 | -2.81 | -2.80 | -2.68 | -2.63 | -2.58 | -2.55 | -2.53 | -2.56 | -2.52 | -2.48 | -2.44 | -2.42 | -2.51 | -2.46 | -2.42 | -2.39 | -2.37 |
| | 200 | -3.23 | -3.20 | -3.14 | -3.12 | -3.10 | -2.92 | -2.89 | -2.85 | -2.82 | -2.81 | -2.69 | -2.65 | -2.60 | -2.57 | -2.55 | -2.60 | -2.54 | -2.50 | -2.47 | -2.45 | -2.54 | -2.50 | -2.45 | -2.41 | -2.40 |
| 1 | 50 | -3.21 | -3.15 | -3.11 | -3.07 | -3.05 | -2.90 | -2.85 | -2.80 | -2.78 | -2.76 | -2.56 | -2.51 | -2.46 | -2.42 | -2.39 | -2.42 | -2.35 | -2.32 | -2.27 | -2.25 | -2.35 | -2.30 | -2.25 | -2.20 | -2.19 |
| | 70 | -3.21 | -3.18 | -3.13 | -3.08 | -3.07 | -2.91 | -2.86 | -2.83 | -2.80 | -2.77 | -2.62 | -2.55 | -2.51 | -2.47 | -2.46 | -2.48 | -2.42 | -2.38 | -2.34 | -2.33 | -2.41 | -2.35 | -2.31 | -2.28 | -2.26 |
| | 100 | -3.22 | -3.17 | -3.14 | -3.09 | -3.08 | -2.93 | -2.87 | -2.82 | -2.81 | -2.79 | -2.64 | -2.60 | -2.53 | -2.51 | -2.48 | -2.52 | -2.47 | -2.42 | -2.39 | -2.36 | -2.46 | -2.41 | -2.36 | -2.33 | -2.31 |
| | 200 | -3.22 | -3.19 | -3.14 | -3.11 | -3.09 | -2.92 | -2.88 | -2.85 | -2.81 | -2.80 | -2.67 | -2.63 | -2.59 | -2.55 | -2.54 | -2.57 | -2.52 | -2.48 | -2.44 | -2.43 | -2.52 | -2.46 | -2.42 | -2.39 | -2.37 |
| 2 | 50 | -3.09 | -3.05 | -3.00 | -2.97 | -2.94 | -2.80 | -2.75 | -2.69 | -2.68 | -2.66 | -2.43 | -2.37 | -2.31 | -2.27 | -2.25 | -2.27 | -2.20 | -2.15 | -2.11 | -2.09 | -2.21 | -2.14 | -2.11 | -2.06 | -2.04 |
| | 70 | -3.14 | -3.11 | -3.06 | -3.02 | -3.00 | -2.85 | -2.79 | -2.75 | -2.73 | -2.70 | -2.51 | -2.46 | -2.41 | -2.37 | -2.35 | -2.37 | -2.32 | -2.27 | -2.22 | -2.21 | -2.30 | -2.24 | -2.20 | -2.17 | -2.15 |
| | 100 | -3.18 | -3.13 | -3.09 | -3.05 | -3.03 | -2.89 | -2.84 | -2.78 | -2.76 | -2.75 | -2.58 | -2.53 | -2.47 | -2.44 | -2.41 | -2.45 | -2.39 | -2.34 | -2.31 | -2.29 | -2.38 | -2.33 | -2.29 | -2.25 | -2.23 |
| | 200 | -3.20 | -3.17 | -3.12 | -3.09 | -3.07 | -2.89 | -2.87 | -2.82 | -2.79 | -2.78 | -2.64 | -2.60 | -2.56 | -2.52 | -2.51 | -2.54 | -2.48 | -2.44 | -2.40 | -2.39 | -2.48 | -2.42 | -2.39 | -2.35 | -2.33 |
| 3 | 50 | -3.04 | -3.00 | -2.94 | -2.92 | -2.88 | -2.75 | -2.70 | -2.63 | -2.62 | -2.59 | -2.34 | -2.28 | -2.22 | -2.18 | -2.15 | -2.17 | -2.11 | -2.06 | -2.01 | -2.00 | -2.15 | -2.08 | -2.04 | -2.00 | -1.97 |
| | 70 | -3.11 | -3.07 | -3.03 | -2.99 | -2.97 | -2.83 | -2.75 | -2.72 | -2.70 | -2.67 | -2.46 | -2.40 | -2.34 | -2.30 | -2.28 | -2.30 | -2.25 | -2.18 | -2.15 | -2.13 | -2.24 | -2.18 | -2.13 | -2.10 | -2.08 |
| | 100 | -3.16 | -3.11 | -3.07 | -3.04 | -3.02 | -2.87 | -2.83 | -2.76 | -2.74 | -2.73 | -2.54 | -2.49 | -2.43 | -2.39 | -2.37 | -2.40 | -2.34 | -2.29 | -2.26 | -2.23 | -2.32 | -2.28 | -2.23 | -2.20 | -2.18 |
| | 200 | -3.19 | -3.16 | -3.11 | -3.08 | -3.06 | -2.89 | -2.86 | -2.82 | -2.79 | -2.77 | -2.62 | -2.58 | -2.54 | -2.50 | -2.49 | -2.51 | -2.46 | -2.41 | -2.38 | -2.36 | -2.45 | -2.40 | -2.35 | -2.32 | -2.30 |
| 4 | 50 | -2.91 | -2.86 | -2.81 | -2.77 | -2.74 | -2.63 | -2.57 | -2.51 | -2.48 | -2.47 | -2.22 | -2.14 | -2.08 | -2.04 | -2.01 | -2.07 | -2.01 | -1.94 | -1.89 | -1.88 | -2.09 | -2.01 | -1.97 | -1.93 | -1.90 |
| | 70 | -3.03 | -2.99 | -2.94 | -2.90 | -2.89 | -2.75 | -2.67 | -2.64 | -2.62 | -2.58 | -2.35 | -2.31 | -2.24 | -2.20 | -2.18 | -2.20 | -2.15 | -2.09 | -2.05 | -2.03 | -2.16 | -2.10 | -2.05 | -2.01 | -1.99 |
| | 100 | -3.10 | -3.06 | -3.02 | -2.98 | -2.97 | -2.82 | -2.77 | -2.72 | -2.69 | -2.68 | -2.47 | -2.42 | -2.36 | -2.32 | -2.30 | -2.33 | -2.27 | -2.22 | -2.18 | -2.16 | -2.25 | -2.22 | -2.16 | -2.12 | -2.11 |
| | 200 | -3.18 | -3.13 | -3.09 | -3.06 | -3.04 | -2.88 | -2.85 | -2.80 | -2.76 | -2.75 | -2.59 | -2.54 | -2.51 | -2.46 | -2.45 | -2.47 | -2.42 | -2.38 | -2.34 | -2.32 | -2.41 | -2.36 | -2.32 | -2.28 | -2.26 |
| | | | | | | | | | | | | | | 10% | | | | | | | | | | | | |
| 0 | 50 | -3.14 | -3.09 | -3.06 | -3.04 | -3.02 | -2.79 | -2.75 | -2.72 | -2.71 | -2.69 | -2.53 | -2.49 | -2.46 | -2.43 | -2.41 | -2.41 | -2.38 | -2.34 | -2.31 | -2.30 | -2.36 | -2.32 | -2.30 | -2.26 | -2.24 |
| | 70 | -3.14 | -3.11 | -3.07 | -3.04 | -3.03 | -2.80 | -2.77 | -2.74 | -2.71 | -2.70 | -2.56 | -2.52 | -2.48 | -2.45 | -2.44 | -2.45 | -2.41 | -2.37 | -2.34 | -2.34 | -2.39 | -2.35 | -2.32 | -2.30 | -2.28 |
| | 100 | -3.14 | -3.10 | -3.08 | -3.05 | -3.04 | -2.82 | -2.78 | -2.74 | -2.72 | -2.71 | -2.57 | -2.54 | -2.49 | -2.47 | -2.45 | -2.47 | -2.43 | -2.40 | -2.37 | -2.36 | -2.41 | -2.38 | -2.35 | -2.32 | -2.31 |
| | 200 | -3.14 | -3.12 | -3.08 | -3.06 | -3.04 | -2.81 | -2.78 | -2.76 | -2.73 | -2.71 | -2.59 | -2.55 | -2.52 | -2.49 | -2.48 | -2.49 | -2.45 | -2.42 | -2.40 | -2.39 | -2.44 | -2.41 | -2.37 | -2.35 | -2.33 |
| 1 | 50 | -3.10 | -3.06 | -3.02 | -3.00 | -2.98 | -2.76 | -2.72 | -2.69 | -2.67 | -2.66 | -2.45 | -2.40 | -2.37 | -2.34 | -2.32 | -2.31 | -2.26 | -2.23 | -2.20 | -2.18 | -2.24 | -2.20 | -2.17 | -2.14 | -2.12 |
| | 70 | -3.11 | -3.08 | -3.05 | -3.02 | -3.00 | -2.79 | -2.74 | -2.72 | -2.69 | -2.68 | -2.50 | -2.46 | -2.41 | -2.39 | -2.38 | -2.37 | -2.33 | -2.30 | -2.27 | -2.26 | -2.31 | -2.26 | -2.24 | -2.21 | -2.20 |
| | 100 | -3.13 | -3.09 | -3.07 | -3.03 | -3.02 | -2.80 | -2.76 | -2.72 | -2.70 | -2.69 | -2.53 | -2.49 | -2.46 | -2.43 | -2.41 | -2.42 | -2.38 | -2.35 | -2.32 | -2.30 | -2.36 | -2.32 | -2.29 | -2.26 | -2.25 |
| | 200 | -3.14 | -3.11 | -3.07 | -3.05 | -3.04 | -2.80 | -2.78 | -2.75 | -2.72 | -2.70 | -2.57 | -2.53 | -2.50 | -2.47 | -2.46 | -2.47 | -2.43 | -2.40 | -2.37 | -2.36 | -2.42 | -2.38 | -2.35 | -2.32 | -2.30 |
| 2 | 50 | -2.98 | -2.94 | -2.91 | -2.89 | -2.87 | -2.65 | -2.62 | -2.58 | -2.57 | -2.55 | -2.31 | -2.25 | -2.22 | -2.19 | -2.17 | -2.15 | -2.10 | -2.07 | -2.04 | -2.02 | -2.10 | -2.05 | -2.02 | -1.99 | -1.97 |
| | 70 | -3.03 | -3.01 | -2.98 | -2.94 | -2.93 | -2.71 | -2.67 | -2.65 | -2.62 | -2.60 | -2.40 | -2.36 | -2.31 | -2.29 | -2.27 | -2.26 | -2.22 | -2.18 | -2.15 | -2.14 | -2.20 | -2.15 | -2.13 | -2.10 | -2.08 |
| | 100 | -3.08 | -3.04 | -3.01 | -2.98 | -2.97 | -2.76 | -2.71 | -2.67 | -2.66 | -2.65 | -2.46 | -2.43 | -2.39 | -2.36 | -2.34 | -2.35 | -2.30 | -2.27 | -2.24 | -2.22 | -2.28 | -2.24 | -2.21 | -2.18 | -2.17 |
| | 200 | -3.12 | -3.09 | -3.05 | -3.03 | -3.01 | -2.78 | -2.76 | -2.73 | -2.70 | -2.68 | -2.53 | -2.50 | -2.47 | -2.44 | -2.43 | -2.43 | -2.39 | -2.36 | -2.33 | -2.32 | -2.38 | -2.34 | -2.31 | -2.28 | -2.26 |
| 3 | 50 | -2.93 | -2.89 | -2.85 | -2.83 | -2.80 | -2.60 | -2.56 | -2.52 | -2.50 | -2.49 | -2.21 | -2.16 | -2.12 | -2.09 | -2.06 | -2.06 | -2.01 | -1.97 | -1.94 | -1.92 | -2.03 | -1.98 | -1.95 | -1.92 | -1.90 |
| | 70 | -3.00 | -2.97 | -2.94 | -2.91 | -2.90 | -2.69 | -2.63 | -2.60 | -2.59 | -2.57 | -2.33 | -2.29 | -2.24 | -2.21 | -2.21 | -2.19 | -2.14 | -2.10 | -2.07 | -2.06 | -2.13 | -2.08 | -2.05 | -2.03 | -2.01 |
| | 100 | -3.06 | -3.02 | -2.99 | -2.97 | -2.95 | -2.73 | -2.69 | -2.65 | -2.63 | -2.62 | -2.42 | -2.38 | -2.34 | -2.32 | -2.29 | -2.29 | -2.25 | -2.21 | -2.19 | -2.16 | -2.22 | -2.19 | -2.15 | -2.12 | -2.11 |
| | 200 | -3.11 | -3.08 | -3.04 | -3.02 | -3.01 | -2.77 | -2.75 | -2.72 | -2.69 | -2.68 | -2.51 | -2.48 | -2.45 | -2.41 | -2.41 | -2.41 | -2.37 | -2.33 | -2.30 | -2.30 | -2.35 | -2.31 | -2.28 | -2.25 | -2.23 |
| 4 | 50 | -2.78 | -2.74 | -2.71 | -2.68 | -2.66 | -2.47 | -2.43 | -2.39 | -2.37 | -2.35 | -2.08 | -2.02 | -1.98 | -1.95 | -1.92 | -1.95 | -1.90 | -1.85 | -1.81 | -1.80 | -1.97 | -1.91 | -1.88 | -1.85 | -1.83 |
| | 70 | -2.92 | -2.88 | -2.85 | -2.82 | -2.81 | -2.61 | -2.55 | -2.53 | -2.51 | -2.49 | -2.23 | -2.20 | -2.14 | -2.11 | -2.09 | -2.09 | -2.05 | -2.00 | -1.97 | -1.96 | -2.06 | -2.00 | -1.97 | -1.94 | -1.92 |
| | 100 | -3.00 | -2.96 | -2.94 | -2.91 | -2.90 | -2.68 | -2.65 | -2.60 | -2.58 | -2.57 | -2.35 | -2.32 | -2.27 | -2.24 | -2.22 | -2.22 | -2.17 | -2.13 | -2.11 | -2.08 | -2.16 | -2.12 | -2.08 | -2.05 | -2.04 |
| | 200 | -3.09 | -3.05 | -3.02 | -2.99 | -2.98 | -2.75 | -2.73 | -2.69 | -2.67 | -2.65 | -2.48 | -2.45 | -2.42 | -2.38 | -2.37 | -2.37 | -2.33 | -2.30 | -2.27 | -2.26 | -2.31 | -2.28 | -2.24 | -2.21 | -2.19 |

*Notes:* m indicates the number of factors. Numbers in the table are critical values of the *BCIPS* statistics. The data generating process is $y_{it} = y_{i,t-1} + \varepsilon_{it}$, for *i*=1,…, *N* and *t*=1,…, *T,* with $y_{i0}$ and $\varepsilon_{it}$ as i.i.d.*N(*0,1*)* and the jth element of $k \times 1$ vector of additional regressors $x_{ijt}$, *j*=1,…, *m*-1, is generated as: $x_{ijt} = x_{ij,t-1} + \varepsilon_{ixjt}$ The *BCIPS* statistic is the t-ratio of the coefficient on $y_{i,t-1}$ from the following OLS regression: $\Delta y_{it} = \mathbf{c}_{i,0}'\mathbf{h}_t + c_{i,1}\sin(2\pi\kappa t/T) + c_{i,2}\cos(2\pi\kappa t/T) + \mathbf{c}_{i,3}'\overline{\mathbf{z}}_{t-1} + \mathbf{c}_{i,4}'\Delta\overline{\mathbf{z}}_t + \sum_{j=1}^{p}\mathbf{c}_{i,5,j}'\Delta\overline{\mathbf{z}}_{t-j} + \sum_{j=1}^{p}c_{i,6,j}\Delta y_{i,t-j} + b_i y_{i,t-1} + e_{it}$, over the frequency component $\kappa = 1,...,5$ and the sample *t*=1, …, *T*, where $\mathbf{h}_t$ =[1], $\mathbf{z}_{it} = (y_{it}\ x_{i1t},..., x_{ikt})'$ and $\overline{\mathbf{z}}_t = N^{-1}\sum_{i=1}^{N}\mathbf{z}_{it}$. $(100 \times \alpha)$% critical values are obtained as the $\alpha$ quantiles of the *BCIPS* statistic for $\alpha$ = 0.01, 0.05, 0.1. Critical values are simulated with 10,000 replications.

TABLE B4

Critical values of the *BCIPS* test with $m$=2 – with an intercept and a linear trend

| | | $\kappa$ =1 | | | | | $\kappa$ =2 | | | | | $\kappa$ =3 | | | | | $\kappa$ =4 | | | | | $\kappa$ =5 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $p$ | $T \setminus N$ | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 |
| | | | | | | | | | | | | | | 1% | | | | | | | | | | | | |
| 0 | 50 | -3.83 | -3.75 | -3.68 | -3.61 | -3.58 | -3.67 | -3.59 | -3.53 | -3.45 | -3.42 | -3.39 | -3.32 | -3.24 | -3.17 | -3.14 | -3.23 | -3.13 | -3.06 | -3.00 | -2.96 | -3.12 | -3.04 | -2.99 | -2.91 | -2.88 |
| | 70 | -3.82 | -3.75 | -3.68 | -3.60 | -3.57 | -3.66 | -3.58 | -3.52 | -3.46 | -3.44 | -3.37 | -3.31 | -3.26 | -3.19 | -3.16 | -3.24 | -3.16 | -3.09 | -3.01 | -2.99 | -3.13 | -3.06 | -2.99 | -2.93 | -2.90 |
| | 100 | -3.82 | -3.74 | -3.67 | -3.61 | -3.57 | -3.63 | -3.57 | -3.51 | -3.45 | -3.43 | -3.39 | -3.32 | -3.26 | -3.20 | -3.16 | -3.25 | -3.17 | -3.10 | -3.05 | -3.02 | -3.17 | -3.08 | -3.02 | -2.95 | -2.93 |
| | 200 | -3.81 | -3.74 | -3.67 | -3.61 | -3.57 | -3.63 | -3.57 | -3.51 | -3.46 | -3.44 | -3.40 | -3.32 | -3.26 | -3.20 | -3.18 | -3.26 | -3.18 | -3.12 | -3.06 | -3.03 | -3.18 | -3.10 | -3.04 | -3.00 | -2.96 |
| 1 | 50 | -3.83 | -3.74 | -3.68 | -3.62 | -3.59 | -3.65 | -3.57 | -3.51 | -3.46 | -3.41 | -3.36 | -3.27 | -3.21 | -3.13 | -3.10 | -3.14 | -3.04 | -2.97 | -2.91 | -2.86 | -3.01 | -2.92 | -2.86 | -2.79 | -2.75 |
| | 70 | -3.80 | -3.74 | -3.68 | -3.61 | -3.58 | -3.65 | -3.58 | -3.50 | -3.45 | -3.42 | -3.34 | -3.28 | -3.22 | -3.15 | -3.12 | -3.17 | -3.09 | -3.02 | -2.94 | -2.93 | -3.06 | -2.98 | -2.92 | -2.86 | -2.82 |
| | 100 | -3.82 | -3.74 | -3.66 | -3.61 | -3.57 | -3.63 | -3.57 | -3.50 | -3.46 | -3.43 | -3.38 | -3.30 | -3.25 | -3.18 | -3.14 | -3.21 | -3.13 | -3.06 | -3.00 | -2.98 | -3.10 | -3.04 | -2.96 | -2.89 | -2.87 |
| | 200 | -3.79 | -3.74 | -3.67 | -3.61 | -3.58 | -3.64 | -3.57 | -3.51 | -3.46 | -3.44 | -3.39 | -3.30 | -3.25 | -3.20 | -3.17 | -3.23 | -3.16 | -3.09 | -3.05 | -3.01 | -3.16 | -3.08 | -3.02 | -2.97 | -2.93 |
| 2 | 50 | -3.74 | -3.64 | -3.57 | -3.52 | -3.50 | -3.55 | -3.48 | -3.40 | -3.35 | -3.30 | -3.25 | -3.16 | -3.06 | -3.01 | -2.97 | -2.97 | -2.88 | -2.80 | -2.74 | -2.70 | -2.84 | -2.75 | -2.69 | -2.62 | -2.57 |
| | 70 | -3.73 | -3.67 | -3.61 | -3.55 | -3.52 | -3.60 | -3.51 | -3.46 | -3.38 | -3.34 | -3.26 | -3.20 | -3.14 | -3.07 | -3.06 | -3.06 | -2.99 | -2.90 | -2.83 | -2.81 | -2.94 | -2.86 | -2.79 | -2.74 | -2.70 |
| | 100 | -3.78 | -3.69 | -3.63 | -3.57 | -3.53 | -3.59 | -3.51 | -3.45 | -3.41 | -3.39 | -3.33 | -3.25 | -3.19 | -3.12 | -3.09 | -3.15 | -3.06 | -2.97 | -2.93 | -2.89 | -3.02 | -2.95 | -2.87 | -2.81 | -2.78 |
| | 200 | -3.78 | -3.71 | -3.64 | -3.59 | -3.55 | -3.62 | -3.54 | -3.49 | -3.44 | -3.42 | -3.35 | -3.28 | -3.23 | -3.16 | -3.14 | -3.20 | -3.12 | -3.06 | -3.01 | -2.97 | -3.14 | -3.04 | -2.98 | -2.93 | -2.89 |
| 3 | 50 | -3.67 | -3.61 | -3.52 | -3.48 | -3.46 | -3.50 | -3.42 | -3.35 | -3.29 | -3.26 | -3.20 | -3.11 | -3.00 | -2.94 | -2.92 | -2.89 | -2.77 | -2.71 | -2.62 | -2.61 | -2.76 | -2.67 | -2.59 | -2.52 | -2.48 |
| | 70 | -3.71 | -3.66 | -3.61 | -3.53 | -3.50 | -3.57 | -3.48 | -3.42 | -3.35 | -3.32 | -3.23 | -3.17 | -3.12 | -3.03 | -3.00 | -3.00 | -2.90 | -2.82 | -2.76 | -2.74 | -2.86 | -2.78 | -2.72 | -2.66 | -2.62 |
| | 100 | -3.78 | -3.69 | -3.61 | -3.57 | -3.53 | -3.58 | -3.52 | -3.45 | -3.41 | -3.38 | -3.32 | -3.21 | -3.17 | -3.09 | -3.07 | -3.10 | -3.00 | -2.94 | -2.87 | -2.84 | -2.97 | -2.90 | -2.81 | -2.75 | -2.73 |
| | 200 | -3.78 | -3.70 | -3.64 | -3.59 | -3.55 | -3.62 | -3.54 | -3.49 | -3.43 | -3.42 | -3.35 | -3.28 | -3.22 | -3.16 | -3.13 | -3.18 | -3.11 | -3.03 | -2.99 | -2.95 | -3.11 | -3.02 | -2.95 | -2.90 | -2.87 |
| 4 | 50 | -3.54 | -3.47 | -3.38 | -3.31 | -3.29 | -3.35 | -3.26 | -3.19 | -3.13 | -3.11 | -3.06 | -2.93 | -2.86 | -2.80 | -2.76 | -2.74 | -2.64 | -2.57 | -2.47 | -2.44 | -2.68 | -2.57 | -2.49 | -2.42 | -2.38 |
| | 70 | -3.65 | -3.57 | -3.51 | -3.45 | -3.42 | -3.48 | -3.41 | -3.33 | -3.27 | -3.24 | -3.14 | -3.08 | -3.02 | -2.94 | -2.90 | -2.88 | -2.82 | -2.71 | -2.65 | -2.63 | -2.77 | -2.69 | -2.63 | -2.56 | -2.52 |
| | 100 | -3.73 | -3.65 | -3.57 | -3.53 | -3.48 | -3.54 | -3.45 | -3.41 | -3.36 | -3.32 | -3.25 | -3.17 | -3.11 | -3.03 | -3.01 | -3.02 | -2.92 | -2.85 | -2.79 | -2.76 | -2.88 | -2.82 | -2.74 | -2.67 | -2.65 |
| | 200 | -3.76 | -3.68 | -3.62 | -3.57 | -3.53 | -3.59 | -3.52 | -3.46 | -3.42 | -3.40 | -3.33 | -3.25 | -3.19 | -3.12 | -3.10 | -3.15 | -3.07 | -2.99 | -2.95 | -2.90 | -3.06 | -2.97 | -2.91 | -2.85 | -2.82 |
| | | | | | | | | | | | | | | 5% | | | | | | | | | | | | |
| 0 | 50 | -3.68 | -3.61 | -3.57 | -3.52 | -3.50 | -3.46 | -3.42 | -3.37 | -3.33 | -3.30 | -3.19 | -3.14 | -3.09 | -3.04 | -3.02 | -3.03 | -2.96 | -2.92 | -2.87 | -2.86 | -2.94 | -2.89 | -2.84 | -2.79 | -2.77 |
| | 70 | -3.67 | -3.62 | -3.57 | -3.52 | -3.50 | -3.47 | -3.41 | -3.38 | -3.33 | -3.30 | -3.20 | -3.15 | -3.10 | -3.06 | -3.04 | -3.06 | -3.00 | -2.94 | -2.90 | -2.89 | -2.97 | -2.91 | -2.87 | -2.83 | -2.81 |
| | 100 | -3.68 | -3.62 | -3.57 | -3.52 | -3.50 | -3.46 | -3.42 | -3.37 | -3.34 | -3.32 | -3.22 | -3.16 | -3.12 | -3.07 | -3.04 | -3.07 | -3.01 | -2.97 | -2.93 | -2.91 | -2.99 | -2.95 | -2.90 | -2.85 | -2.83 |
| | 200 | -3.67 | -3.62 | -3.57 | -3.53 | -3.51 | -3.47 | -3.41 | -3.38 | -3.34 | -3.33 | -3.23 | -3.16 | -3.13 | -3.08 | -3.06 | -3.09 | -3.04 | -2.98 | -2.95 | -2.93 | -3.03 | -2.97 | -2.92 | -2.88 | -2.86 |
| 1 | 50 | -3.66 | -3.59 | -3.55 | -3.50 | -3.48 | -3.44 | -3.40 | -3.34 | -3.30 | -3.28 | -3.14 | -3.07 | -3.02 | -2.98 | -2.96 | -2.93 | -2.85 | -2.82 | -2.77 | -2.75 | -2.81 | -2.75 | -2.71 | -2.66 | -2.64 |
| | 70 | -3.65 | -3.60 | -3.56 | -3.51 | -3.49 | -3.45 | -3.40 | -3.36 | -3.31 | -3.30 | -3.16 | -3.11 | -3.06 | -3.02 | -2.99 | -2.98 | -2.93 | -2.87 | -2.83 | -2.81 | -2.87 | -2.83 | -2.79 | -2.74 | -2.72 |
| | 100 | -3.67 | -3.61 | -3.56 | -3.52 | -3.49 | -3.45 | -3.40 | -3.35 | -3.33 | -3.31 | -3.18 | -3.13 | -3.09 | -3.04 | -3.02 | -3.03 | -2.97 | -2.92 | -2.88 | -2.86 | -2.93 | -2.89 | -2.84 | -2.79 | -2.77 |
| | 200 | -3.66 | -3.62 | -3.57 | -3.52 | -3.50 | -3.46 | -3.41 | -3.37 | -3.34 | -3.33 | -3.21 | -3.15 | -3.12 | -3.07 | -3.05 | -3.07 | -3.01 | -2.96 | -2.93 | -2.90 | -3.00 | -2.94 | -2.90 | -2.85 | -2.84 |
| 2 | 50 | -3.52 | -3.46 | -3.42 | -3.38 | -3.36 | -3.32 | -3.27 | -3.22 | -3.19 | -3.16 | -3.00 | -2.94 | -2.88 | -2.84 | -2.82 | -2.76 | -2.69 | -2.63 | -2.58 | -2.57 | -2.63 | -2.58 | -2.52 | -2.48 | -2.46 |
| | 70 | -3.57 | -3.53 | -3.48 | -3.43 | -3.42 | -3.38 | -3.33 | -3.29 | -3.24 | -3.22 | -3.07 | -3.02 | -2.96 | -2.93 | -2.90 | -2.87 | -2.81 | -2.74 | -2.70 | -2.69 | -2.75 | -2.70 | -2.65 | -2.61 | -2.59 |
| | 100 | -3.62 | -3.57 | -3.51 | -3.47 | -3.45 | -3.40 | -3.35 | -3.30 | -3.29 | -3.26 | -3.12 | -3.07 | -3.03 | -2.98 | -2.96 | -2.95 | -2.89 | -2.84 | -2.80 | -2.78 | -2.84 | -2.80 | -2.75 | -2.70 | -2.68 |
| | 200 | -3.64 | -3.59 | -3.54 | -3.50 | -3.48 | -3.44 | -3.38 | -3.35 | -3.32 | -3.31 | -3.18 | -3.12 | -3.09 | -3.04 | -3.02 | -3.04 | -2.98 | -2.92 | -2.89 | -2.86 | -2.96 | -2.90 | -2.85 | -2.81 | -2.79 |
| 3 | 50 | -3.46 | -3.42 | -3.36 | -3.33 | -3.30 | -3.26 | -3.20 | -3.16 | -3.12 | -3.10 | -2.92 | -2.87 | -2.80 | -2.76 | -2.73 | -2.65 | -2.58 | -2.53 | -2.47 | -2.45 | -2.54 | -2.48 | -2.44 | -2.38 | -2.36 |
| | 70 | -3.53 | -3.50 | -3.45 | -3.40 | -3.39 | -3.34 | -3.29 | -3.25 | -3.21 | -3.18 | -3.01 | -2.97 | -2.91 | -2.87 | -2.85 | -2.78 | -2.73 | -2.67 | -2.62 | -2.61 | -2.67 | -2.62 | -2.57 | -2.52 | -2.50 |
| | 100 | -3.60 | -3.55 | -3.50 | -3.46 | -3.43 | -3.39 | -3.34 | -3.29 | -3.26 | -3.25 | -3.09 | -3.04 | -3.00 | -2.94 | -2.92 | -2.90 | -2.83 | -2.79 | -2.74 | -2.72 | -2.78 | -2.74 | -2.68 | -2.64 | -2.62 |
| | 200 | -3.64 | -3.58 | -3.54 | -3.50 | -3.48 | -3.43 | -3.38 | -3.35 | -3.31 | -3.30 | -3.17 | -3.10 | -3.07 | -3.02 | -3.01 | -3.01 | -2.95 | -2.90 | -2.86 | -2.84 | -2.93 | -2.87 | -2.82 | -2.78 | -2.76 |
| 4 | 50 | -3.31 | -3.25 | -3.21 | -3.16 | -3.14 | -3.11 | -3.04 | -3.00 | -2.96 | -2.93 | -2.77 | -2.70 | -2.65 | -2.59 | -2.57 | -2.50 | -2.43 | -2.36 | -2.31 | -2.28 | -2.46 | -2.38 | -2.32 | -2.27 | -2.25 |
| | 70 | -3.45 | -3.40 | -3.35 | -3.31 | -3.30 | -3.26 | -3.19 | -3.16 | -3.12 | -3.08 | -2.92 | -2.87 | -2.82 | -2.77 | -2.74 | -2.67 | -2.61 | -2.55 | -2.50 | -2.49 | -2.56 | -2.51 | -2.46 | -2.41 | -2.39 |
| | 100 | -3.55 | -3.49 | -3.44 | -3.40 | -3.38 | -3.34 | -3.29 | -3.24 | -3.21 | -3.19 | -3.03 | -2.97 | -2.93 | -2.87 | -2.85 | -2.81 | -2.76 | -2.70 | -2.66 | -2.64 | -2.70 | -2.65 | -2.60 | -2.55 | -2.54 |
| | 200 | -3.62 | -3.56 | -3.51 | -3.47 | -3.45 | -3.41 | -3.35 | -3.32 | -3.28 | -3.28 | -3.15 | -3.07 | -3.04 | -2.99 | -2.98 | -2.97 | -2.92 | -2.86 | -2.82 | -2.80 | -2.89 | -2.83 | -2.78 | -2.73 | -2.72 |
| | | | | | | | | | | | | | | 10% | | | | | | | | | | | | |
| 0 | 50 | -3.59 | -3.54 | -3.51 | -3.47 | -3.45 | -3.35 | -3.32 | -3.28 | -3.25 | -3.23 | -3.09 | -3.05 | -3.00 | -2.97 | -2.95 | -2.93 | -2.88 | -2.85 | -2.81 | -2.79 | -2.85 | -2.79 | -2.77 | -2.73 | -2.71 |
| | 70 | -3.59 | -3.55 | -3.51 | -3.47 | -3.46 | -3.37 | -3.32 | -3.29 | -3.26 | -3.24 | -3.10 | -3.05 | -3.01 | -2.99 | -2.97 | -2.96 | -2.91 | -2.87 | -2.84 | -2.83 | -2.88 | -2.83 | -2.80 | -2.77 | -2.75 |
| | 100 | -3.60 | -3.56 | -3.52 | -3.48 | -3.46 | -3.36 | -3.33 | -3.29 | -3.27 | -3.25 | -3.11 | -3.07 | -3.04 | -3.00 | -2.98 | -2.97 | -2.93 | -2.89 | -2.87 | -2.85 | -2.90 | -2.87 | -2.83 | -2.79 | -2.78 |
| | 200 | -3.60 | -3.56 | -3.52 | -3.49 | -3.47 | -3.37 | -3.32 | -3.30 | -3.28 | -3.26 | -3.13 | -3.08 | -3.06 | -3.02 | -3.01 | -3.00 | -2.96 | -2.92 | -2.89 | -2.87 | -2.94 | -2.89 | -2.85 | -2.82 | -2.81 |
| 1 | 50 | -3.56 | -3.50 | -3.47 | -3.44 | -3.42 | -3.33 | -3.29 | -3.25 | -3.22 | -3.20 | -3.02 | -2.97 | -2.93 | -2.90 | -2.88 | -2.83 | -2.76 | -2.73 | -2.69 | -2.68 | -2.71 | -2.66 | -2.63 | -2.59 | -2.58 |
| | 70 | -3.57 | -3.53 | -3.49 | -3.45 | -3.44 | -3.35 | -3.30 | -3.28 | -3.24 | -3.22 | -3.05 | -3.01 | -2.97 | -2.94 | -2.92 | -2.88 | -2.84 | -2.79 | -2.76 | -2.75 | -2.78 | -2.74 | -2.71 | -2.67 | -2.66 |
| | 100 | -3.58 | -3.55 | -3.51 | -3.47 | -3.45 | -3.35 | -3.32 | -3.28 | -3.26 | -3.24 | -3.08 | -3.04 | -3.01 | -2.97 | -2.95 | -2.93 | -2.88 | -2.84 | -2.82 | -2.80 | -2.84 | -2.81 | -2.77 | -2.73 | -2.71 |
| | 200 | -3.59 | -3.55 | -3.51 | -3.48 | -3.46 | -3.36 | -3.32 | -3.29 | -3.27 | -3.26 | -3.11 | -3.06 | -3.04 | -3.00 | -2.99 | -2.98 | -2.93 | -2.90 | -2.86 | -2.85 | -2.91 | -2.86 | -2.82 | -2.79 | -2.78 |
| 2 | 50 | -3.42 | -3.38 | -3.35 | -3.31 | -3.30 | -3.20 | -3.16 | -3.12 | -3.10 | -3.07 | -2.87 | -2.82 | -2.78 | -2.74 | -2.73 | -2.64 | -2.59 | -2.55 | -2.51 | -2.50 | -2.53 | -2.48 | -2.45 | -2.41 | -2.39 |
| | 70 | -3.49 | -3.44 | -3.41 | -3.37 | -3.36 | -3.26 | -3.22 | -3.20 | -3.16 | -3.14 | -2.96 | -2.92 | -2.87 | -2.84 | -2.82 | -2.76 | -2.71 | -2.66 | -2.63 | -2.62 | -2.65 | -2.61 | -2.57 | -2.54 | -2.52 |
| | 100 | -3.53 | -3.49 | -3.45 | -3.42 | -3.40 | -3.29 | -3.26 | -3.23 | -3.20 | -3.19 | -3.02 | -2.97 | -2.94 | -2.90 | -2.88 | -2.85 | -2.80 | -2.76 | -2.73 | -2.71 | -2.74 | -2.72 | -2.68 | -2.64 | -2.62 |
| | 200 | -3.57 | -3.53 | -3.49 | -3.46 | -3.44 | -3.34 | -3.30 | -3.27 | -3.25 | -3.24 | -3.08 | -3.04 | -3.01 | -2.97 | -2.96 | -2.94 | -2.89 | -2.86 | -2.83 | -2.81 | -2.87 | -2.82 | -2.78 | -2.75 | -2.74 |
| 3 | 50 | -3.35 | -3.31 | -3.28 | -3.25 | -3.23 | -3.13 | -3.08 | -3.06 | -3.03 | -3.01 | -2.78 | -2.73 | -2.69 | -2.65 | -2.63 | -2.53 | -2.47 | -2.43 | -2.39 | -2.37 | -2.43 | -2.39 | -2.35 | -2.31 | -2.29 |
| | 70 | -3.45 | -3.41 | -3.37 | -3.34 | -3.33 | -3.23 | -3.17 | -3.16 | -3.12 | -3.10 | -2.90 | -2.86 | -2.81 | -2.78 | -2.76 | -2.67 | -2.62 | -2.58 | -2.54 | -2.53 | -2.56 | -2.52 | -2.49 | -2.45 | -2.43 |
| | 100 | -3.51 | -3.47 | -3.43 | -3.40 | -3.38 | -3.28 | -3.24 | -3.20 | -3.19 | -3.17 | -2.98 | -2.93 | -2.90 | -2.86 | -2.85 | -2.79 | -2.74 | -2.70 | -2.68 | -2.65 | -2.68 | -2.65 | -2.61 | -2.57 | -2.56 |
| | 200 | -3.56 | -3.52 | -3.48 | -3.45 | -3.43 | -3.33 | -3.29 | -3.27 | -3.24 | -3.23 | -3.07 | -3.01 | -2.99 | -2.95 | -2.94 | -2.92 | -2.87 | -2.83 | -2.80 | -2.78 | -2.84 | -2.79 | -2.75 | -2.72 | -2.71 |
| 4 | 50 | -3.19 | -3.15 | -3.12 | -3.08 | -3.05 | -2.97 | -2.92 | -2.89 | -2.87 | -2.84 | -2.62 | -2.57 | -2.53 | -2.48 | -2.46 | -2.38 | -2.32 | -2.27 | -2.22 | -2.21 | -2.34 | -2.28 | -2.24 | -2.19 | -2.18 |
| | 70 | -3.36 | -3.30 | -3.27 | -3.24 | -3.23 | -3.14 | -3.09 | -3.06 | -3.03 | -3.00 | -2.79 | -2.75 | -2.71 | -2.67 | -2.65 | -2.55 | -2.50 | -2.46 | -2.42 | -2.41 | -2.46 | -2.42 | -2.38 | -2.34 | -2.33 |
| | 100 | -3.45 | -3.41 | -3.37 | -3.35 | -3.32 | -3.22 | -3.19 | -3.15 | -3.12 | -3.11 | -2.91 | -2.86 | -2.83 | -2.78 | -2.77 | -2.70 | -2.66 | -2.61 | -2.59 | -2.57 | -2.60 | -2.56 | -2.52 | -2.49 | -2.47 |
| | 200 | -3.53 | -3.49 | -3.45 | -3.42 | -3.41 | -3.30 | -3.27 | -3.25 | -3.21 | -3.21 | -3.04 | -2.98 | -2.96 | -2.92 | -2.91 | -2.88 | -2.83 | -2.79 | -2.76 | -2.74 | -2.79 | -2.75 | -2.71 | -2.67 | -2.66 |

*Notes:* Same as those in Table B3 except that $\mathbf{h}_t$ in regression is set to $\mathbf{h}_t$ =[1, $t$].

TABLE B5

Critical values of the *BCIPS* test with $m$=3 – with an intercept only

| | | $\kappa$ =1 | | | | | $\kappa$ =2 | | | | | $\kappa$ =3 | | | | | $\kappa$ =4 | | | | | $\kappa$ =5 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *p* | *T* \ *N* | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 |
| | | | | | | | | | | | | | | 1% | | | | | | | | | | | | |
| 0 | 50 | -3.56 | -3.48 | -3.41 | -3.35 | -3.32 | -3.39 | -3.31 | -3.25 | -3.20 | -3.18 | -3.15 | -3.05 | -2.98 | -2.94 | -2.91 | -2.98 | -2.89 | -2.82 | -2.76 | -2.74 | -2.88 | -2.83 | -2.75 | -2.69 | -2.65 |
| | 70 | -3.56 | -3.49 | -3.42 | -3.37 | -3.34 | -3.40 | -3.31 | -3.25 | -3.21 | -3.19 | -3.15 | -3.06 | -3.01 | -2.96 | -2.93 | -3.01 | -2.93 | -2.86 | -2.80 | -2.79 | -2.92 | -2.85 | -2.78 | -2.72 | -2.70 |
| | 100 | -3.55 | -3.49 | -3.43 | -3.37 | -3.35 | -3.38 | -3.31 | -3.27 | -3.22 | -3.18 | -3.17 | -3.10 | -3.02 | -2.97 | -2.94 | -3.05 | -2.95 | -2.88 | -2.84 | -2.80 | -2.94 | -2.86 | -2.80 | -2.76 | -2.72 |
| | 200 | -3.57 | -3.50 | -3.45 | -3.38 | -3.36 | -3.40 | -3.34 | -3.29 | -3.25 | -3.21 | -3.16 | -3.11 | -3.04 | -2.99 | -2.96 | -3.05 | -2.98 | -2.91 | -2.86 | -2.84 | -2.97 | -2.90 | -2.84 | -2.78 | -2.76 |
| 1 | 50 | -3.51 | -3.44 | -3.37 | -3.31 | -3.28 | -3.34 | -3.27 | -3.21 | -3.16 | -3.12 | -3.08 | -2.98 | -2.92 | -2.86 | -2.82 | -2.86 | -2.78 | -2.71 | -2.65 | -2.61 | -2.75 | -2.68 | -2.61 | -2.55 | -2.52 |
| | 70 | -3.53 | -3.45 | -3.38 | -3.32 | -3.31 | -3.38 | -3.29 | -3.22 | -3.18 | -3.15 | -3.11 | -3.02 | -2.96 | -2.90 | -2.87 | -2.94 | -2.85 | -2.80 | -2.73 | -2.71 | -2.83 | -2.76 | -2.68 | -2.62 | -2.59 |
| | 100 | -3.53 | -3.48 | -3.40 | -3.34 | -3.33 | -3.37 | -3.31 | -3.24 | -3.21 | -3.16 | -3.12 | -3.05 | -2.98 | -2.93 | -2.90 | -2.98 | -2.89 | -2.82 | -2.78 | -2.75 | -2.89 | -2.81 | -2.74 | -2.70 | -2.66 |
| | 200 | -3.58 | -3.50 | -3.45 | -3.37 | -3.34 | -3.39 | -3.33 | -3.27 | -3.24 | -3.20 | -3.14 | -3.09 | -3.03 | -2.97 | -2.94 | -3.02 | -2.95 | -2.88 | -2.83 | -2.81 | -2.95 | -2.86 | -2.81 | -2.76 | -2.73 |
| 2 | 50 | -3.37 | -3.30 | -3.23 | -3.16 | -3.12 | -3.22 | -3.13 | -3.06 | -2.99 | -2.98 | -2.92 | -2.84 | -2.75 | -2.71 | -2.67 | -2.69 | -2.62 | -2.54 | -2.46 | -2.43 | -2.59 | -2.51 | -2.41 | -2.34 | -2.32 |
| | 70 | -3.45 | -3.38 | -3.30 | -3.24 | -3.21 | -3.29 | -3.21 | -3.15 | -3.08 | -3.05 | -3.00 | -2.94 | -2.84 | -2.80 | -2.78 | -2.81 | -2.72 | -2.66 | -2.60 | -2.56 | -2.69 | -2.61 | -2.55 | -2.50 | -2.46 |
| | 100 | -3.50 | -3.42 | -3.34 | -3.30 | -3.27 | -3.29 | -3.25 | -3.18 | -3.16 | -3.10 | -3.07 | -3.00 | -2.93 | -2.86 | -2.84 | -2.88 | -2.82 | -2.74 | -2.68 | -2.66 | -2.81 | -2.73 | -2.65 | -2.59 | -2.56 |
| | 200 | -3.55 | -3.46 | -3.41 | -3.34 | -3.32 | -3.34 | -3.31 | -3.23 | -3.19 | -3.17 | -3.14 | -3.06 | -2.99 | -2.94 | -2.91 | -2.98 | -2.89 | -2.83 | -2.79 | -2.76 | -2.92 | -2.83 | -2.77 | -2.72 | -2.68 |
| 3 | 50 | -3.29 | -3.20 | -3.13 | -3.06 | -3.03 | -3.13 | -3.03 | -2.97 | -2.89 | -2.86 | -2.84 | -2.75 | -2.65 | -2.61 | -2.56 | -2.57 | -2.49 | -2.41 | -2.33 | -2.29 | -2.49 | -2.39 | -2.29 | -2.22 | -2.20 |
| | 70 | -3.40 | -3.32 | -3.24 | -3.19 | -3.18 | -3.24 | -3.15 | -3.09 | -3.02 | -3.00 | -2.96 | -2.87 | -2.78 | -2.74 | -2.70 | -2.71 | -2.63 | -2.56 | -2.51 | -2.48 | -2.60 | -2.53 | -2.46 | -2.41 | -2.36 |
| | 100 | -3.47 | -3.39 | -3.32 | -3.27 | -3.24 | -3.27 | -3.23 | -3.16 | -3.13 | -3.07 | -3.03 | -2.95 | -2.89 | -2.81 | -2.79 | -2.83 | -2.76 | -2.69 | -2.62 | -2.59 | -2.74 | -2.67 | -2.59 | -2.52 | -2.49 |
| | 200 | -3.54 | -3.46 | -3.39 | -3.33 | -3.31 | -3.33 | -3.30 | -3.22 | -3.18 | -3.17 | -3.13 | -3.05 | -2.97 | -2.92 | -2.90 | -2.96 | -2.88 | -2.81 | -2.76 | -2.73 | -2.88 | -2.80 | -2.75 | -2.68 | -2.65 |
| 4 | 50 | -3.10 | -2.99 | -2.93 | -2.85 | -2.80 | -2.92 | -2.83 | -2.76 | -2.68 | -2.66 | -2.65 | -2.55 | -2.47 | -2.41 | -2.36 | -2.41 | -2.33 | -2.24 | -2.14 | -2.10 | -2.38 | -2.26 | -2.18 | -2.08 | -2.05 |
| | 70 | -3.29 | -3.20 | -3.13 | -3.08 | -3.05 | -3.15 | -3.05 | -2.98 | -2.92 | -2.88 | -2.83 | -2.77 | -2.67 | -2.61 | -2.59 | -2.59 | -2.50 | -2.44 | -2.37 | -2.33 | -2.52 | -2.43 | -2.34 | -2.30 | -2.25 |
| | 100 | -3.41 | -3.32 | -3.25 | -3.22 | -3.17 | -3.23 | -3.17 | -3.10 | -3.06 | -3.00 | -2.98 | -2.87 | -2.81 | -2.73 | -2.71 | -2.75 | -2.68 | -2.60 | -2.53 | -2.50 | -2.65 | -2.57 | -2.50 | -2.44 | -2.40 |
| | 200 | -3.51 | -3.43 | -3.37 | -3.30 | -3.28 | -3.31 | -3.26 | -3.19 | -3.16 | -3.14 | -3.09 | -3.01 | -2.94 | -2.89 | -2.86 | -2.92 | -2.82 | -2.78 | -2.72 | -2.68 | -2.84 | -2.75 | -2.70 | -2.64 | -2.61 |
| | | | | | | | | | | | | | | 5% | | | | | | | | | | | | |
| 0 | 50 | -3.37 | -3.34 | -3.27 | -3.24 | -3.23 | -3.17 | -3.13 | -3.08 | -3.05 | -3.03 | -2.92 | -2.87 | -2.82 | -2.78 | -2.76 | -2.78 | -2.72 | -2.67 | -2.63 | -2.61 | -2.70 | -2.65 | -2.60 | -2.56 | -2.54 |
| | 70 | -3.39 | -3.34 | -3.30 | -3.26 | -3.24 | -3.17 | -3.13 | -3.09 | -3.06 | -3.06 | -2.95 | -2.89 | -2.85 | -2.82 | -2.79 | -2.82 | -2.76 | -2.71 | -2.68 | -2.65 | -2.74 | -2.68 | -2.64 | -2.60 | -2.58 |
| | 100 | -3.39 | -3.36 | -3.31 | -3.27 | -3.25 | -3.19 | -3.14 | -3.10 | -3.08 | -3.05 | -2.96 | -2.91 | -2.86 | -2.83 | -2.80 | -2.83 | -2.77 | -2.73 | -2.70 | -2.68 | -2.77 | -2.71 | -2.67 | -2.63 | -2.61 |
| | 200 | -3.41 | -3.36 | -3.32 | -3.28 | -3.27 | -3.21 | -3.15 | -3.11 | -3.09 | -3.07 | -2.96 | -2.93 | -2.89 | -2.84 | -2.83 | -2.86 | -2.80 | -2.76 | -2.72 | -2.71 | -2.80 | -2.74 | -2.71 | -2.66 | -2.65 |
| 1 | 50 | -3.31 | -3.26 | -3.21 | -3.17 | -3.16 | -3.12 | -3.06 | -3.02 | -2.98 | -2.96 | -2.84 | -2.77 | -2.73 | -2.69 | -2.66 | -2.65 | -2.59 | -2.54 | -2.50 | -2.48 | -2.55 | -2.50 | -2.45 | -2.42 | -2.39 |
| | 70 | -3.36 | -3.29 | -3.25 | -3.21 | -3.19 | -3.13 | -3.09 | -3.04 | -3.02 | -3.01 | -2.89 | -2.83 | -2.79 | -2.76 | -2.72 | -2.73 | -2.67 | -2.62 | -2.59 | -2.56 | -2.64 | -2.59 | -2.54 | -2.50 | -2.48 |
| | 100 | -3.37 | -3.34 | -3.28 | -3.24 | -3.22 | -3.17 | -3.12 | -3.08 | -3.05 | -3.03 | -2.92 | -2.87 | -2.82 | -2.78 | -2.76 | -2.78 | -2.72 | -2.67 | -2.64 | -2.62 | -2.70 | -2.64 | -2.60 | -2.57 | -2.54 |
| | 200 | -3.40 | -3.35 | -3.32 | -3.27 | -3.26 | -3.19 | -3.14 | -3.11 | -3.08 | -3.06 | -2.95 | -2.91 | -2.87 | -2.82 | -2.81 | -2.82 | -2.77 | -2.74 | -2.70 | -2.68 | -2.77 | -2.71 | -2.67 | -2.63 | -2.62 |
| 2 | 50 | -3.14 | -3.11 | -3.05 | -3.01 | -2.98 | -2.97 | -2.91 | -2.86 | -2.82 | -2.82 | -2.67 | -2.62 | -2.56 | -2.52 | -2.49 | -2.46 | -2.40 | -2.35 | -2.30 | -2.28 | -2.37 | -2.30 | -2.26 | -2.20 | -2.18 |
| | 70 | -3.25 | -3.20 | -3.15 | -3.11 | -3.09 | -3.05 | -3.00 | -2.96 | -2.91 | -2.90 | -2.78 | -2.73 | -2.67 | -2.63 | -2.61 | -2.59 | -2.53 | -2.49 | -2.44 | -2.42 | -2.50 | -2.44 | -2.39 | -2.36 | -2.34 |
| | 100 | -3.32 | -3.26 | -3.21 | -3.19 | -3.15 | -3.09 | -3.06 | -3.02 | -2.99 | -2.97 | -2.85 | -2.79 | -2.74 | -2.70 | -2.69 | -2.69 | -2.63 | -2.59 | -2.55 | -2.53 | -2.60 | -2.55 | -2.51 | -2.46 | -2.44 |
| | 200 | -3.37 | -3.32 | -3.28 | -3.24 | -3.22 | -3.16 | -3.12 | -3.07 | -3.04 | -3.04 | -2.92 | -2.87 | -2.82 | -2.79 | -2.78 | -2.79 | -2.73 | -2.69 | -2.66 | -2.64 | -2.73 | -2.67 | -2.62 | -2.59 | -2.57 |
| 3 | 50 | -3.04 | -2.99 | -2.95 | -2.89 | -2.87 | -2.86 | -2.80 | -2.76 | -2.71 | -2.70 | -2.55 | -2.50 | -2.43 | -2.40 | -2.38 | -2.33 | -2.26 | -2.22 | -2.16 | -2.13 | -2.26 | -2.19 | -2.13 | -2.07 | -2.06 |
| | 70 | -3.20 | -3.14 | -3.09 | -3.04 | -3.02 | -2.99 | -2.94 | -2.91 | -2.85 | -2.83 | -2.70 | -2.65 | -2.59 | -2.55 | -2.54 | -2.49 | -2.44 | -2.39 | -2.35 | -2.32 | -2.40 | -2.35 | -2.29 | -2.26 | -2.24 |
| | 100 | -3.28 | -3.23 | -3.18 | -3.15 | -3.12 | -3.07 | -3.02 | -2.98 | -2.95 | -2.93 | -2.80 | -2.75 | -2.70 | -2.65 | -2.64 | -2.63 | -2.56 | -2.52 | -2.48 | -2.46 | -2.53 | -2.48 | -2.43 | -2.38 | -2.37 |
| | 200 | -3.36 | -3.31 | -3.27 | -3.22 | -3.21 | -3.15 | -3.11 | -3.06 | -3.03 | -3.02 | -2.91 | -2.85 | -2.80 | -2.77 | -2.75 | -2.75 | -2.70 | -2.66 | -2.63 | -2.61 | -2.69 | -2.64 | -2.59 | -2.56 | -2.54 |
| 4 | 50 | -2.84 | -2.77 | -2.72 | -2.67 | -2.64 | -2.67 | -2.60 | -2.55 | -2.50 | -2.48 | -2.37 | -2.32 | -2.25 | -2.20 | -2.17 | -2.17 | -2.09 | -2.04 | -1.97 | -1.94 | -2.14 | -2.06 | -1.99 | -1.93 | -1.91 |
| | 70 | -3.08 | -3.02 | -2.96 | -2.92 | -2.90 | -2.88 | -2.82 | -2.79 | -2.73 | -2.71 | -2.59 | -2.53 | -2.47 | -2.42 | -2.41 | -2.37 | -2.31 | -2.26 | -2.21 | -2.19 | -2.29 | -2.23 | -2.17 | -2.14 | -2.12 |
| | 100 | -3.21 | -3.16 | -3.10 | -3.07 | -3.04 | -3.00 | -2.95 | -2.92 | -2.88 | -2.86 | -2.72 | -2.67 | -2.62 | -2.57 | -2.56 | -2.54 | -2.47 | -2.43 | -2.39 | -2.36 | -2.44 | -2.39 | -2.34 | -2.29 | -2.27 |
| | 200 | -3.33 | -3.28 | -3.24 | -3.19 | -3.17 | -3.11 | -3.07 | -3.03 | -3.00 | -2.99 | -2.86 | -2.81 | -2.76 | -2.74 | -2.72 | -2.72 | -2.66 | -2.61 | -2.58 | -2.56 | -2.65 | -2.59 | -2.54 | -2.51 | -2.49 |
| | | | | | | | | | | | | | | 10% | | | | | | | | | | | | |
| 0 | 50 | -3.28 | -3.25 | -3.20 | -3.18 | -3.16 | -3.05 | -3.02 | -2.99 | -2.97 | -2.94 | -2.81 | -2.76 | -2.73 | -2.69 | -2.68 | -2.67 | -2.63 | -2.59 | -2.55 | -2.54 | -2.59 | -2.55 | -2.52 | -2.49 | -2.47 |
| | 70 | -3.29 | -3.26 | -3.23 | -3.20 | -3.18 | -3.05 | -3.03 | -3.00 | -2.98 | -2.97 | -2.84 | -2.79 | -2.76 | -2.74 | -2.71 | -2.71 | -2.66 | -2.62 | -2.60 | -2.58 | -2.63 | -2.60 | -2.55 | -2.53 | -2.51 |
| | 100 | -3.30 | -3.27 | -3.24 | -3.21 | -3.20 | -3.08 | -3.04 | -3.01 | -2.99 | -2.98 | -2.84 | -2.81 | -2.78 | -2.75 | -2.73 | -2.73 | -2.68 | -2.65 | -2.63 | -2.61 | -2.67 | -2.62 | -2.59 | -2.56 | -2.55 |
| | 200 | -3.33 | -3.29 | -3.26 | -3.23 | -3.22 | -3.09 | -3.05 | -3.03 | -3.01 | -2.99 | -2.86 | -2.83 | -2.80 | -2.77 | -2.76 | -2.76 | -2.71 | -2.69 | -2.66 | -2.65 | -2.70 | -2.65 | -2.63 | -2.59 | -2.58 |
| 1 | 50 | -3.21 | -3.17 | -3.13 | -3.10 | -3.09 | -2.99 | -2.95 | -2.92 | -2.89 | -2.87 | -2.71 | -2.66 | -2.63 | -2.58 | -2.57 | -2.54 | -2.49 | -2.45 | -2.41 | -2.40 | -2.45 | -2.40 | -2.36 | -2.33 | -2.31 |
| | 70 | -3.25 | -3.21 | -3.17 | -3.14 | -3.13 | -3.01 | -2.99 | -2.95 | -2.93 | -2.92 | -2.78 | -2.73 | -2.69 | -2.67 | -2.64 | -2.62 | -2.57 | -2.53 | -2.51 | -2.48 | -2.53 | -2.49 | -2.45 | -2.42 | -2.41 |
| | 100 | -3.28 | -3.24 | -3.21 | -3.18 | -3.17 | -3.06 | -3.03 | -2.98 | -2.96 | -2.94 | -2.81 | -2.77 | -2.73 | -2.70 | -2.69 | -2.67 | -2.62 | -2.59 | -2.56 | -2.55 | -2.60 | -2.55 | -2.52 | -2.49 | -2.47 |
| | 200 | -3.31 | -3.28 | -3.25 | -3.21 | -3.20 | -3.08 | -3.03 | -3.01 | -3.00 | -2.98 | -2.84 | -2.81 | -2.78 | -2.75 | -2.74 | -2.72 | -2.69 | -2.66 | -2.63 | -2.61 | -2.67 | -2.62 | -2.59 | -2.56 | -2.55 |
| 2 | 50 | -3.04 | -3.00 | -2.96 | -2.93 | -2.90 | -2.83 | -2.79 | -2.76 | -2.73 | -2.72 | -2.53 | -2.50 | -2.44 | -2.42 | -2.40 | -2.33 | -2.29 | -2.26 | -2.22 | -2.20 | -2.25 | -2.20 | -2.17 | -2.13 | -2.11 |
| | 70 | -3.16 | -3.10 | -3.07 | -3.04 | -3.02 | -2.93 | -2.88 | -2.86 | -2.83 | -2.81 | -2.64 | -2.61 | -2.57 | -2.53 | -2.52 | -2.48 | -2.43 | -2.40 | -2.36 | -2.35 | -2.39 | -2.35 | -2.31 | -2.28 | -2.26 |
| | 100 | -3.22 | -3.18 | -3.14 | -3.11 | -3.09 | -2.98 | -2.95 | -2.92 | -2.90 | -2.89 | -2.73 | -2.68 | -2.65 | -2.62 | -2.61 | -2.58 | -2.54 | -2.50 | -2.46 | -2.45 | -2.49 | -2.45 | -2.43 | -2.39 | -2.37 |
| | 200 | -3.29 | -3.25 | -3.21 | -3.18 | -3.16 | -3.05 | -3.02 | -2.98 | -2.96 | -2.95 | -2.81 | -2.77 | -2.74 | -2.71 | -2.70 | -2.68 | -2.64 | -2.61 | -2.58 | -2.57 | -2.62 | -2.58 | -2.55 | -2.52 | -2.51 |
| 3 | 50 | -2.92 | -2.88 | -2.84 | -2.80 | -2.78 | -2.72 | -2.67 | -2.64 | -2.61 | -2.59 | -2.42 | -2.37 | -2.32 | -2.29 | -2.27 | -2.20 | -2.15 | -2.12 | -2.07 | -2.05 | -2.14 | -2.08 | -2.04 | -2.00 | -1.98 |
| | 70 | -3.10 | -3.04 | -3.00 | -2.96 | -2.95 | -2.86 | -2.82 | -2.79 | -2.75 | -2.75 | -2.57 | -2.53 | -2.49 | -2.45 | -2.44 | -2.38 | -2.34 | -2.29 | -2.26 | -2.24 | -2.29 | -2.25 | -2.20 | -2.18 | -2.16 |
| | 100 | -3.18 | -3.14 | -3.10 | -3.07 | -3.05 | -2.94 | -2.91 | -2.88 | -2.86 | -2.84 | -2.68 | -2.63 | -2.59 | -2.57 | -2.55 | -2.51 | -2.46 | -2.43 | -2.40 | -2.38 | -2.42 | -2.38 | -2.35 | -2.31 | -2.29 |
| | 200 | -3.27 | -3.23 | -3.19 | -3.16 | -3.15 | -3.03 | -3.00 | -2.97 | -2.94 | -2.93 | -2.78 | -2.75 | -2.71 | -2.69 | -2.67 | -2.66 | -2.61 | -2.58 | -2.55 | -2.53 | -2.59 | -2.54 | -2.51 | -2.48 | -2.47 |
| 4 | 50 | -2.71 | -2.65 | -2.62 | -2.58 | -2.56 | -2.52 | -2.47 | -2.43 | -2.40 | -2.39 | -2.23 | -2.18 | -2.13 | -2.09 | -2.07 | -2.03 | -1.97 | -1.93 | -1.88 | -1.86 | -2.00 | -1.95 | -1.89 | -1.85 | -1.83 |
| | 70 | -2.97 | -2.91 | -2.87 | -2.84 | -2.82 | -2.75 | -2.70 | -2.67 | -2.63 | -2.62 | -2.45 | -2.40 | -2.36 | -2.32 | -2.31 | -2.25 | -2.20 | -2.16 | -2.12 | -2.10 | -2.17 | -2.13 | -2.08 | -2.06 | -2.04 |
| | 100 | -3.10 | -3.06 | -3.02 | -2.99 | -2.97 | -2.87 | -2.84 | -2.81 | -2.78 | -2.77 | -2.60 | -2.55 | -2.51 | -2.48 | -2.47 | -2.42 | -2.37 | -2.33 | -2.30 | -2.28 | -2.33 | -2.29 | -2.26 | -2.21 | -2.20 |
| | 200 | -3.23 | -3.19 | -3.16 | -3.13 | -3.11 | -3.00 | -2.97 | -2.94 | -2.91 | -2.90 | -2.75 | -2.71 | -2.67 | -2.65 | -2.63 | -2.61 | -2.57 | -2.53 | -2.51 | -2.49 | -2.54 | -2.49 | -2.46 | -2.43 | -2.42 |

*Notes:* Same as those in Table B3.

TABLE B6

Critical values of the *BCIPS* test with $m$=3 –with an intercept and a linear trend

| | | $\kappa$ =1 | | | | | $\kappa$ =2 | | | | | $\kappa$ =3 | | | | | $\kappa$ =4 | | | | | $\kappa$ =5 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $p$ | $T \setminus N$ | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 |
| | | | | | | | | | | | | | | 1% | | | | | | | | | | | | |
| 0 | 50 | -3.96 | -3.87 | -3.79 | -3.73 | -3.68 | -3.82 | -3.74 | -3.67 | -3.63 | -3.59 | -3.62 | -3.54 | -3.45 | -3.42 | -3.39 | -3.42 | -3.34 | -3.28 | -3.21 | -3.20 | -3.34 | -3.24 | -3.17 | -3.10 | -3.08 |
| | 70 | -3.96 | -3.86 | -3.79 | -3.72 | -3.70 | -3.81 | -3.73 | -3.67 | -3.63 | -3.59 | -3.62 | -3.55 | -3.48 | -3.41 | -3.39 | -3.48 | -3.37 | -3.31 | -3.26 | -3.22 | -3.37 | -3.27 | -3.21 | -3.16 | -3.12 |
| | 100 | -3.95 | -3.89 | -3.81 | -3.73 | -3.70 | -3.80 | -3.75 | -3.68 | -3.63 | -3.61 | -3.63 | -3.56 | -3.48 | -3.43 | -3.41 | -3.50 | -3.40 | -3.33 | -3.27 | -3.23 | -3.38 | -3.31 | -3.25 | -3.18 | -3.14 |
| | 200 | -3.98 | -3.89 | -3.82 | -3.75 | -3.72 | -3.82 | -3.74 | -3.70 | -3.64 | -3.61 | -3.63 | -3.56 | -3.50 | -3.44 | -3.41 | -3.49 | -3.41 | -3.35 | -3.30 | -3.26 | -3.41 | -3.33 | -3.26 | -3.22 | -3.18 |
| 1 | 50 | -3.89 | -3.83 | -3.73 | -3.68 | -3.64 | -3.78 | -3.69 | -3.63 | -3.58 | -3.54 | -3.56 | -3.48 | -3.37 | -3.34 | -3.33 | -3.35 | -3.25 | -3.17 | -3.11 | -3.08 | -3.19 | -3.12 | -3.02 | -2.96 | -2.93 |
| | 70 | -3.91 | -3.83 | -3.76 | -3.70 | -3.66 | -3.78 | -3.72 | -3.65 | -3.60 | -3.56 | -3.59 | -3.51 | -3.44 | -3.37 | -3.36 | -3.40 | -3.31 | -3.24 | -3.20 | -3.14 | -3.30 | -3.17 | -3.11 | -3.06 | -3.03 |
| | 100 | -3.93 | -3.86 | -3.78 | -3.72 | -3.68 | -3.78 | -3.73 | -3.67 | -3.62 | -3.59 | -3.60 | -3.53 | -3.46 | -3.41 | -3.39 | -3.45 | -3.35 | -3.28 | -3.23 | -3.18 | -3.32 | -3.26 | -3.19 | -3.12 | -3.07 |
| | 200 | -3.97 | -3.88 | -3.80 | -3.74 | -3.71 | -3.81 | -3.74 | -3.69 | -3.63 | -3.61 | -3.62 | -3.54 | -3.50 | -3.43 | -3.40 | -3.48 | -3.38 | -3.32 | -3.28 | -3.24 | -3.39 | -3.30 | -3.23 | -3.18 | -3.15 |
| 2 | 50 | -3.74 | -3.67 | -3.58 | -3.51 | -3.47 | -3.61 | -3.54 | -3.47 | -3.40 | -3.39 | -3.41 | -3.33 | -3.25 | -3.18 | -3.17 | -3.14 | -3.07 | -3.01 | -2.92 | -2.89 | -2.99 | -2.91 | -2.80 | -2.75 | -2.71 |
| | 70 | -3.82 | -3.76 | -3.67 | -3.62 | -3.57 | -3.70 | -3.61 | -3.54 | -3.48 | -3.46 | -3.48 | -3.39 | -3.35 | -3.27 | -3.26 | -3.27 | -3.17 | -3.09 | -3.06 | -3.00 | -3.10 | -3.03 | -2.96 | -2.90 | -2.87 |
| | 100 | -3.87 | -3.78 | -3.71 | -3.66 | -3.62 | -3.72 | -3.66 | -3.60 | -3.55 | -3.52 | -3.52 | -3.46 | -3.40 | -3.34 | -3.32 | -3.34 | -3.27 | -3.19 | -3.13 | -3.11 | -3.20 | -3.14 | -3.08 | -3.01 | -2.98 |
| | 200 | -3.91 | -3.84 | -3.77 | -3.72 | -3.67 | -3.78 | -3.71 | -3.65 | -3.62 | -3.59 | -3.60 | -3.52 | -3.46 | -3.40 | -3.37 | -3.44 | -3.34 | -3.28 | -3.23 | -3.21 | -3.33 | -3.26 | -3.19 | -3.14 | -3.09 |
| 3 | 50 | -3.64 | -3.54 | -3.48 | -3.41 | -3.38 | -3.52 | -3.42 | -3.36 | -3.27 | -3.26 | -3.31 | -3.21 | -3.12 | -3.07 | -3.03 | -3.03 | -2.94 | -2.86 | -2.78 | -2.75 | -2.87 | -2.75 | -2.66 | -2.60 | -2.56 |
| | 70 | -3.78 | -3.69 | -3.61 | -3.56 | -3.52 | -3.63 | -3.56 | -3.49 | -3.42 | -3.40 | -3.43 | -3.34 | -3.27 | -3.20 | -3.20 | -3.16 | -3.08 | -3.02 | -2.96 | -2.91 | -3.00 | -2.92 | -2.86 | -2.81 | -2.76 |
| | 100 | -3.85 | -3.77 | -3.68 | -3.65 | -3.60 | -3.71 | -3.63 | -3.58 | -3.51 | -3.50 | -3.50 | -3.42 | -3.37 | -3.31 | -3.29 | -3.27 | -3.22 | -3.13 | -3.08 | -3.05 | -3.12 | -3.08 | -3.00 | -2.93 | -2.91 |
| | 200 | -3.91 | -3.84 | -3.76 | -3.70 | -3.66 | -3.77 | -3.71 | -3.65 | -3.60 | -3.57 | -3.58 | -3.51 | -3.44 | -3.39 | -3.36 | -3.42 | -3.32 | -3.25 | -3.20 | -3.18 | -3.30 | -3.23 | -3.16 | -3.10 | -3.05 |
| 4 | 50 | -3.41 | -3.32 | -3.22 | -3.15 | -3.11 | -3.29 | -3.19 | -3.11 | -3.02 | -3.00 | -3.08 | -3.00 | -2.90 | -2.84 | -2.79 | -2.83 | -2.73 | -2.65 | -2.55 | -2.52 | -2.71 | -2.58 | -2.48 | -2.40 | -2.36 |
| | 70 | -3.64 | -3.56 | -3.49 | -3.44 | -3.39 | -3.53 | -3.43 | -3.36 | -3.30 | -3.27 | -3.31 | -3.21 | -3.14 | -3.08 | -3.08 | -3.06 | -2.95 | -2.88 | -2.84 | -2.77 | -2.89 | -2.79 | -2.71 | -2.65 | -2.61 |
| | 100 | -3.77 | -3.69 | -3.61 | -3.57 | -3.53 | -3.63 | -3.56 | -3.50 | -3.45 | -3.42 | -3.43 | -3.35 | -3.29 | -3.23 | -3.21 | -3.21 | -3.13 | -3.04 | -3.00 | -2.96 | -3.04 | -2.99 | -2.90 | -2.84 | -2.80 |
| | 200 | -3.88 | -3.81 | -3.73 | -3.67 | -3.64 | -3.74 | -3.68 | -3.61 | -3.58 | -3.54 | -3.54 | -3.48 | -3.41 | -3.37 | -3.33 | -3.37 | -3.26 | -3.21 | -3.16 | -3.14 | -3.26 | -3.17 | -3.11 | -3.05 | -3.01 |
| | | | | | | | | | | | | | | 5% | | | | | | | | | | | | |
| 0 | 50 | -3.77 | -3.73 | -3.67 | -3.62 | -3.60 | -3.62 | -3.57 | -3.53 | -3.49 | -3.47 | -3.40 | -3.35 | -3.30 | -3.26 | -3.24 | -3.24 | -3.18 | -3.13 | -3.08 | -3.07 | -3.14 | -3.08 | -3.02 | -2.99 | -2.96 |
| | 70 | -3.79 | -3.73 | -3.68 | -3.64 | -3.61 | -3.63 | -3.59 | -3.54 | -3.50 | -3.48 | -3.43 | -3.38 | -3.31 | -3.28 | -3.26 | -3.28 | -3.22 | -3.16 | -3.13 | -3.10 | -3.18 | -3.12 | -3.06 | -3.03 | -3.01 |
| | 100 | -3.81 | -3.75 | -3.70 | -3.65 | -3.63 | -3.64 | -3.59 | -3.55 | -3.52 | -3.50 | -3.44 | -3.39 | -3.33 | -3.29 | -3.28 | -3.28 | -3.23 | -3.19 | -3.15 | -3.12 | -3.20 | -3.16 | -3.10 | -3.06 | -3.04 |
| | 200 | -3.82 | -3.76 | -3.71 | -3.67 | -3.64 | -3.65 | -3.60 | -3.57 | -3.53 | -3.51 | -3.45 | -3.39 | -3.36 | -3.32 | -3.30 | -3.31 | -3.25 | -3.21 | -3.17 | -3.15 | -3.24 | -3.18 | -3.13 | -3.09 | -3.08 |
| 1 | 50 | -3.71 | -3.66 | -3.59 | -3.55 | -3.53 | -3.56 | -3.50 | -3.46 | -3.42 | -3.39 | -3.33 | -3.27 | -3.21 | -3.17 | -3.16 | -3.11 | -3.05 | -3.00 | -2.96 | -2.93 | -2.98 | -2.92 | -2.86 | -2.83 | -2.79 |
| | 70 | -3.74 | -3.68 | -3.64 | -3.59 | -3.57 | -3.59 | -3.54 | -3.50 | -3.46 | -3.44 | -3.38 | -3.32 | -3.26 | -3.23 | -3.21 | -3.19 | -3.13 | -3.08 | -3.04 | -3.01 | -3.07 | -3.02 | -2.97 | -2.93 | -2.91 |
| | 100 | -3.77 | -3.72 | -3.66 | -3.62 | -3.60 | -3.61 | -3.57 | -3.53 | -3.49 | -3.47 | -3.40 | -3.35 | -3.30 | -3.26 | -3.25 | -3.24 | -3.19 | -3.14 | -3.10 | -3.06 | -3.13 | -3.08 | -3.04 | -2.99 | -2.96 |
| | 200 | -3.80 | -3.75 | -3.70 | -3.65 | -3.63 | -3.63 | -3.59 | -3.55 | -3.52 | -3.50 | -3.43 | -3.38 | -3.35 | -3.30 | -3.28 | -3.28 | -3.23 | -3.19 | -3.15 | -3.13 | -3.22 | -3.15 | -3.10 | -3.06 | -3.04 |
| 2 | 50 | -3.52 | -3.48 | -3.42 | -3.37 | -3.35 | -3.39 | -3.34 | -3.29 | -3.24 | -3.22 | -3.15 | -3.10 | -3.04 | -3.00 | -2.98 | -2.91 | -2.86 | -2.80 | -2.75 | -2.72 | -2.77 | -2.70 | -2.64 | -2.59 | -2.58 |
| | 70 | -3.64 | -3.58 | -3.53 | -3.49 | -3.46 | -3.49 | -3.44 | -3.38 | -3.35 | -3.33 | -3.26 | -3.20 | -3.15 | -3.11 | -3.10 | -3.05 | -2.99 | -2.93 | -2.90 | -2.86 | -2.90 | -2.86 | -2.81 | -2.76 | -2.74 |
| | 100 | -3.70 | -3.65 | -3.59 | -3.55 | -3.53 | -3.54 | -3.50 | -3.46 | -3.42 | -3.40 | -3.33 | -3.28 | -3.22 | -3.19 | -3.18 | -3.14 | -3.09 | -3.03 | -3.00 | -2.97 | -3.03 | -2.98 | -2.92 | -2.88 | -2.86 |
| | 200 | -3.77 | -3.71 | -3.66 | -3.62 | -3.60 | -3.61 | -3.56 | -3.52 | -3.49 | -3.47 | -3.41 | -3.35 | -3.30 | -3.27 | -3.25 | -3.24 | -3.18 | -3.15 | -3.10 | -3.08 | -3.16 | -3.11 | -3.05 | -3.01 | -2.99 |
| 3 | 50 | -3.41 | -3.34 | -3.29 | -3.23 | -3.21 | -3.26 | -3.21 | -3.16 | -3.10 | -3.09 | -3.03 | -2.98 | -2.91 | -2.87 | -2.84 | -2.77 | -2.71 | -2.65 | -2.59 | -2.57 | -2.63 | -2.55 | -2.48 | -2.43 | -2.41 |
| | 70 | -3.56 | -3.51 | -3.46 | -3.42 | -3.39 | -3.43 | -3.37 | -3.32 | -3.28 | -3.25 | -3.18 | -3.13 | -3.08 | -3.03 | -3.02 | -2.96 | -2.89 | -2.84 | -2.80 | -2.76 | -2.80 | -2.74 | -2.70 | -2.65 | -2.63 |
| | 100 | -3.67 | -3.60 | -3.55 | -3.51 | -3.49 | -3.51 | -3.46 | -3.42 | -3.38 | -3.37 | -3.28 | -3.23 | -3.17 | -3.14 | -3.13 | -3.09 | -3.02 | -2.97 | -2.93 | -2.90 | -2.95 | -2.90 | -2.84 | -2.80 | -2.78 |
| | 200 | -3.75 | -3.69 | -3.65 | -3.61 | -3.58 | -3.60 | -3.55 | -3.50 | -3.48 | -3.46 | -3.39 | -3.33 | -3.28 | -3.25 | -3.23 | -3.22 | -3.16 | -3.12 | -3.07 | -3.05 | -3.13 | -3.07 | -3.02 | -2.98 | -2.96 |
| 4 | 50 | -3.16 | -3.08 | -3.04 | -2.98 | -2.95 | -3.02 | -2.96 | -2.91 | -2.85 | -2.83 | -2.82 | -2.75 | -2.68 | -2.64 | -2.61 | -2.55 | -2.49 | -2.42 | -2.36 | -2.33 | -2.45 | -2.35 | -2.30 | -2.23 | -2.21 |
| | 70 | -3.44 | -3.38 | -3.32 | -3.28 | -3.24 | -3.29 | -3.23 | -3.18 | -3.14 | -3.11 | -3.05 | -3.00 | -2.94 | -2.89 | -2.88 | -2.82 | -2.75 | -2.68 | -2.65 | -2.61 | -2.66 | -2.60 | -2.55 | -2.51 | -2.48 |
| | 100 | -3.59 | -3.52 | -3.47 | -3.43 | -3.41 | -3.43 | -3.39 | -3.34 | -3.30 | -3.28 | -3.20 | -3.14 | -3.09 | -3.05 | -3.04 | -2.99 | -2.92 | -2.87 | -2.84 | -2.80 | -2.85 | -2.79 | -2.74 | -2.69 | -2.67 |
| | 200 | -3.72 | -3.66 | -3.61 | -3.57 | -3.55 | -3.57 | -3.51 | -3.47 | -3.44 | -3.43 | -3.35 | -3.30 | -3.25 | -3.21 | -3.19 | -3.17 | -3.11 | -3.07 | -3.02 | -3.00 | -3.08 | -3.02 | -2.96 | -2.93 | -2.90 |
| | | | | | | | | | | | | | | 10% | | | | | | | | | | | | |
| 0 | 50 | -3.69 | -3.65 | -3.60 | -3.56 | -3.55 | -3.52 | -3.48 | -3.45 | -3.41 | -3.40 | -3.29 | -3.25 | -3.21 | -3.17 | -3.17 | -3.14 | -3.08 | -3.05 | -3.01 | -3.00 | -3.03 | -2.99 | -2.95 | -2.92 | -2.90 |
| | 70 | -3.70 | -3.66 | -3.62 | -3.59 | -3.57 | -3.53 | -3.49 | -3.46 | -3.43 | -3.42 | -3.32 | -3.28 | -3.23 | -3.21 | -3.19 | -3.18 | -3.12 | -3.09 | -3.06 | -3.04 | -3.08 | -3.03 | -2.99 | -2.97 | -2.95 |
| | 100 | -3.72 | -3.68 | -3.64 | -3.61 | -3.59 | -3.54 | -3.51 | -3.48 | -3.45 | -3.43 | -3.33 | -3.29 | -3.25 | -3.22 | -3.21 | -3.19 | -3.15 | -3.12 | -3.08 | -3.06 | -3.10 | -3.07 | -3.03 | -3.00 | -2.98 |
| | 200 | -3.74 | -3.70 | -3.66 | -3.62 | -3.60 | -3.56 | -3.52 | -3.49 | -3.47 | -3.45 | -3.35 | -3.31 | -3.28 | -3.25 | -3.23 | -3.22 | -3.17 | -3.14 | -3.11 | -3.09 | -3.15 | -3.10 | -3.06 | -3.03 | -3.02 |
| 1 | 50 | -3.61 | -3.57 | -3.52 | -3.48 | -3.47 | -3.45 | -3.40 | -3.37 | -3.34 | -3.31 | -3.19 | -3.15 | -3.11 | -3.08 | -3.06 | -2.99 | -2.95 | -2.91 | -2.87 | -2.86 | -2.86 | -2.83 | -2.78 | -2.75 | -2.73 |
| | 70 | -3.65 | -3.60 | -3.57 | -3.53 | -3.52 | -3.48 | -3.45 | -3.41 | -3.39 | -3.37 | -3.26 | -3.22 | -3.17 | -3.15 | -3.13 | -3.09 | -3.03 | -2.99 | -2.96 | -2.94 | -2.97 | -2.93 | -2.88 | -2.85 | -2.84 |
| | 100 | -3.69 | -3.65 | -3.61 | -3.57 | -3.55 | -3.51 | -3.48 | -3.45 | -3.42 | -3.40 | -3.29 | -3.25 | -3.21 | -3.18 | -3.17 | -3.13 | -3.09 | -3.05 | -3.03 | -3.00 | -3.03 | -2.99 | -2.96 | -2.92 | -2.90 |
| | 200 | -3.72 | -3.69 | -3.64 | -3.61 | -3.59 | -3.55 | -3.50 | -3.47 | -3.45 | -3.44 | -3.33 | -3.29 | -3.26 | -3.23 | -3.21 | -3.18 | -3.15 | -3.11 | -3.08 | -3.06 | -3.11 | -3.07 | -3.03 | -3.00 | -2.98 |
| 2 | 50 | -3.41 | -3.37 | -3.33 | -3.30 | -3.28 | -3.27 | -3.21 | -3.19 | -3.15 | -3.14 | -3.01 | -2.97 | -2.93 | -2.90 | -2.88 | -2.78 | -2.74 | -2.69 | -2.65 | -2.64 | -2.65 | -2.60 | -2.54 | -2.51 | -2.50 |
| | 70 | -3.53 | -3.49 | -3.45 | -3.42 | -3.40 | -3.37 | -3.34 | -3.29 | -3.27 | -3.25 | -3.14 | -3.09 | -3.05 | -3.02 | -3.01 | -2.94 | -2.88 | -2.85 | -2.81 | -2.79 | -2.80 | -2.76 | -2.73 | -2.69 | -2.67 |
| | 100 | -3.61 | -3.57 | -3.52 | -3.50 | -3.48 | -3.44 | -3.41 | -3.38 | -3.34 | -3.33 | -3.21 | -3.17 | -3.13 | -3.10 | -3.09 | -3.03 | -2.99 | -2.95 | -2.92 | -2.90 | -2.92 | -2.89 | -2.84 | -2.81 | -2.79 |
| | 200 | -3.68 | -3.64 | -3.60 | -3.57 | -3.55 | -3.51 | -3.48 | -3.44 | -3.42 | -3.41 | -3.30 | -3.26 | -3.22 | -3.19 | -3.18 | -3.15 | -3.10 | -3.07 | -3.03 | -3.02 | -3.07 | -3.02 | -2.98 | -2.95 | -2.93 |
| 3 | 50 | -3.28 | -3.23 | -3.19 | -3.15 | -3.13 | -3.13 | -3.08 | -3.05 | -3.01 | -2.99 | -2.89 | -2.84 | -2.79 | -2.76 | -2.74 | -2.63 | -2.58 | -2.54 | -2.49 | -2.47 | -2.50 | -2.44 | -2.39 | -2.35 | -2.34 |
| | 70 | -3.46 | -3.41 | -3.38 | -3.34 | -3.32 | -3.31 | -3.26 | -3.22 | -3.19 | -3.17 | -3.06 | -3.01 | -2.96 | -2.94 | -2.92 | -2.83 | -2.78 | -2.74 | -2.71 | -2.68 | -2.68 | -2.64 | -2.61 | -2.57 | -2.55 |
| | 100 | -3.57 | -3.53 | -3.48 | -3.45 | -3.44 | -3.40 | -3.36 | -3.33 | -3.30 | -3.29 | -3.16 | -3.13 | -3.08 | -3.05 | -3.04 | -2.98 | -2.92 | -2.88 | -2.85 | -2.83 | -2.84 | -2.80 | -2.76 | -2.73 | -2.71 |
| | 200 | -3.67 | -3.62 | -3.59 | -3.55 | -3.54 | -3.49 | -3.46 | -3.43 | -3.41 | -3.39 | -3.28 | -3.24 | -3.19 | -3.17 | -3.16 | -3.12 | -3.07 | -3.03 | -3.00 | -2.99 | -3.03 | -2.98 | -2.94 | -2.91 | -2.89 |
| 4 | 50 | -3.04 | -2.97 | -2.94 | -2.89 | -2.87 | -2.89 | -2.84 | -2.80 | -2.75 | -2.74 | -2.66 | -2.61 | -2.56 | -2.52 | -2.50 | -2.42 | -2.36 | -2.31 | -2.26 | -2.24 | -2.31 | -2.24 | -2.20 | -2.14 | -2.13 |
| | 70 | -3.32 | -3.27 | -3.23 | -3.20 | -3.17 | -3.17 | -3.12 | -3.08 | -3.05 | -3.02 | -2.93 | -2.87 | -2.82 | -2.80 | -2.78 | -2.68 | -2.63 | -2.58 | -2.55 | -2.52 | -2.54 | -2.50 | -2.46 | -2.42 | -2.40 |
| | 100 | -3.49 | -3.44 | -3.39 | -3.37 | -3.35 | -3.32 | -3.28 | -3.25 | -3.21 | -3.21 | -3.07 | -3.04 | -2.99 | -2.96 | -2.95 | -2.87 | -2.81 | -2.77 | -2.75 | -2.72 | -2.74 | -2.70 | -2.65 | -2.62 | -2.60 |
| | 200 | -3.63 | -3.58 | -3.55 | -3.52 | -3.50 | -3.46 | -3.43 | -3.39 | -3.37 | -3.35 | -3.24 | -3.20 | -3.16 | -3.14 | -3.12 | -3.07 | -3.02 | -2.99 | -2.95 | -2.94 | -2.98 | -2.93 | -2.89 | -2.86 | -2.84 |

*Notes:* Same as those in Table B3 except that $\mathbf{h}_t$ in regression is set to $\mathbf{h}_t$ =[1, $t$].

TABLE B7

Critical values of the *BCIPS* test with $m$=4 –With an intercept only

| | | $\kappa$ =1 | | | | | $\kappa$ =2 | | | | | $\kappa$ =3 | | | | | $\kappa$ =4 | | | | | $\kappa$ =5 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $p$ | $T \setminus N$ | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 |
| | | | | | | | | | | | | | | 1% | | | | | | | | | | | | |
| 0 | 50 | -3.70 | -3.62 | -3.55 | -3.48 | -3.45 | -3.59 | -3.48 | -3.42 | -3.36 | -3.33 | -3.36 | -3.30 | -3.23 | -3.16 | -3.14 | -3.20 | -3.13 | -3.06 | -3.02 | -2.96 | -3.09 | -3.03 | -2.95 | -2.89 | -2.85 |
| | 70 | -3.71 | -3.65 | -3.57 | -3.51 | -3.47 | -3.58 | -3.53 | -3.45 | -3.39 | -3.36 | -3.39 | -3.30 | -3.26 | -3.19 | -3.19 | -3.24 | -3.16 | -3.09 | -3.03 | -2.99 | -3.15 | -3.07 | -3.00 | -2.94 | -2.91 |
| | 100 | -3.73 | -3.64 | -3.58 | -3.54 | -3.50 | -3.59 | -3.52 | -3.46 | -3.42 | -3.38 | -3.42 | -3.35 | -3.27 | -3.21 | -3.18 | -3.25 | -3.19 | -3.12 | -3.05 | -3.02 | -3.19 | -3.09 | -3.06 | -2.97 | -2.96 |
| | 200 | -3.74 | -3.67 | -3.61 | -3.54 | -3.51 | -3.61 | -3.52 | -3.46 | -3.44 | -3.40 | -3.43 | -3.34 | -3.28 | -3.23 | -3.21 | -3.29 | -3.20 | -3.14 | -3.09 | -3.07 | -3.20 | -3.13 | -3.08 | -3.01 | -2.98 |
| 1 | 50 | -3.62 | -3.51 | -3.44 | -3.38 | -3.36 | -3.50 | -3.38 | -3.33 | -3.27 | -3.24 | -3.26 | -3.20 | -3.13 | -3.07 | -3.03 | -3.06 | -3.00 | -2.91 | -2.87 | -2.81 | -2.95 | -2.86 | -2.78 | -2.72 | -2.67 |
| | 70 | -3.65 | -3.58 | -3.51 | -3.44 | -3.40 | -3.52 | -3.44 | -3.38 | -3.33 | -3.30 | -3.35 | -3.24 | -3.19 | -3.13 | -3.11 | -3.15 | -3.07 | -3.00 | -2.93 | -2.90 | -3.05 | -2.97 | -2.88 | -2.82 | -2.79 |
| | 100 | -3.69 | -3.61 | -3.54 | -3.49 | -3.45 | -3.57 | -3.48 | -3.42 | -3.38 | -3.35 | -3.37 | -3.31 | -3.22 | -3.17 | -3.14 | -3.21 | -3.12 | -3.07 | -2.98 | -2.96 | -3.11 | -3.03 | -2.96 | -2.89 | -2.88 |
| | 200 | -3.73 | -3.66 | -3.59 | -3.52 | -3.49 | -3.59 | -3.51 | -3.45 | -3.41 | -3.38 | -3.40 | -3.32 | -3.25 | -3.21 | -3.18 | -3.26 | -3.17 | -3.12 | -3.06 | -3.04 | -3.17 | -3.10 | -3.04 | -2.98 | -2.94 |
| 2 | 50 | -3.39 | -3.32 | -3.25 | -3.17 | -3.15 | -3.29 | -3.19 | -3.12 | -3.06 | -3.03 | -3.09 | -3.00 | -2.93 | -2.86 | -2.81 | -2.89 | -2.78 | -2.69 | -2.61 | -2.58 | -2.72 | -2.61 | -2.55 | -2.49 | -2.44 |
| | 70 | -3.52 | -3.46 | -3.37 | -3.32 | -3.29 | -3.43 | -3.31 | -3.28 | -3.22 | -3.17 | -3.22 | -3.13 | -3.06 | -3.01 | -2.97 | -3.01 | -2.92 | -2.86 | -2.80 | -2.76 | -2.91 | -2.81 | -2.71 | -2.66 | -2.64 |
| | 100 | -3.60 | -3.54 | -3.47 | -3.39 | -3.36 | -3.47 | -3.41 | -3.34 | -3.30 | -3.24 | -3.29 | -3.21 | -3.17 | -3.09 | -3.07 | -3.12 | -3.03 | -2.97 | -2.90 | -2.88 | -3.01 | -2.92 | -2.86 | -2.78 | -2.75 |
| | 200 | -3.68 | -3.61 | -3.54 | -3.49 | -3.45 | -3.54 | -3.48 | -3.43 | -3.37 | -3.34 | -3.37 | -3.30 | -3.25 | -3.16 | -3.14 | -3.20 | -3.13 | -3.07 | -3.00 | -2.99 | -3.11 | -3.04 | -2.98 | -2.93 | -2.90 |
| 3 | 50 | -3.23 | -3.16 | -3.06 | -2.98 | -2.96 | -3.10 | -3.00 | -2.94 | -2.88 | -2.84 | -2.96 | -2.87 | -2.76 | -2.68 | -2.64 | -2.72 | -2.61 | -2.50 | -2.44 | -2.40 | -2.55 | -2.45 | -2.36 | -2.30 | -2.25 |
| | 70 | -3.44 | -3.37 | -3.28 | -3.22 | -3.19 | -3.35 | -3.22 | -3.16 | -3.12 | -3.08 | -3.13 | -3.03 | -2.96 | -2.91 | -2.87 | -2.90 | -2.82 | -2.75 | -2.68 | -2.65 | -2.78 | -2.68 | -2.60 | -2.54 | -2.50 |
| | 100 | -3.55 | -3.48 | -3.40 | -3.34 | -3.31 | -3.45 | -3.36 | -3.29 | -3.25 | -3.18 | -3.24 | -3.17 | -3.10 | -3.05 | -3.01 | -3.06 | -2.97 | -2.89 | -2.82 | -2.80 | -2.92 | -2.83 | -2.78 | -2.69 | -2.67 |
| | 200 | -3.67 | -3.59 | -3.51 | -3.47 | -3.43 | -3.54 | -3.46 | -3.41 | -3.36 | -3.32 | -3.34 | -3.27 | -3.22 | -3.13 | -3.13 | -3.17 | -3.10 | -3.04 | -2.97 | -2.96 | -3.07 | -3.01 | -2.94 | -2.89 | -2.85 |
| 4 | 50 | -2.94 | -2.84 | -2.75 | -2.66 | -2.63 | -2.85 | -2.73 | -2.63 | -2.57 | -2.51 | -2.66 | -2.58 | -2.48 | -2.39 | -2.34 | -2.47 | -2.34 | -2.25 | -2.16 | -2.13 | -2.36 | -2.23 | -2.12 | -2.04 | -2.00 |
| | 70 | -3.28 | -3.21 | -3.11 | -3.05 | -3.01 | -3.21 | -3.06 | -2.99 | -2.96 | -2.91 | -2.96 | -2.88 | -2.82 | -2.74 | -2.71 | -2.76 | -2.67 | -2.59 | -2.52 | -2.47 | -2.62 | -2.53 | -2.45 | -2.39 | -2.33 |
| | 100 | -3.47 | -3.38 | -3.32 | -3.24 | -3.21 | -3.36 | -3.27 | -3.19 | -3.17 | -3.10 | -3.14 | -3.07 | -3.00 | -2.95 | -2.91 | -2.96 | -2.86 | -2.79 | -2.72 | -2.70 | -2.81 | -2.73 | -2.66 | -2.58 | -2.55 |
| | 200 | -3.63 | -3.55 | -3.47 | -3.43 | -3.39 | -3.50 | -3.43 | -3.37 | -3.32 | -3.28 | -3.31 | -3.25 | -3.17 | -3.10 | -3.09 | -3.13 | -3.06 | -3.00 | -2.92 | -2.90 | -3.02 | -2.95 | -2.89 | -2.83 | -2.80 |
| | | | | | | | | | | | | | | 5% | | | | | | | | | | | | |
| 0 | 50 | -3.51 | -3.45 | -3.41 | -3.36 | -3.34 | -3.37 | -3.31 | -3.26 | -3.22 | -3.20 | -3.15 | -3.09 | -3.05 | -3.01 | -2.99 | -2.99 | -2.94 | -2.90 | -2.85 | -2.83 | -2.90 | -2.85 | -2.80 | -2.76 | -2.73 |
| | 70 | -3.53 | -3.49 | -3.44 | -3.40 | -3.37 | -3.38 | -3.33 | -3.28 | -3.25 | -3.24 | -3.19 | -3.13 | -3.09 | -3.04 | -3.03 | -3.04 | -2.98 | -2.93 | -2.90 | -2.87 | -2.96 | -2.90 | -2.85 | -2.80 | -2.79 |
| | 100 | -3.56 | -3.50 | -3.46 | -3.42 | -3.40 | -3.39 | -3.35 | -3.30 | -3.28 | -3.26 | -3.21 | -3.17 | -3.11 | -3.06 | -3.05 | -3.07 | -3.01 | -2.97 | -2.92 | -2.90 | -2.99 | -2.93 | -2.90 | -2.84 | -2.83 |
| | 200 | -3.58 | -3.53 | -3.49 | -3.44 | -3.42 | -3.41 | -3.37 | -3.33 | -3.30 | -3.28 | -3.23 | -3.17 | -3.13 | -3.09 | -3.06 | -3.09 | -3.03 | -3.01 | -2.96 | -2.94 | -3.01 | -2.98 | -2.93 | -2.89 | -2.87 |
| 1 | 50 | -3.39 | -3.34 | -3.30 | -3.25 | -3.22 | -3.27 | -3.19 | -3.15 | -3.11 | -3.08 | -3.03 | -2.97 | -2.94 | -2.88 | -2.87 | -2.84 | -2.79 | -2.73 | -2.69 | -2.67 | -2.72 | -2.67 | -2.61 | -2.57 | -2.55 |
| | 70 | -3.45 | -3.41 | -3.36 | -3.32 | -3.29 | -3.31 | -3.27 | -3.22 | -3.18 | -3.16 | -3.11 | -3.05 | -3.01 | -2.96 | -2.95 | -2.94 | -2.89 | -2.83 | -2.79 | -2.76 | -2.84 | -2.78 | -2.73 | -2.68 | -2.66 |
| | 100 | -3.50 | -3.45 | -3.41 | -3.37 | -3.35 | -3.35 | -3.31 | -3.26 | -3.23 | -3.21 | -3.16 | -3.11 | -3.06 | -3.01 | -3.00 | -3.00 | -2.94 | -2.90 | -2.85 | -2.83 | -2.91 | -2.85 | -2.81 | -2.76 | -2.75 |
| | 200 | -3.56 | -3.51 | -3.46 | -3.42 | -3.40 | -3.39 | -3.35 | -3.30 | -3.28 | -3.26 | -3.20 | -3.14 | -3.10 | -3.06 | -3.04 | -3.06 | -3.00 | -2.97 | -2.93 | -2.91 | -2.98 | -2.94 | -2.88 | -2.85 | -2.83 |
| 2 | 50 | -3.18 | -3.12 | -3.07 | -3.02 | -2.99 | -3.04 | -2.97 | -2.93 | -2.88 | -2.86 | -2.84 | -2.76 | -2.71 | -2.67 | -2.64 | -2.63 | -2.56 | -2.50 | -2.44 | -2.43 | -2.49 | -2.42 | -2.37 | -2.33 | -2.30 |
| | 70 | -3.32 | -3.26 | -3.22 | -3.18 | -3.15 | -3.20 | -3.11 | -3.09 | -3.05 | -3.03 | -2.97 | -2.91 | -2.86 | -2.83 | -2.81 | -2.78 | -2.72 | -2.68 | -2.62 | -2.61 | -2.67 | -2.61 | -2.56 | -2.52 | -2.49 |
| | 100 | -3.42 | -3.36 | -3.32 | -3.28 | -3.26 | -3.27 | -3.22 | -3.18 | -3.15 | -3.13 | -3.07 | -2.99 | -2.97 | -2.93 | -2.90 | -2.89 | -2.85 | -2.79 | -2.75 | -2.73 | -2.80 | -2.74 | -2.69 | -2.65 | -2.62 |
| | 200 | -3.51 | -3.47 | -3.42 | -3.38 | -3.36 | -3.36 | -3.31 | -3.28 | -3.24 | -3.21 | -3.16 | -3.11 | -3.07 | -3.01 | -3.02 | -3.02 | -2.95 | -2.92 | -2.88 | -2.85 | -2.93 | -2.88 | -2.83 | -2.80 | -2.77 |
| 3 | 50 | -2.99 | -2.93 | -2.87 | -2.82 | -2.79 | -2.85 | -2.79 | -2.74 | -2.68 | -2.66 | -2.66 | -2.58 | -2.53 | -2.48 | -2.46 | -2.45 | -2.37 | -2.30 | -2.25 | -2.23 | -2.32 | -2.24 | -2.18 | -2.13 | -2.10 |
| | 70 | -3.23 | -3.17 | -3.12 | -3.07 | -3.05 | -3.10 | -3.02 | -2.99 | -2.95 | -2.92 | -2.87 | -2.80 | -2.76 | -2.72 | -2.71 | -2.67 | -2.61 | -2.55 | -2.51 | -2.48 | -2.55 | -2.47 | -2.42 | -2.38 | -2.35 |
| | 100 | -3.37 | -3.30 | -3.25 | -3.21 | -3.19 | -3.21 | -3.17 | -3.12 | -3.09 | -3.06 | -3.01 | -2.94 | -2.91 | -2.86 | -2.83 | -2.82 | -2.77 | -2.72 | -2.67 | -2.65 | -2.72 | -2.65 | -2.60 | -2.56 | -2.53 |
| | 200 | -3.48 | -3.44 | -3.39 | -3.35 | -3.33 | -3.33 | -3.30 | -3.25 | -3.21 | -3.19 | -3.13 | -3.08 | -3.04 | -2.98 | -2.99 | -2.98 | -2.92 | -2.88 | -2.84 | -2.82 | -2.89 | -2.84 | -2.79 | -2.75 | -2.73 |
| 4 | 50 | -2.69 | -2.62 | -2.55 | -2.49 | -2.46 | -2.58 | -2.48 | -2.43 | -2.37 | -2.34 | -2.38 | -2.31 | -2.25 | -2.19 | -2.16 | -2.20 | -2.10 | -2.03 | -1.97 | -1.95 | -2.10 | -2.02 | -1.94 | -1.88 | -1.84 |
| | 70 | -3.05 | -3.00 | -2.94 | -2.89 | -2.87 | -2.93 | -2.85 | -2.81 | -2.77 | -2.74 | -2.72 | -2.64 | -2.61 | -2.56 | -2.54 | -2.51 | -2.45 | -2.39 | -2.34 | -2.31 | -2.40 | -2.33 | -2.27 | -2.22 | -2.19 |
| | 100 | -3.26 | -3.20 | -3.16 | -3.11 | -3.09 | -3.12 | -3.08 | -3.03 | -2.99 | -2.96 | -2.92 | -2.84 | -2.81 | -2.76 | -2.74 | -2.72 | -2.66 | -2.61 | -2.56 | -2.54 | -2.61 | -2.54 | -2.49 | -2.43 | -2.42 |
| | 200 | -3.45 | -3.40 | -3.35 | -3.31 | -3.29 | -3.29 | -3.26 | -3.21 | -3.17 | -3.15 | -3.09 | -3.05 | -3.00 | -2.94 | -2.94 | -2.93 | -2.87 | -2.83 | -2.79 | -2.76 | -2.83 | -2.78 | -2.73 | -2.69 | -2.68 |
| | | | | | | | | | | | | | | 10% | | | | | | | | | | | | |
| 0 | 50 | -3.41 | -3.36 | -3.33 | -3.30 | -3.28 | -3.25 | -3.21 | -3.17 | -3.13 | -3.12 | -3.03 | -2.99 | -2.96 | -2.93 | -2.91 | -2.88 | -2.85 | -2.80 | -2.78 | -2.76 | -2.79 | -2.75 | -2.71 | -2.68 | -2.67 |
| | 70 | -3.44 | -3.40 | -3.36 | -3.33 | -3.32 | -3.27 | -3.23 | -3.20 | -3.17 | -3.16 | -3.07 | -3.02 | -2.99 | -2.95 | -2.95 | -2.93 | -2.88 | -2.85 | -2.83 | -2.80 | -2.86 | -2.80 | -2.77 | -2.74 | -2.72 |
| | 100 | -3.46 | -3.42 | -3.39 | -3.36 | -3.34 | -3.29 | -3.26 | -3.21 | -3.20 | -3.18 | -3.09 | -3.06 | -3.02 | -2.98 | -2.97 | -2.96 | -2.91 | -2.88 | -2.85 | -2.83 | -2.89 | -2.84 | -2.81 | -2.77 | -2.76 |
| | 200 | -3.48 | -3.45 | -3.41 | -3.38 | -3.37 | -3.31 | -3.28 | -3.24 | -3.22 | -3.21 | -3.11 | -3.07 | -3.04 | -3.01 | -2.99 | -2.99 | -2.94 | -2.92 | -2.89 | -2.87 | -2.92 | -2.89 | -2.84 | -2.82 | -2.80 |
| 1 | 50 | -3.29 | -3.23 | -3.21 | -3.17 | -3.15 | -3.14 | -3.08 | -3.05 | -3.02 | -3.00 | -2.90 | -2.86 | -2.82 | -2.79 | -2.78 | -2.71 | -2.68 | -2.64 | -2.60 | -2.59 | -2.60 | -2.56 | -2.52 | -2.49 | -2.47 |
| | 70 | -3.36 | -3.32 | -3.28 | -3.25 | -3.23 | -3.20 | -3.16 | -3.12 | -3.09 | -3.08 | -2.99 | -2.93 | -2.91 | -2.87 | -2.86 | -2.82 | -2.78 | -2.74 | -2.71 | -2.69 | -2.73 | -2.69 | -2.64 | -2.60 | -2.59 |
| | 100 | -3.41 | -3.37 | -3.33 | -3.31 | -3.29 | -3.24 | -3.21 | -3.17 | -3.15 | -3.13 | -3.04 | -3.00 | -2.96 | -2.92 | -2.92 | -2.89 | -2.84 | -2.81 | -2.78 | -2.76 | -2.81 | -2.75 | -2.73 | -2.69 | -2.68 |
| | 200 | -3.46 | -3.43 | -3.39 | -3.36 | -3.34 | -3.29 | -3.26 | -3.23 | -3.20 | -3.18 | -3.09 | -3.04 | -3.01 | -2.98 | -2.96 | -2.95 | -2.91 | -2.89 | -2.86 | -2.83 | -2.88 | -2.84 | -2.80 | -2.78 | -2.76 |
| 2 | 50 | -3.06 | -3.01 | -2.97 | -2.93 | -2.92 | -2.90 | -2.85 | -2.83 | -2.78 | -2.77 | -2.69 | -2.64 | -2.60 | -2.56 | -2.54 | -2.49 | -2.43 | -2.39 | -2.36 | -2.34 | -2.37 | -2.30 | -2.26 | -2.23 | -2.22 |
| | 70 | -3.22 | -3.18 | -3.13 | -3.10 | -3.08 | -3.07 | -3.01 | -2.99 | -2.96 | -2.94 | -2.84 | -2.79 | -2.76 | -2.74 | -2.72 | -2.66 | -2.61 | -2.58 | -2.54 | -2.52 | -2.55 | -2.51 | -2.46 | -2.43 | -2.42 |
| | 100 | -3.32 | -3.27 | -3.24 | -3.20 | -3.19 | -3.15 | -3.11 | -3.09 | -3.06 | -3.05 | -2.95 | -2.90 | -2.87 | -2.83 | -2.82 | -2.78 | -2.74 | -2.70 | -2.66 | -2.65 | -2.69 | -2.64 | -2.61 | -2.57 | -2.55 |
| | 200 | -3.42 | -3.38 | -3.35 | -3.32 | -3.30 | -3.24 | -3.22 | -3.18 | -3.16 | -3.14 | -3.04 | -3.01 | -2.97 | -2.94 | -2.93 | -2.90 | -2.86 | -2.83 | -2.80 | -2.78 | -2.83 | -2.78 | -2.74 | -2.72 | -2.71 |
| 3 | 50 | -2.86 | -2.81 | -2.77 | -2.73 | -2.70 | -2.72 | -2.66 | -2.62 | -2.58 | -2.57 | -2.50 | -2.45 | -2.41 | -2.37 | -2.35 | -2.30 | -2.24 | -2.19 | -2.15 | -2.13 | -2.19 | -2.12 | -2.08 | -2.04 | -2.02 |
| | 70 | -3.11 | -3.07 | -3.03 | -2.99 | -2.97 | -2.97 | -2.91 | -2.89 | -2.85 | -2.83 | -2.73 | -2.68 | -2.65 | -2.62 | -2.60 | -2.54 | -2.49 | -2.44 | -2.41 | -2.39 | -2.42 | -2.37 | -2.33 | -2.30 | -2.28 |
| | 100 | -3.26 | -3.21 | -3.17 | -3.14 | -3.13 | -3.10 | -3.06 | -3.03 | -3.00 | -2.98 | -2.89 | -2.83 | -2.80 | -2.76 | -2.75 | -2.70 | -2.66 | -2.62 | -2.58 | -2.57 | -2.60 | -2.56 | -2.51 | -2.48 | -2.46 |
| | 200 | -3.39 | -3.35 | -3.32 | -3.29 | -3.28 | -3.22 | -3.20 | -3.16 | -3.14 | -3.12 | -3.01 | -2.98 | -2.94 | -2.91 | -2.90 | -2.87 | -2.82 | -2.80 | -2.77 | -2.74 | -2.78 | -2.74 | -2.70 | -2.68 | -2.67 |
| 4 | 50 | -2.55 | -2.49 | -2.44 | -2.40 | -2.37 | -2.42 | -2.35 | -2.32 | -2.27 | -2.25 | -2.23 | -2.18 | -2.12 | -2.08 | -2.05 | -2.06 | -1.98 | -1.92 | -1.88 | -1.85 | -1.96 | -1.90 | -1.84 | -1.79 | -1.77 |
| | 70 | -2.94 | -2.90 | -2.85 | -2.81 | -2.79 | -2.81 | -2.74 | -2.70 | -2.68 | -2.66 | -2.57 | -2.52 | -2.49 | -2.46 | -2.43 | -2.38 | -2.33 | -2.29 | -2.24 | -2.22 | -2.26 | -2.21 | -2.17 | -2.13 | -2.10 |
| | 100 | -3.15 | -3.11 | -3.06 | -3.03 | -3.02 | -3.00 | -2.97 | -2.93 | -2.89 | -2.88 | -2.79 | -2.72 | -2.69 | -2.66 | -2.64 | -2.59 | -2.55 | -2.51 | -2.46 | -2.45 | -2.49 | -2.45 | -2.40 | -2.35 | -2.34 |
| | 200 | -3.35 | -3.31 | -3.27 | -3.25 | -3.23 | -3.18 | -3.16 | -3.11 | -3.09 | -3.07 | -2.98 | -2.94 | -2.90 | -2.86 | -2.85 | -2.82 | -2.77 | -2.74 | -2.71 | -2.69 | -2.73 | -2.69 | -2.65 | -2.62 | -2.61 |

*Notes:* Same as those in Table B3.

TABLE B8

Critical values of the *BCIPS* test with *m*=4 –with an intercept and a linear trend

| | | $\kappa$ =1 | | | | | $\kappa$ =2 | | | | | $\kappa$ =3 | | | | | $\kappa$ =4 | | | | | $\kappa$ =5 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *p* | *T* \ *N* | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 |
| | | | | | | | | | | | | | | 1% | | | | | | | | | | | | |
| 0 | 50 | -4.06 | -3.97 | -3.89 | -3.82 | -3.79 | -3.96 | -3.87 | -3.79 | -3.72 | -3.70 | -3.80 | -3.71 | -3.65 | -3.58 | -3.57 | -3.62 | -3.56 | -3.49 | -3.41 | -3.38 | -3.52 | -3.41 | -3.34 | -3.29 | -3.24 |
| | 70 | -4.07 | -3.99 | -3.91 | -3.84 | -3.81 | -3.96 | -3.89 | -3.81 | -3.77 | -3.72 | -3.82 | -3.74 | -3.68 | -3.61 | -3.57 | -3.65 | -3.57 | -3.50 | -3.46 | -3.40 | -3.56 | -3.47 | -3.40 | -3.34 | -3.30 |
| | 100 | -4.08 | -4.00 | -3.93 | -3.87 | -3.82 | -3.97 | -3.91 | -3.84 | -3.78 | -3.75 | -3.83 | -3.75 | -3.68 | -3.63 | -3.59 | -3.67 | -3.60 | -3.52 | -3.47 | -3.44 | -3.58 | -3.51 | -3.44 | -3.37 | -3.33 |
| | 200 | -4.08 | -3.99 | -3.95 | -3.88 | -3.85 | -3.98 | -3.91 | -3.85 | -3.80 | -3.77 | -3.83 | -3.76 | -3.69 | -3.65 | -3.63 | -3.69 | -3.62 | -3.57 | -3.49 | -3.46 | -3.60 | -3.53 | -3.47 | -3.41 | -3.37 |
| 1 | 50 | -3.97 | -3.88 | -3.79 | -3.72 | -3.69 | -3.89 | -3.77 | -3.68 | -3.62 | -3.60 | -3.69 | -3.62 | -3.55 | -3.48 | -3.46 | -3.51 | -3.42 | -3.34 | -3.29 | -3.25 | -3.35 | -3.27 | -3.17 | -3.12 | -3.08 |
| | 70 | -4.00 | -3.92 | -3.85 | -3.79 | -3.75 | -3.91 | -3.83 | -3.74 | -3.70 | -3.66 | -3.78 | -3.67 | -3.62 | -3.54 | -3.51 | -3.56 | -3.50 | -3.40 | -3.37 | -3.31 | -3.45 | -3.36 | -3.29 | -3.23 | -3.19 |
| | 100 | -4.03 | -3.96 | -3.88 | -3.83 | -3.78 | -3.94 | -3.87 | -3.79 | -3.75 | -3.71 | -3.81 | -3.71 | -3.65 | -3.58 | -3.56 | -3.62 | -3.56 | -3.47 | -3.40 | -3.38 | -3.52 | -3.43 | -3.37 | -3.30 | -3.27 |
| | 200 | -4.06 | -3.99 | -3.93 | -3.87 | -3.83 | -3.96 | -3.88 | -3.83 | -3.77 | -3.75 | -3.81 | -3.74 | -3.67 | -3.62 | -3.60 | -3.67 | -3.59 | -3.54 | -3.47 | -3.44 | -3.57 | -3.49 | -3.42 | -3.37 | -3.33 |
| 2 | 50 | -3.72 | -3.64 | -3.57 | -3.50 | -3.46 | -3.65 | -3.56 | -3.47 | -3.40 | -3.37 | -3.50 | -3.40 | -3.31 | -3.24 | -3.21 | -3.30 | -3.18 | -3.12 | -3.03 | -2.99 | -3.08 | -2.97 | -2.93 | -2.86 | -2.80 |
| | 70 | -3.87 | -3.79 | -3.71 | -3.64 | -3.61 | -3.78 | -3.67 | -3.63 | -3.57 | -3.52 | -3.61 | -3.53 | -3.44 | -3.42 | -3.39 | -3.45 | -3.36 | -3.28 | -3.21 | -3.18 | -3.28 | -3.19 | -3.11 | -3.06 | -3.01 |
| | 100 | -3.94 | -3.86 | -3.79 | -3.74 | -3.70 | -3.86 | -3.79 | -3.71 | -3.65 | -3.61 | -3.69 | -3.63 | -3.57 | -3.52 | -3.48 | -3.53 | -3.45 | -3.36 | -3.31 | -3.28 | -3.40 | -3.32 | -3.24 | -3.18 | -3.15 |
| | 200 | -4.03 | -3.96 | -3.87 | -3.83 | -3.78 | -3.92 | -3.85 | -3.81 | -3.74 | -3.70 | -3.80 | -3.70 | -3.64 | -3.60 | -3.56 | -3.63 | -3.55 | -3.49 | -3.42 | -3.39 | -3.52 | -3.42 | -3.37 | -3.32 | -3.29 |
| 3 | 50 | -3.53 | -3.46 | -3.35 | -3.26 | -3.23 | -3.43 | -3.34 | -3.27 | -3.19 | -3.15 | -3.32 | -3.19 | -3.10 | -3.03 | -2.99 | -3.12 | -2.99 | -2.89 | -2.83 | -2.79 | -2.91 | -2.79 | -2.69 | -2.64 | -2.59 |
| | 70 | -3.78 | -3.68 | -3.60 | -3.53 | -3.50 | -3.68 | -3.60 | -3.52 | -3.48 | -3.42 | -3.52 | -3.42 | -3.36 | -3.31 | -3.28 | -3.33 | -3.26 | -3.16 | -3.09 | -3.06 | -3.14 | -3.06 | -2.97 | -2.92 | -2.88 |
| | 100 | -3.89 | -3.82 | -3.72 | -3.68 | -3.65 | -3.81 | -3.73 | -3.66 | -3.61 | -3.56 | -3.65 | -3.59 | -3.52 | -3.45 | -3.43 | -3.46 | -3.37 | -3.30 | -3.25 | -3.22 | -3.31 | -3.25 | -3.15 | -3.09 | -3.06 |
| | 200 | -4.01 | -3.94 | -3.86 | -3.81 | -3.77 | -3.90 | -3.83 | -3.78 | -3.72 | -3.68 | -3.78 | -3.68 | -3.63 | -3.57 | -3.54 | -3.60 | -3.51 | -3.46 | -3.39 | -3.37 | -3.50 | -3.40 | -3.34 | -3.28 | -3.25 |
| 4 | 50 | -3.21 | -3.07 | -3.01 | -2.91 | -2.84 | -3.10 | -3.02 | -2.89 | -2.82 | -2.79 | -3.00 | -2.88 | -2.75 | -2.68 | -2.65 | -2.79 | -2.70 | -2.57 | -2.53 | -2.45 | -2.64 | -2.51 | -2.42 | -2.34 | -2.27 |
| | 70 | -3.59 | -3.50 | -3.41 | -3.34 | -3.31 | -3.50 | -3.39 | -3.33 | -3.28 | -3.24 | -3.34 | -3.24 | -3.16 | -3.13 | -3.10 | -3.15 | -3.07 | -2.99 | -2.90 | -2.86 | -2.98 | -2.88 | -2.80 | -2.73 | -2.67 |
| | 100 | -3.80 | -3.69 | -3.62 | -3.58 | -3.55 | -3.70 | -3.63 | -3.55 | -3.49 | -3.46 | -3.54 | -3.47 | -3.41 | -3.34 | -3.32 | -3.37 | -3.26 | -3.20 | -3.13 | -3.10 | -3.22 | -3.12 | -3.04 | -2.97 | -2.94 |
| | 200 | -3.96 | -3.89 | -3.81 | -3.77 | -3.73 | -3.85 | -3.79 | -3.73 | -3.68 | -3.64 | -3.74 | -3.64 | -3.58 | -3.53 | -3.50 | -3.56 | -3.47 | -3.41 | -3.35 | -3.32 | -3.44 | -3.35 | -3.28 | -3.23 | -3.19 |
| | | | | | | | | | | | | | | 5% | | | | | | | | | | | | |
| 0 | 50 | -3.87 | -3.82 | -3.76 | -3.71 | -3.69 | -3.77 | -3.70 | -3.65 | -3.60 | -3.59 | -3.58 | -3.53 | -3.49 | -3.44 | -3.42 | -3.42 | -3.37 | -3.31 | -3.27 | -3.25 | -3.31 | -3.25 | -3.20 | -3.16 | -3.14 |
| | 70 | -3.90 | -3.85 | -3.79 | -3.75 | -3.72 | -3.78 | -3.73 | -3.68 | -3.64 | -3.62 | -3.62 | -3.55 | -3.52 | -3.47 | -3.45 | -3.47 | -3.41 | -3.35 | -3.31 | -3.29 | -3.37 | -3.30 | -3.25 | -3.21 | -3.19 |
| | 100 | -3.92 | -3.86 | -3.81 | -3.77 | -3.74 | -3.80 | -3.75 | -3.70 | -3.66 | -3.65 | -3.63 | -3.59 | -3.53 | -3.49 | -3.47 | -3.50 | -3.44 | -3.38 | -3.34 | -3.32 | -3.40 | -3.35 | -3.29 | -3.24 | -3.23 |
| | 200 | -3.94 | -3.89 | -3.84 | -3.80 | -3.77 | -3.81 | -3.76 | -3.72 | -3.69 | -3.67 | -3.65 | -3.60 | -3.55 | -3.52 | -3.50 | -3.51 | -3.45 | -3.42 | -3.38 | -3.35 | -3.43 | -3.37 | -3.33 | -3.29 | -3.27 |
| 1 | 50 | -3.76 | -3.69 | -3.63 | -3.59 | -3.56 | -3.64 | -3.58 | -3.53 | -3.48 | -3.47 | -3.46 | -3.41 | -3.36 | -3.30 | -3.29 | -3.26 | -3.22 | -3.16 | -3.12 | -3.09 | -3.12 | -3.05 | -3.00 | -2.97 | -2.94 |
| | 70 | -3.81 | -3.77 | -3.72 | -3.67 | -3.64 | -3.70 | -3.66 | -3.60 | -3.57 | -3.54 | -3.55 | -3.47 | -3.44 | -3.39 | -3.37 | -3.37 | -3.30 | -3.24 | -3.21 | -3.18 | -3.24 | -3.18 | -3.12 | -3.08 | -3.05 |
| | 100 | -3.86 | -3.81 | -3.75 | -3.72 | -3.70 | -3.75 | -3.70 | -3.65 | -3.61 | -3.60 | -3.59 | -3.54 | -3.48 | -3.44 | -3.42 | -3.43 | -3.37 | -3.31 | -3.27 | -3.25 | -3.31 | -3.26 | -3.21 | -3.16 | -3.15 |
| | 200 | -3.91 | -3.86 | -3.81 | -3.77 | -3.75 | -3.79 | -3.74 | -3.70 | -3.67 | -3.65 | -3.63 | -3.57 | -3.52 | -3.49 | -3.47 | -3.48 | -3.42 | -3.39 | -3.35 | -3.32 | -3.39 | -3.33 | -3.29 | -3.25 | -3.23 |
| 2 | 50 | -3.51 | -3.44 | -3.39 | -3.33 | -3.31 | -3.39 | -3.34 | -3.28 | -3.23 | -3.21 | -3.23 | -3.16 | -3.10 | -3.06 | -3.04 | -3.03 | -2.95 | -2.90 | -2.86 | -2.83 | -2.85 | -2.78 | -2.73 | -2.69 | -2.66 |
| | 70 | -3.68 | -3.62 | -3.56 | -3.51 | -3.49 | -3.56 | -3.49 | -3.46 | -3.42 | -3.39 | -3.38 | -3.32 | -3.28 | -3.24 | -3.23 | -3.20 | -3.14 | -3.09 | -3.04 | -3.02 | -3.06 | -3.00 | -2.94 | -2.90 | -2.88 |
| | 100 | -3.77 | -3.71 | -3.66 | -3.62 | -3.60 | -3.66 | -3.61 | -3.56 | -3.52 | -3.50 | -3.48 | -3.44 | -3.39 | -3.35 | -3.33 | -3.31 | -3.26 | -3.21 | -3.16 | -3.15 | -3.19 | -3.14 | -3.09 | -3.04 | -3.02 |
| | 200 | -3.87 | -3.82 | -3.76 | -3.73 | -3.70 | -3.74 | -3.70 | -3.66 | -3.63 | -3.59 | -3.59 | -3.53 | -3.50 | -3.45 | -3.44 | -3.44 | -3.38 | -3.34 | -3.29 | -3.28 | -3.34 | -3.27 | -3.23 | -3.20 | -3.17 |
| 3 | 50 | -3.29 | -3.21 | -3.15 | -3.10 | -3.07 | -3.16 | -3.12 | -3.05 | -3.00 | -2.98 | -3.03 | -2.95 | -2.89 | -2.83 | -2.82 | -2.82 | -2.74 | -2.68 | -2.63 | -2.61 | -2.65 | -2.58 | -2.50 | -2.46 | -2.43 |
| | 70 | -3.56 | -3.49 | -3.44 | -3.39 | -3.37 | -3.45 | -3.38 | -3.34 | -3.30 | -3.27 | -3.27 | -3.21 | -3.16 | -3.13 | -3.10 | -3.07 | -3.02 | -2.96 | -2.91 | -2.89 | -2.92 | -2.85 | -2.80 | -2.75 | -2.72 |
| | 100 | -3.70 | -3.66 | -3.59 | -3.56 | -3.53 | -3.59 | -3.54 | -3.50 | -3.45 | -3.43 | -3.43 | -3.37 | -3.33 | -3.29 | -3.27 | -3.24 | -3.18 | -3.13 | -3.09 | -3.07 | -3.10 | -3.05 | -2.99 | -2.94 | -2.92 |
| | 200 | -3.85 | -3.79 | -3.74 | -3.70 | -3.68 | -3.72 | -3.68 | -3.64 | -3.60 | -3.57 | -3.57 | -3.50 | -3.47 | -3.42 | -3.41 | -3.40 | -3.34 | -3.31 | -3.26 | -3.24 | -3.30 | -3.23 | -3.19 | -3.15 | -3.13 |
| 4 | 50 | -2.95 | -2.86 | -2.78 | -2.73 | -2.68 | -2.83 | -2.76 | -2.69 | -2.63 | -2.61 | -2.70 | -2.62 | -2.55 | -2.49 | -2.46 | -2.52 | -2.43 | -2.36 | -2.30 | -2.27 | -2.37 | -2.28 | -2.21 | -2.15 | -2.11 |
| | 70 | -3.36 | -3.30 | -3.24 | -3.20 | -3.17 | -3.27 | -3.19 | -3.14 | -3.11 | -3.07 | -3.09 | -3.03 | -2.98 | -2.93 | -2.92 | -2.90 | -2.84 | -2.77 | -2.71 | -2.69 | -2.73 | -2.66 | -2.61 | -2.56 | -2.52 |
| | 100 | -3.60 | -3.54 | -3.48 | -3.44 | -3.42 | -3.50 | -3.44 | -3.39 | -3.34 | -3.32 | -3.32 | -3.26 | -3.22 | -3.17 | -3.16 | -3.12 | -3.06 | -3.02 | -2.96 | -2.95 | -2.99 | -2.93 | -2.86 | -2.81 | -2.79 |
| | 200 | -3.80 | -3.74 | -3.69 | -3.66 | -3.63 | -3.68 | -3.64 | -3.59 | -3.55 | -3.53 | -3.52 | -3.46 | -3.42 | -3.38 | -3.36 | -3.36 | -3.29 | -3.25 | -3.20 | -3.19 | -3.24 | -3.17 | -3.13 | -3.09 | -3.07 |
| | | | | | | | | | | | | | | 10% | | | | | | | | | | | | |
| 0 | 50 | -3.78 | -3.73 | -3.69 | -3.65 | -3.64 | -3.66 | -3.60 | -3.57 | -3.53 | -3.52 | -3.47 | -3.43 | -3.40 | -3.36 | -3.34 | -3.31 | -3.27 | -3.22 | -3.19 | -3.18 | -3.20 | -3.15 | -3.12 | -3.09 | -3.07 |
| | 70 | -3.81 | -3.78 | -3.73 | -3.70 | -3.68 | -3.67 | -3.64 | -3.60 | -3.58 | -3.56 | -3.51 | -3.46 | -3.43 | -3.39 | -3.38 | -3.36 | -3.31 | -3.27 | -3.24 | -3.22 | -3.27 | -3.21 | -3.17 | -3.14 | -3.12 |
| | 100 | -3.84 | -3.80 | -3.75 | -3.72 | -3.70 | -3.71 | -3.66 | -3.62 | -3.60 | -3.59 | -3.52 | -3.50 | -3.45 | -3.42 | -3.40 | -3.39 | -3.34 | -3.30 | -3.27 | -3.25 | -3.30 | -3.26 | -3.21 | -3.18 | -3.17 |
| | 200 | -3.86 | -3.82 | -3.78 | -3.75 | -3.73 | -3.72 | -3.68 | -3.65 | -3.63 | -3.62 | -3.55 | -3.51 | -3.48 | -3.45 | -3.43 | -3.42 | -3.37 | -3.34 | -3.31 | -3.29 | -3.34 | -3.29 | -3.26 | -3.23 | -3.21 |
| 1 | 50 | -3.65 | -3.59 | -3.55 | -3.52 | -3.49 | -3.53 | -3.47 | -3.43 | -3.39 | -3.39 | -3.33 | -3.29 | -3.25 | -3.21 | -3.20 | -3.14 | -3.10 | -3.05 | -3.02 | -3.01 | -3.00 | -2.95 | -2.91 | -2.88 | -2.86 |
| | 70 | -3.72 | -3.69 | -3.64 | -3.61 | -3.59 | -3.59 | -3.56 | -3.52 | -3.49 | -3.47 | -3.43 | -3.37 | -3.34 | -3.31 | -3.29 | -3.25 | -3.20 | -3.15 | -3.13 | -3.11 | -3.14 | -3.08 | -3.04 | -3.01 | -2.98 |
| | 100 | -3.77 | -3.74 | -3.69 | -3.66 | -3.64 | -3.65 | -3.61 | -3.57 | -3.54 | -3.53 | -3.47 | -3.44 | -3.40 | -3.36 | -3.34 | -3.32 | -3.27 | -3.23 | -3.20 | -3.18 | -3.22 | -3.17 | -3.13 | -3.09 | -3.08 |
| | 200 | -3.83 | -3.79 | -3.75 | -3.72 | -3.70 | -3.70 | -3.66 | -3.63 | -3.61 | -3.59 | -3.52 | -3.48 | -3.44 | -3.42 | -3.41 | -3.39 | -3.34 | -3.31 | -3.28 | -3.25 | -3.29 | -3.24 | -3.22 | -3.19 | -3.17 |
| 2 | 50 | -3.38 | -3.33 | -3.29 | -3.25 | -3.22 | -3.26 | -3.22 | -3.17 | -3.14 | -3.13 | -3.09 | -3.04 | -2.99 | -2.97 | -2.94 | -2.89 | -2.83 | -2.79 | -2.75 | -2.73 | -2.72 | -2.67 | -2.63 | -2.60 | -2.57 |
| | 70 | -3.57 | -3.52 | -3.48 | -3.44 | -3.42 | -3.45 | -3.39 | -3.36 | -3.33 | -3.32 | -3.26 | -3.21 | -3.18 | -3.15 | -3.14 | -3.08 | -3.03 | -2.99 | -2.95 | -2.94 | -2.94 | -2.89 | -2.85 | -2.81 | -2.79 |
| | 100 | -3.67 | -3.63 | -3.59 | -3.56 | -3.54 | -3.56 | -3.52 | -3.48 | -3.44 | -3.43 | -3.37 | -3.33 | -3.30 | -3.26 | -3.25 | -3.20 | -3.16 | -3.12 | -3.08 | -3.07 | -3.09 | -3.05 | -3.00 | -2.96 | -2.95 |
| | 200 | -3.78 | -3.74 | -3.71 | -3.68 | -3.66 | -3.65 | -3.62 | -3.59 | -3.56 | -3.54 | -3.48 | -3.44 | -3.41 | -3.37 | -3.36 | -3.34 | -3.29 | -3.26 | -3.22 | -3.21 | -3.24 | -3.19 | -3.15 | -3.12 | -3.11 |
| 3 | 50 | -3.15 | -3.10 | -3.05 | -3.01 | -2.98 | -3.04 | -2.99 | -2.93 | -2.91 | -2.89 | -2.87 | -2.82 | -2.77 | -2.73 | -2.72 | -2.67 | -2.61 | -2.57 | -2.52 | -2.50 | -2.51 | -2.45 | -2.40 | -2.36 | -2.34 |
| | 70 | -3.45 | -3.40 | -3.35 | -3.32 | -3.30 | -3.34 | -3.27 | -3.25 | -3.22 | -3.19 | -3.14 | -3.09 | -3.06 | -3.03 | -3.01 | -2.95 | -2.90 | -2.85 | -2.81 | -2.80 | -2.80 | -2.74 | -2.70 | -2.66 | -2.64 |
| | 100 | -3.60 | -3.57 | -3.52 | -3.48 | -3.47 | -3.49 | -3.45 | -3.41 | -3.37 | -3.36 | -3.30 | -3.27 | -3.23 | -3.20 | -3.18 | -3.11 | -3.07 | -3.04 | -2.99 | -2.99 | -2.99 | -2.95 | -2.90 | -2.86 | -2.85 |
| | 200 | -3.75 | -3.71 | -3.68 | -3.65 | -3.63 | -3.62 | -3.59 | -3.56 | -3.53 | -3.51 | -3.45 | -3.41 | -3.38 | -3.34 | -3.33 | -3.30 | -3.25 | -3.22 | -3.18 | -3.17 | -3.20 | -3.15 | -3.11 | -3.08 | -3.06 |
| 4 | 50 | -2.80 | -2.74 | -2.67 | -2.63 | -2.60 | -2.69 | -2.63 | -2.58 | -2.53 | -2.51 | -2.54 | -2.48 | -2.43 | -2.38 | -2.36 | -2.36 | -2.29 | -2.24 | -2.19 | -2.17 | -2.21 | -2.16 | -2.10 | -2.05 | -2.02 |
| | 70 | -3.25 | -3.19 | -3.15 | -3.11 | -3.09 | -3.15 | -3.07 | -3.04 | -3.01 | -2.98 | -2.96 | -2.90 | -2.87 | -2.84 | -2.82 | -2.76 | -2.71 | -2.66 | -2.62 | -2.60 | -2.61 | -2.55 | -2.51 | -2.47 | -2.44 |
| | 100 | -3.49 | -3.45 | -3.40 | -3.37 | -3.35 | -3.38 | -3.34 | -3.29 | -3.26 | -3.24 | -3.19 | -3.15 | -3.12 | -3.08 | -3.06 | -2.99 | -2.95 | -2.91 | -2.87 | -2.87 | -2.87 | -2.82 | -2.77 | -2.73 | -2.72 |
| | 200 | -3.71 | -3.67 | -3.63 | -3.60 | -3.58 | -3.57 | -3.55 | -3.51 | -3.49 | -3.46 | -3.41 | -3.36 | -3.33 | -3.30 | -3.29 | -3.25 | -3.20 | -3.17 | -3.13 | -3.11 | -3.14 | -3.08 | -3.05 | -3.02 | -3.00 |

*Notes:* Same as those in Table B3 except that $\mathbf{h}_t$ in regression is set to $\mathbf{h}_t$ =[1, *t*].

TABLE B9

Sizes and Powers of the *BCIPS* test with two known factors ($m$=2) in which factors and idiosyncratic errors are serially uncorrelated –with an Intercept and a linear trend

| | | | $\kappa$=1 | | | | | $\kappa$=2 | | | | | $\kappa$=3 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $T \setminus N$ | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 |
| | | | | | | | | Size | | | | | | | |
| | | | | | | $BCIPS(\hat{p}, \kappa)$, $\alpha_{iy,1},\alpha_{iy,2}$~i.i.d.$U[1, 2]$, $\alpha_{ix,1},\alpha_{ix,2}$~i.i.d.$U[1, 2]$ | | | | | | | | | |
| 50 | 0.052 | 0.052 | 0.047 | 0.040 | 0.051 | 0.047 | 0.046 | 0.057 | 0.042 | 0.058 | 0.048 | 0.042 | 0.047 | 0.047 | 0.046 |
| 70 | 0.050 | 0.049 | 0.043 | 0.042 | 0.045 | 0.050 | 0.043 | 0.052 | 0.042 | 0.049 | 0.049 | 0.053 | 0.047 | 0.049 | 0.049 |
| 100 | 0.045 | 0.049 | 0.044 | 0.056 | 0.051 | 0.048 | 0.052 | 0.052 | 0.042 | 0.049 | 0.037 | 0.051 | 0.046 | 0.050 | 0.053 |
| 200 | 0.041 | 0.048 | 0.049 | 0.050 | 0.052 | 0.045 | 0.045 | 0.044 | 0.047 | 0.046 | 0.045 | 0.056 | 0.044 | 0.043 | 0.057 |
| | | | | | | $BCIPS(\hat{p}, \kappa)$, $\alpha_{iy,1},-\alpha_{iy,2}$ ~ i.i.d.$U[10, 20]$, $-\alpha_{ix,1}$, $\alpha_{ix,2}$ ~ i.i.d.$U[3,5]$ | | | | | | | | | |
| 50 | 0.042 | 0.046 | 0.056 | 0.046 | 0.046 | 0.051 | 0.043 | 0.037 | 0.053 | 0.059 | 0.044 | 0.040 | 0.050 | 0.049 | 0.050 |
| 70 | 0.042 | 0.060 | 0.046 | 0.046 | 0.038 | 0.045 | 0.052 | 0.047 | 0.055 | 0.050 | 0.045 | 0.047 | 0.048 | 0.052 | 0.047 |
| 100 | 0.036 | 0.037 | 0.041 | 0.048 | 0.052 | 0.042 | 0.047 | 0.047 | 0.049 | 0.046 | 0.056 | 0.044 | 0.038 | 0.054 | 0.054 |
| 200 | 0.049 | 0.053 | 0.049 | 0.050 | 0.048 | 0.050 | 0.041 | 0.041 | 0.043 | 0.039 | 0.035 | 0.060 | 0.043 | 0.049 | 0.049 |
| | | | | | | $BCIPS(\hat{p}, \kappa)$, $\alpha_{iy,1},\alpha_{iy,2}$ ~ i.i.d.$U[10, 100]$, $\alpha_{ix,1}$, $\alpha_{ix,2}$ ~ i.i.d.$U[3,5]$ | | | | | | | | | |
| 50 | 0.048 | 0.052 | 0.043 | 0.044 | 0.045 | 0.053 | 0.043 | 0.041 | 0.057 | 0.068 | 0.055 | 0.033 | 0.043 | 0.053 | 0.047 |
| 70 | 0.043 | 0.038 | 0.050 | 0.051 | 0.044 | 0.040 | 0.048 | 0.044 | 0.047 | 0.055 | 0.058 | 0.049 | 0.051 | 0.046 | 0.051 |
| 100 | 0.045 | 0.040 | 0.045 | 0.045 | 0.050 | 0.049 | 0.052 | 0.057 | 0.043 | 0.045 | 0.047 | 0.045 | 0.045 | 0.049 | 0.056 |
| 200 | 0.048 | 0.040 | 0.051 | 0.049 | 0.047 | 0.048 | 0.043 | 0.046 | 0.045 | 0.037 | 0.055 | 0.050 | 0.042 | 0.048 | 0.046 |
| | | | | | | | | Power: | | | | | | | |
| | | | | | | $BCIPS(\hat{p}, \kappa)$, $\alpha_{iy,1},\alpha_{iy,2}$~i.i.d.$U(1, 2)$, $\alpha_{ix,1}$, $\alpha_{ix,2}$ ~ i.i.d.$U(1,2)$ | | | | | | | | | |
| 50 | 0.154 | 0.141 | 0.162 | 0.148 | 0.172 | 0.306 | 0.302 | 0.363 | 0.304 | 0.412 | 0.363 | 0.319 | 0.390 | 0.400 | 0.443 |
| 70 | 0.212 | 0.309 | 0.315 | 0.446 | 0.459 | 0.416 | 0.566 | 0.575 | 0.706 | 0.712 | 0.513 | 0.683 | 0.716 | 0.840 | 0.834 |
| 100 | 0.491 | 0.739 | 0.714 | 0.961 | 0.991 | 0.765 | 0.919 | 0.923 | 0.992 | 0.997 | 0.870 | 0.978 | 0.972 | 1.000 | 1.000 |
| 200 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| | | | | | | $BCIPS(\hat{p}, \kappa)$, $\alpha_{iy,1},-\alpha_{iy,2}$ ~ i.i.d.$U(10, 20)$, $-\alpha_{ix,1}$, $\alpha_{ix,2}$ ~ i.i.d.$U(3,5)$ | | | | | | | | | |
| 50 | 0.102 | 0.143 | 0.161 | 0.156 | 0.210 | 0.270 | 0.326 | 0.373 | 0.435 | 0.528 | 0.282 | 0.361 | 0.398 | 0.498 | 0.532 |
| 70 | 0.195 | 0.309 | 0.314 | 0.436 | 0.569 | 0.400 | 0.626 | 0.611 | 0.802 | 0.873 | 0.516 | 0.711 | 0.735 | 0.883 | 0.955 |
| 100 | 0.673 | 0.530 | 0.819 | 0.919 | 0.982 | 0.922 | 0.829 | 0.978 | 0.990 | 1.000 | 0.966 | 0.923 | 0.996 | 1.000 | 1.000 |
| 200 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| | | | | | | $BCIPS(\hat{p}, \kappa)$, $\alpha_{iy,1},\alpha_{iy,2}$ ~ i.i.d.$U(10, 100)$, $\alpha_{ix,1}$, $\alpha_{ix,2}$ ~ i.i.d.$U(3,5)$ | | | | | | | | | |
| 50 | 0.107 | 0.157 | 0.090 | 0.097 | 0.076 | 0.221 | 0.266 | 0.232 | 0.236 | 0.269 | 0.244 | 0.323 | 0.270 | 0.345 | 0.321 |
| 70 | 0.161 | 0.199 | 0.255 | 0.367 | 0.341 | 0.328 | 0.502 | 0.510 | 0.673 | 0.769 | 0.498 | 0.657 | 0.708 | 0.855 | 0.933 |
| 100 | 0.544 | 0.638 | 0.875 | 0.928 | 0.984 | 0.890 | 0.936 | 0.998 | 1.000 | 1.000 | 0.954 | 0.986 | 1.000 | 1.000 | 1.000 |
| 200 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |

*Notes:* $y_{it}$ is generated as $y_{it} = \mu_{iy}(1-\phi_i L)t + (1-\phi_i L)(\mu_i + \alpha_{iy,1}\sin(2\pi\kappa t/T) + \alpha_{iy,2}\cos(2\pi\kappa t/T)) + \phi_i y_{it-1} + \gamma_{iy,1} f_{1t} + \gamma_{iy,2} f_{2t} + \eta_{iyt}$, $\eta_{iyt} = \rho_{iy}\eta_{iyt-1} + (1-\rho_{iy}^2)^{1/2}\varepsilon_{iyt}$, with $y_{i0}$, $\varepsilon_{iy0}$ ~ i.i.d.$N(0,1)$, $\mu_i$ ~ i.i.d.$N[1,1]$, $\gamma_{iy,1}$ ~ i.i.d.$U[0,2]$, $\gamma_{iy,2}$ ~ i.i.d.$U[0,1]$, $f_{1t}, f_{2t}$ ~ i.i.d.$N(0,1)$, $\varepsilon_{iyt}$ ~ i.i.d.$N(0,\sigma_i^2)$ with $\sigma_i^2$ ~ i.i.d.$U[0.5,1.5]$; $\rho_{iy}$ ~ i.i.d.$U[0.2, 0.4]$ and ~ i.i.d.$U[-0.4,-0.2]$ to denote the case of positive and negative residual serial correlation, respectively. $x_{it} = x_{it-1} + \alpha_{ix,1}\Delta\sin(2\pi\kappa t/T) + \alpha_{ix,2}\Delta\cos(2\pi\kappa t/T) + \gamma_{ix,1} f_{1t} + \eta_{ixt}$, $\eta_{ixt} = \rho_{ix}\eta_{it-1} + \varepsilon_{ixt}$, $x_{i0}$ ~ i.i.d.$N(0,1)$, $\gamma_{ix,1}$ ~~ i.i.d.$U[0,2]$, $\rho_{ix}$ ~ i.i.d.$U[0.2,0.4]$ and $\varepsilon_{ixt} \sim N(0,\ 1\text{-}\rho_{ix}^2)$. Sizes (under the null $\phi_i = 1$) and Powers (under the alternative $\phi_i$ ~ i.i.d.$U[0.85,0.95]$) of the *BCIPS* statistic are computed at the 5% nominal level based on the *BCAD*F regression equation. The lag order of the model is selected based on the *SBC* of the panel: $SBC = -\frac{TN}{2}(1+\ln 2\pi) - \frac{T}{2}\sum_{i=1}^{N}\ln\left(\left(\sum_{t=1}^{T}\hat{e}_{it}^2\right)/T\right)$, where $T$ is the number of observations and $N$ is the panel size. The *BCIPS* statistics is described by equation (28).

TABLE B10

Sizes of Pesaran et al.'s (2013) *CIPS* test with two known factors in which factors and idiosyncratic errors are serially uncorrelated—with an Intercept and a linear trend

| | $\kappa$ =1 | | | | | $\kappa$ =2 | | | | | $\kappa$ =3 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $T \setminus N$ | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 |
| Size: Pesaran's $CIPS(\hat{p}, \kappa)$, $\alpha_{iy,1}, -\alpha_{iy,2} \sim$ i.i.d.$U(1, 2)$, $-\alpha_{ix,1}$, $\alpha_{ix,2} \sim$ i.i.d.$U(1,2)$ | | | | | | | | | | | | | | | |
| 50 | 0.216 | 0.194 | 0.252 | 0.318 | 0.386 | 0.196 | 0.172 | 0.190 | 0.292 | 0.294 | 0.058 | 0.055 | 0.047 | 0.069 | 0.066 |
| 70 | 0.141 | 0.143 | 0.181 | 0.197 | 0.292 | 0.108 | 0.131 | 0.155 | 0.220 | 0.235 | 0.040 | 0.039 | 0.053 | 0.079 | 0.061 |
| 100 | 0.117 | 0.114 | 0.168 | 0.229 | 0.198 | 0.102 | 0.093 | 0.154 | 0.173 | 0.181 | 0.051 | 0.030 | 0.077 | 0.057 | 0.060 |
| 200 | 0.084 | 0.100 | 0.113 | 0.097 | 0.102 | 0.052 | 0.087 | 0.085 | 0.065 | 0.089 | 0.028 | 0.046 | 0.028 | 0.031 | 0.037 |
| Size: Pesaran's $CIPS(\hat{p}, \kappa)$, $\alpha_{iy,1}, -\alpha_{iy,2} \sim$ i.i.d.$U(3, 5)$, $-\alpha_{ix,1}$, $\alpha_{ix,2} \sim$ i.i.d.$U(3,5)$ | | | | | | | | | | | | | | | |
| 50 | 0.520 | 0.574 | 0.574 | 0.722 | 0.794 | 0.338 | 0.305 | 0.288 | 0.398 | 0.427 | 0.085 | 0.062 | 0.047 | 0.069 | 0.060 |
| 70 | 0.364 | 0.435 | 0.466 | 0.621 | 0.699 | 0.205 | 0.249 | 0.273 | 0.346 | 0.439 | 0.051 | 0.054 | 0.058 | 0.067 | 0.086 |
| 100 | 0.262 | 0.347 | 0.417 | 0.521 | 0.546 | 0.161 | 0.267 | 0.275 | 0.311 | 0.374 | 0.057 | 0.089 | 0.074 | 0.071 | 0.095 |
| 200 | 0.241 | 0.256 | 0.279 | 0.385 | 0.400 | 0.243 | 0.155 | 0.227 | 0.276 | 0.272 | 0.123 | 0.049 | 0.110 | 0.114 | 0.094 |
| Size: Pesaran's $CIPS(\hat{p}, \kappa)$, $\alpha_{iy,1}, -\alpha_{iy,2} \sim$ i.i.d.$U(10,20)$, $-\alpha_{ix,1}$, $\alpha_{ix,2} \sim$ i.i.d.$U(3,5)$ | | | | | | | | | | | | | | | |
| 50 | 0.445 | 0.375 | 0.877 | 0.836 | 0.950 | 0.214 | 0.229 | 0.348 | 0.376 | 0.466 | 0.043 | 0.045 | 0.046 | 0.053 | 0.079 |
| 70 | 0.380 | 0.474 | 0.801 | 0.651 | 0.745 | 0.189 | 0.270 | 0.363 | 0.298 | 0.360 | 0.048 | 0.063 | 0.070 | 0.043 | 0.045 |
| 100 | 0.166 | 0.391 | 0.393 | 0.557 | 0.686 | 0.114 | 0.254 | 0.190 | 0.283 | 0.391 | 0.032 | 0.069 | 0.035 | 0.053 | 0.071 |
| 200 | 0.152 | 0.489 | 0.367 | 0.453 | 0.600 | 0.066 | 0.413 | 0.241 | 0.363 | 0.454 | 0.021 | 0.173 | 0.067 | 0.136 | 0.156 |

*Notes:* Same as those in Table B9.

TABLE B11

Sizes and powers of the *BCIPS* test with two known factors ($m$=2) in which factors are serially uncorrelated but idiosyncratic errors are serially correlated –with an Intercept and a linear trend

| | | | $\kappa$=1 | | | | | $\kappa$=2 | | | | | $\kappa$=3 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $T \setminus N$ | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 |
| | | | | | | | | $\alpha_{iy,1},\ \alpha_{iy,2},\ \alpha_{ix,1},\ \alpha_{ix,2} \sim$ i.i.d, $U(1,2)$ | | | | | | | |
| | | | | | | | | Size: *BCIPS*( $\hat{p}$ , $\kappa$ ), positive correlation in idiosyncratic errors | | | | | | | |
| 50 | 0.058 | 0.053 | 0.044 | 0.043 | 0.037 | 0.040 | 0.033 | 0.034 | 0.034 | 0.041 | 0.041 | 0.031 | 0.024 | 0.021 | 0.018 |
| 70 | 0.052 | 0.054 | 0.045 | 0.046 | 0.033 | 0.041 | 0.046 | 0.039 | 0.027 | 0.034 | 0.031 | 0.036 | 0.035 | 0.019 | 0.026 |
| 100 | 0.044 | 0.035 | 0.041 | 0.037 | 0.042 | 0.049 | 0.043 | 0.041 | 0.031 | 0.050 | 0.045 | 0.027 | 0.033 | 0.027 | 0.041 |
| 200 | 0.050 | 0.044 | 0.050 | 0.048 | 0.043 | 0.049 | 0.050 | 0.046 | 0.036 | 0.048 | 0.041 | 0.044 | 0.038 | 0.042 | 0.037 |
| | | | | | | | | Size: *BCIPS*( $\hat{p}$ , $\kappa$ ); negative correlation in idiosyncratic errors | | | | | | | |
| 50 | 0.059 | 0.057 | 0.051 | 0.058 | 0.057 | 0.049 | 0.056 | 0.059 | 0.062 | 0.075 | 0.066 | 0.075 | 0.066 | 0.080 | 0.076 |
| 70 | 0.045 | 0.058 | 0.052 | 0.056 | 0.047 | 0.054 | 0.060 | 0.051 | 0.051 | 0.058 | 0.056 | 0.064 | 0.066 | 0.057 | 0.074 |
| 100 | 0.040 | 0.037 | 0.044 | 0.048 | 0.049 | 0.053 | 0.050 | 0.051 | 0.041 | 0.065 | 0.061 | 0.050 | 0.063 | 0.053 | 0.076 |
| 200 | 0.040 | 0.040 | 0.039 | 0.046 | 0.042 | 0.047 | 0.052 | 0.052 | 0.043 | 0.050 | 0.047 | 0.047 | 0.044 | 0.051 | 0.049 |
| | | | | | | | | Power: *BCIPS*( $\hat{p}$ , $\kappa$ ); positive correlation in idiosyncratic errors | | | | | | | |
| 50 | 0.086 | 0.102 | 0.085 | 0.082 | 0.074 | 0.160 | 0.179 | 0.192 | 0.204 | 0.215 | 0.146 | 0.167 | 0.157 | 0.176 | 0.184 |
| 70 | 0.112 | 0.192 | 0.181 | 0.193 | 0.234 | 0.234 | 0.373 | 0.365 | 0.406 | 0.454 | 0.219 | 0.396 | 0.413 | 0.410 | 0.522 |
| 100 | 0.340 | 0.322 | 0.478 | 0.631 | 0.733 | 0.645 | 0.610 | 0.791 | 0.850 | 0.903 | 0.725 | 0.706 | 0.852 | 0.946 | 0.976 |
| 200 | 0.999 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| | | | | | | | | Power: *BCIPS*( $\hat{p}$ , $\kappa$ ); negative correlation in idiosyncratic errors | | | | | | | |
| 50 | 0.100 | 0.113 | 0.098 | 0.093 | 0.083 | 0.200 | 0.224 | 0.234 | 0.231 | 0.257 | 0.259 | 0.314 | 0.297 | 0.344 | 0.355 |
| 70 | 0.110 | 0.226 | 0.213 | 0.226 | 0.283 | 0.239 | 0.447 | 0.433 | 0.455 | 0.559 | 0.311 | 0.593 | 0.616 | 0.644 | 0.776 |
| 100 | 0.417 | 0.410 | 0.623 | 0.757 | 0.871 | 0.704 | 0.715 | 0.886 | 0.928 | 0.975 | 0.826 | 0.852 | 0.966 | 0.992 | 0.999 |
| 200 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |

*Notes:* Same as those in Table B9

TABLE B12

Sizes and powers of the *BCIPS* test with two known factors ($m$=2) in which factors are serially uncorrelated but idiosyncratic errors are serially correlated –with an Intercept and a linear trend

| | | | $\kappa$=1 | | | | | $\kappa$=2 | | | | | $\kappa$=3 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $T \setminus N$ | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 |
| $\alpha_{iy1}, -\alpha_{iy2} \sim$ i.i.d.$U(10, 20)$, $-\alpha_{ix1}$, $\alpha_{ix2} \sim$ i.i.d.$U(3,5)$ | | | | | | | | | | | | | | | |
| Size: *BCIPS*( $\hat{p}$ , $\kappa$ ), positive correlation in idiosyncratic errors | | | | | | | | | | | | | | | |
| 50 | 0.033 | 0.045 | 0.049 | 0.032 | 0.038 | 0.036 | 0.033 | 0.028 | 0.029 | 0.031 | 0.034 | 0.024 | 0.023 | 0.024 | 0.020 |
| 70 | 0.046 | 0.057 | 0.034 | 0.049 | 0.034 | 0.042 | 0.042 | 0.037 | 0.041 | 0.031 | 0.035 | 0.037 | 0.032 | 0.025 | 0.022 |
| 100 | 0.049 | 0.044 | 0.044 | 0.040 | 0.049 | 0.046 | 0.046 | 0.042 | 0.036 | 0.036 | 0.049 | 0.033 | 0.034 | 0.034 | 0.038 |
| 200 | 0.053 | 0.050 | 0.052 | 0.047 | 0.048 | 0.051 | 0.043 | 0.041 | 0.042 | 0.032 | 0.039 | 0.062 | 0.044 | 0.040 | 0.038 |
| Size: *BCIPS*( $\hat{p}$ , $\kappa$ ), negative correlation in idiosyncratic errors | | | | | | | | | | | | | | | |
| 50 | 0.039 | 0.050 | 0.052 | 0.054 | 0.057 | 0.056 | 0.054 | 0.048 | 0.063 | 0.073 | 0.070 | 0.060 | 0.073 | 0.075 | 0.083 |
| 70 | 0.047 | 0.060 | 0.044 | 0.059 | 0.039 | 0.054 | 0.059 | 0.051 | 0.060 | 0.058 | 0.059 | 0.059 | 0.069 | 0.065 | 0.069 |
| 100 | 0.044 | 0.048 | 0.040 | 0.042 | 0.051 | 0.050 | 0.053 | 0.051 | 0.050 | 0.051 | 0.061 | 0.046 | 0.051 | 0.066 | 0.069 |
| 200 | 0.045 | 0.049 | 0.046 | 0.044 | 0.050 | 0.051 | 0.041 | 0.038 | 0.048 | 0.042 | 0.044 | 0.063 | 0.043 | 0.055 | 0.048 |
| Power: *BCIPS*( $\hat{p}$ , $\kappa$ ), positive correlation in idiosyncratic errors | | | | | | | | | | | | | | | |
| 50 | 0.071 | 0.090 | 0.101 | 0.088 | 0.107 | 0.191 | 0.219 | 0.240 | 0.256 | 0.302 | 0.150 | 0.183 | 0.178 | 0.206 | 0.221 |
| 70 | 0.135 | 0.174 | 0.157 | 0.234 | 0.262 | 0.292 | 0.418 | 0.411 | 0.581 | 0.618 | 0.301 | 0.426 | 0.421 | 0.534 | 0.616 |
| 100 | 0.381 | 0.319 | 0.543 | 0.609 | 0.767 | 0.744 | 0.676 | 0.867 | 0.880 | 0.954 | 0.811 | 0.729 | 0.924 | 0.965 | 0.990 |
| 200 | 0.999 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| Power: *BCIPS*( $\hat{p}$ , $\kappa$ ), negative correlation in idiosyncratic errors | | | | | | | | | | | | | | | |
| 50 | 0.068 | 0.083 | 0.083 | 0.072 | 0.082 | 0.185 | 0.202 | 0.234 | 0.239 | 0.290 | 0.211 | 0.278 | 0.295 | 0.339 | 0.368 |
| 70 | 0.127 | 0.185 | 0.168 | 0.220 | 0.252 | 0.267 | 0.441 | 0.429 | 0.587 | 0.649 | 0.379 | 0.583 | 0.599 | 0.742 | 0.851 |
| 100 | 0.529 | 0.383 | 0.635 | 0.727 | 0.887 | 0.836 | 0.722 | 0.917 | 0.959 | 0.995 | 0.929 | 0.860 | 0.980 | 0.998 | 1.000 |
| 200 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| $\alpha_{iy,1}$, $\alpha_{iy,2} \sim$ i.i.d.$U(10,100)$, $\alpha_{ix,1}$, $\alpha_{ix,2} \sim$ i.i.d.$U(3,5)$ | | | | | | | | | | | | | | | |
| 50 | 0.044 | 0.045 | 0.035 | 0.039 | 0.032 | 0.039 | 0.048 | 0.031 | 0.036 | 0.027 | 0.040 | 0.031 | 0.029 | 0.024 | 0.017 |
| 70 | 0.043 | 0.042 | 0.040 | 0.038 | 0.041 | 0.033 | 0.041 | 0.036 | 0.036 | 0.046 | 0.027 | 0.034 | 0.035 | 0.029 | 0.024 |
| 100 | 0.045 | 0.041 | 0.052 | 0.051 | 0.036 | 0.039 | 0.054 | 0.044 | 0.032 | 0.036 | 0.033 | 0.029 | 0.037 | 0.028 | 0.036 |
| 200 | 0.045 | 0.043 | 0.045 | 0.051 | 0.042 | 0.043 | 0.052 | 0.043 | 0.044 | 0.050 | 0.051 | 0.030 | 0.040 | 0.042 | 0.027 |
| Size: *BCIPS*( $\hat{p}$ , $\kappa$ ), negative correlation in idiosyncratic errors | | | | | | | | | | | | | | | |
| 50 | 0.056 | 0.064 | 0.050 | 0.058 | 0.057 | 0.059 | 0.076 | 0.056 | 0.076 | 0.061 | 0.079 | 0.079 | 0.074 | 0.074 | 0.080 |
| 70 | 0.053 | 0.048 | 0.042 | 0.054 | 0.059 | 0.049 | 0.052 | 0.052 | 0.053 | 0.072 | 0.053 | 0.063 | 0.068 | 0.062 | 0.067 |
| 100 | 0.047 | 0.044 | 0.050 | 0.057 | 0.046 | 0.047 | 0.060 | 0.056 | 0.047 | 0.049 | 0.059 | 0.046 | 0.063 | 0.054 | 0.066 |
| 200 | 0.046 | 0.039 | 0.044 | 0.051 | 0.044 | 0.053 | 0.051 | 0.044 | 0.054 | 0.053 | 0.054 | 0.038 | 0.052 | 0.051 | 0.040 |
| Power: *BCIPS*( $\hat{p}$ , $\kappa$ ), positive correlation in idiosyncratic errors | | | | | | | | | | | | | | | |
| 50 | 0.168 | 0.175 | 0.198 | 0.224 | 0.206 | 0.239 | 0.231 | 0.277 | 0.272 | 0.298 | 0.304 | 0.343 | 0.390 | 0.536 | 0.627 |
| 70 | 0.379 | 0.355 | 0.398 | 0.589 | 0.733 | 0.448 | 0.611 | 0.743 | 0.762 | 0.928 | 0.588 | 0.812 | 0.947 | 0.970 | 1.000 |
| 100 | 0.680 | 0.878 | 0.987 | 0.998 | 1.000 | 0.920 | 0.989 | 1.000 | 1.000 | 1.000 | 0.983 | 0.998 | 1.000 | 1.000 | 1.000 |
| 200 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| Power: *BCIPS*( $\hat{p}$ , $\kappa$ ), negative correlation in idiosyncratic errors | | | | | | | | | | | | | | | |
| 50 | 0.099 | 0.079 | 0.090 | 0.064 | 0.041 | 0.342 | 0.280 | 0.340 | 0.413 | 0.499 | 0.636 | 0.650 | 0.778 | 0.940 | 0.992 |
| 70 | 0.350 | 0.352 | 0.454 | 0.537 | 0.772 | 0.699 | 0.901 | 0.982 | 0.988 | 1.000 | 0.909 | 0.993 | 1.000 | 1.000 | 1.000 |
| 100 | 0.856 | 0.959 | 1.000 | 1.000 | 1.000 | 0.997 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| 200 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |

*Notes:* Same as those in Table B9

TABLE B13

Sizes of the BCIPS test with two known factors in which factors are serially uncorrelated and $\kappa$ is unknown—with an Intercept and a linear trend

| | $\kappa$=1 | | | | | $\kappa$=2 | | | | | $\kappa$=3 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $T \setminus N$ | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 | 20 | 30 | 50 | 100 | 200 |
| | Size: *BCIPS*( $\hat{p}$ , $\kappa$ ), iid in idiosyncratic errors | | | | | | | | | | | | | | |
| 50 | 0.101 | 0.087 | 0.084 | 0.074 | 0.083 | 0.109 | 0.088 | 0.082 | 0.088 | 0.092 | 0.113 | 0.072 | 0.077 | 0.086 | 0.087 |
| 70 | 0.086 | 0.090 | 0.074 | 0.077 | 0.087 | 0.092 | 0.076 | 0.065 | 0.086 | 0.078 | 0.095 | 0.073 | 0.067 | 0.070 | 0.070 |
| 100 | 0.075 | 0.079 | 0.076 | 0.068 | 0.073 | 0.064 | 0.068 | 0.070 | 0.069 | 0.064 | 0.061 | 0.057 | 0.060 | 0.055 | 0.057 |
| 200 | 0.080 | 0.080 | 0.075 | 0.071 | 0.072 | 0.072 | 0.072 | 0.063 | 0.068 | 0.057 | 0.050 | 0.054 | 0.043 | 0.039 | 0.040 |
| | Size: *BCIPS*( $\hat{p}$ , $\kappa$ ), positive correlation in idiosyncratic errors | | | | | | | | | | | | | | |
| 50 | 0.097 | 0.082 | 0.077 | 0.067 | 0.072 | 0.120 | 0.104 | 0.100 | 0.109 | 0.100 | 0.120 | 0.086 | 0.084 | 0.090 | 0.089 |
| 70 | 0.096 | 0.085 | 0.076 | 0.082 | 0.074 | 0.117 | 0.091 | 0.079 | 0.096 | 0.095 | 0.102 | 0.079 | 0.058 | 0.073 | 0.063 |
| 100 | 0.092 | 0.083 | 0.085 | 0.076 | 0.074 | 0.086 | 0.087 | 0.085 | 0.085 | 0.084 | 0.064 | 0.064 | 0.058 | 0.060 | 0.042 |
| 200 | 0.090 | 0.088 | 0.085 | 0.076 | 0.079 | 0.084 | 0.084 | 0.081 | 0.082 | 0.073 | 0.061 | 0.063 | 0.046 | 0.038 | 0.026 |
| | Size: *BCIPS*( $\hat{p}$ , $\kappa$ ), negative correlation in idiosyncratic errors | | | | | | | | | | | | | | |
| 50 | 0.100 | 0.091 | 0.084 | 0.076 | 0.081 | 0.104 | 0.092 | 0.086 | 0.105 | 0.098 | 0.117 | 0.095 | 0.104 | 0.113 | 0.125 |
| 70 | 0.086 | 0.086 | 0.070 | 0.078 | 0.084 | 0.090 | 0.073 | 0.070 | 0.087 | 0.079 | 0.095 | 0.086 | 0.072 | 0.087 | 0.091 |
| 100 | 0.075 | 0.075 | 0.076 | 0.062 | 0.070 | 0.063 | 0.067 | 0.074 | 0.066 | 0.070 | 0.066 | 0.061 | 0.069 | 0.066 | 0.076 |
| 200 | 0.078 | 0.075 | 0.069 | 0.064 | 0.071 | 0.065 | 0.061 | 0.059 | 0.060 | 0.054 | 0.050 | 0.062 | 0.050 | 0.054 | 0.056 |

*Notes:* Same as those in Table 1. $\alpha_{iy,1}$, $\alpha_{iy,2}$, $\alpha_{ix,1}$, $\alpha_{ix,2}$ ~ i.i.d.$U(1,2)$ . Numbers in the table are the sizes of the *BCIPS* statistic in which the frequency parameter ( $\kappa$ ) in the Fourier function and the lag order of the model are jointly selected based on the method discussed in section 3.6. The *BCIPS* statistics is described by equation (28).

TABLE B14

The *BCIPS* and *CIPS* panel unit-root tests for real exchange rates

$$\Delta q_{it} = c_{i,0} + c_{i,1}\sin(2\pi\kappa t/T) + c_{i,2}\cos(2\pi\kappa t/T)) + \mathbf{c}'_{i,3}\overline{\mathbf{z}}_{t-1} + \mathbf{c}'_{i,4}\Delta\overline{\mathbf{z}}_t + \sum_{j=1}^{p}\mathbf{c}'_{i,5,j}\Delta\overline{\mathbf{z}}_{t-j}$$
$$+\sum_{j=1}^{p} c_{i,6,j}\Delta q_{i,t-j} + b_i q_{i,t-1} + e_{it}, \quad \text{where } \mathbf{z}_{it} = (q_{it}, \mathbf{x}'_{it})'.$$

| Included $\mathbf{x}_{it}$ | $(\hat{p},\hat{\kappa})$ | $[N,T]$ | *CD* | *BCIPS* | *CIPS* |
|---|---|---|---|---|---|
| | | $\hat{p} = Int\left[4\left\{\min(N,T)/100\right\}\right]^{0.25}$ | | | |
| | | m=1 | | | |
| No | (2,1) | [29,124] | **115.9** | **-3.396**** | -2.074 |
| | | m=2 | | | |
| $\overline{gdp}$ | (2,1) | [19,124] | **83.2** | **-3.700**** | **-2.822**** |
| $p_{oil}$ | (2,1) | [29,124] | **115.9** | **-3.181*** | -2.131 |
| $\overline{r}^L$ | (2,1) | [20,124] | **97.7** | **-3.257*** | **-2.624**** |
| $\overline{pd}$ | (2,1) | [16,124] | **73.9** | -3.198 | **-2.658**** |
| | | m=3 | | | |
| $\overline{gdp}$ , $p_{oil}$ | (2,1) | [19,124] | **83.2** | -3.310 | **-2.995**** |
| $p_{oil}$ , $\overline{r}^L$ | (2,1) | [20,124] | **97.7** | -2.966 | **-2.714*** |
| $\overline{r}^L$ , $\overline{gdp}$ | (2,2) | [17,124] | **79.6** | **-3.507**** | **-2.863**** |
| $\overline{\text{pd}}$ , $\overline{gdp}$ | (2,3) | [15,124] | **68.0** | **-3.967**** | **-3.426**** |
| $\overline{pd}$ , $p_{oil}$ | (2,1) | [16,124] | **73.9** | -2.982 | **-2.739*** |
| $\overline{pd}$ , $\overline{r}^L$ | (2,1) | [15,124] | **68.1** | -3.087 | **-2.648*** |
| | | m=4 | | | |
| $\overline{gdp}$ , $p_{oil}$ , $\overline{r}^L$ | (2,1) | [17,124] | **81.4** | -3.316 | **-2.873**** |
| $\overline{pd}$ , $p_{oil}$ , $\overline{r}^L$ | (2,1) | [15,124] | **68.1** | -2.825 | -2.604 |
| $\overline{gdp}$ , $\overline{pd}$ , $\overline{r}^L$ | (2,2) | [15,124] | **66.6** | **-3.960**** | **-3.386**** |
| $\overline{gdp}$ , $p_{oil}$ , $\overline{pd}$ | (2,1) | [15,124] | **68.1** | -3.268 | **-2.321**** |

*Notes:* m is the number of factors in the model. *CD* is the cross-sectional dependence test of Pesaran (2004). The Bold faced numbers indicate significance at the 5% level. '**' indicates significance at the 1% level and '*' indicates significance at the 5% level . $\hat{\kappa}$ and $\hat{p}$ are jointly determined based on the rule of minimum sum of square described in section 3.6.