

Appendix

On Forecast Stability

Appendix A.

Tables [A.1](#), [A.2](#) and [A.3](#) respectively show the MASE, RMSSE, and sMAPE based accuracy and stability results of vertical stability experiments across the four experimental datasets.

Table A.1: MASE, MASC and MASC-I results of vertical stability experiments.

| | | MASE | | | | MASC | | | | MASC.I | | | |
|----------|--------|--------|--------|----------|--------|--------|--------|----------|--------|--------|--------|----------|--------|
| | | M4 | M3 | Favorita | M5 | M4 | M3 | Favorita | M5 | M4 | M3 | Favorita | M5 |
| N-BEATS | Base | 0.6385 | 0.6431 | - | - | 0.3073 | 0.2603 | - | - | 0.4561 | 0.3921 | - | - |
| N-BEATS | Stable | 0.6485 | 0.6391 | - | - | 0.2532 | 0.1931 | - | - | 0.4155 | 0.3314 | - | - |
| N-BEATS | PI.0.2 | 0.6346 | 0.6423 | - | - | 0.2762 | 0.2113 | - | - | 0.4358 | 0.3589 | - | - |
| N-BEATS | PI.0.4 | 0.6382 | 0.6450 | - | - | 0.2239 | 0.1769 | - | - | 0.3983 | 0.3296 | - | - |
| N-BEATS | PI.0.5 | 0.6425 | 0.6478 | - | - | 0.2099 | 0.1676 | - | - | 0.3820 | 0.3166 | - | - |
| N-BEATS | PI.0.6 | 0.6485 | 0.6515 | - | - | 0.2056 | 0.1639 | - | - | 0.3676 | 0.3048 | - | - |
| N-BEATS | PI.0.8 | 0.6650 | 0.6615 | - | - | 0.2201 | 0.1715 | - | - | 0.3445 | 0.2852 | - | - |
| N-BEATS | PI.1 | 0.6871 | 0.6748 | - | - | 0.2545 | 0.1924 | - | - | 0.3298 | 0.2710 | - | - |
| N-BEATS | FI.0.2 | 0.6343 | 0.6419 | - | - | 0.2754 | 0.2098 | - | - | 0.4299 | 0.3538 | - | - |
| N-BEATS | FI.0.4 | 0.6374 | 0.6439 | - | - | 0.2098 | 0.1632 | - | - | 0.3691 | 0.3050 | - | - |
| N-BEATS | FI.0.5 | 0.6424 | 0.6466 | - | - | 0.1785 | 0.1403 | - | - | 0.3317 | 0.2744 | - | - |
| N-BEATS | FI.0.6 | 0.6505 | 0.6512 | - | - | 0.1473 | 0.1169 | - | - | 0.2875 | 0.2381 | - | - |
| N-BEATS | FI.0.8 | 0.6826 | 0.6700 | - | - | 0.0815 | 0.0659 | - | - | 0.1713 | 0.1420 | - | - |
| N-BEATS | FI.1 | 0.7532 | 0.7164 | - | - | 0.0000 | 0.0000 | - | - | 0.0000 | 0.0000 | - | - |
| | | | | | | | | | | | | | |
| PR | Base | 0.7911 | 0.7552 | 0.7737 | 1.3569 | 0.2186 | 0.1901 | 0.1666 | 0.4012 | 0.3721 | 0.2875 | 0.1966 | 0.6465 |
| PR | PI.0.2 | 0.7983 | 0.7593 | 0.7715 | 1.3493 | 0.1969 | 0.1574 | 0.1313 | 0.3123 | 0.3546 | 0.2597 | 0.1740 | 0.6063 |
| PR | PI.0.4 | 0.8075 | 0.7650 | 0.7705 | 1.3465 | 0.1695 | 0.1319 | 0.1022 | 0.2512 | 0.3231 | 0.2344 | 0.1540 | 0.5735 |
| PR | PI.0.5 | 0.8128 | 0.7684 | 0.7704 | 1.3469 | 0.1604 | 0.1236 | 0.0932 | 0.2371 | 0.3084 | 0.2230 | 0.1452 | 0.5604 |
| PR | PI.0.6 | 0.8186 | 0.7721 | 0.7707 | 1.3485 | 0.1546 | 0.1188 | 0.0881 | 0.2355 | 0.2946 | 0.2123 | 0.1373 | 0.5496 |
| PR | PI.0.8 | 0.8316 | 0.7807 | 0.7723 | 1.3555 | 0.1520 | 0.1188 | 0.0883 | 0.2653 | 0.2699 | 0.1940 | 0.1250 | 0.5357 |
| PR | PI.1 | 0.8465 | 0.7908 | 0.7752 | 1.3674 | 0.1596 | 0.1286 | 0.1010 | 0.3261 | 0.2497 | 0.1804 | 0.1187 | 0.5325 |
| PR | FI.0.2 | 0.7989 | 0.7598 | 0.7713 | 1.3485 | 0.1948 | 0.1562 | 0.1312 | 0.3122 | 0.3495 | 0.2559 | 0.1717 | 0.6010 |
| PR | FI.0.4 | 0.8108 | 0.7676 | 0.7699 | 1.3426 | 0.1569 | 0.1233 | 0.0983 | 0.2352 | 0.2990 | 0.2168 | 0.1432 | 0.5455 |
| PR | FI.0.5 | 0.8189 | 0.7731 | 0.7696 | 1.3404 | 0.1368 | 0.1065 | 0.0824 | 0.1997 | 0.2676 | 0.1931 | 0.1267 | 0.5099 |
| PR | FI.0.6 | 0.8291 | 0.7800 | 0.7699 | 1.3387 | 0.1153 | 0.0889 | 0.0669 | 0.1652 | 0.2309 | 0.1657 | 0.1081 | 0.4650 |
| PR | FI.0.8 | 0.8589 | 0.7999 | 0.7723 | 1.3398 | 0.0657 | 0.0497 | 0.0354 | 0.0945 | 0.1358 | 0.0964 | 0.0624 | 0.3217 |
| PR | FI.1 | 0.9111 | 0.8332 | 0.7796 | 1.3875 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| | | | | | | | | | | | | | |
| LightGBM | Base | 0.8540 | 0.7664 | 0.9142 | 1.3416 | 0.2815 | 0.2395 | 0.1520 | 0.2728 | 0.4452 | 0.3504 | 0.2274 | 0.5206 |
| LightGBM | PI.0.2 | 0.8580 | 0.7692 | 0.9180 | 1.3399 | 0.2608 | 0.1941 | 0.1251 | 0.2203 | 0.4255 | 0.3180 | 0.2049 | 0.4936 |
| LightGBM | PI.0.4 | 0.8664 | 0.7745 | 0.9226 | 1.3408 | 0.2154 | 0.1603 | 0.1035 | 0.1842 | 0.3869 | 0.2894 | 0.1842 | 0.4711 |
| LightGBM | PI.0.5 | 0.8723 | 0.7782 | 0.9251 | 1.3420 | 0.2016 | 0.1502 | 0.0961 | 0.1752 | 0.3696 | 0.2766 | 0.1747 | 0.4613 |
| LightGBM | PI.0.6 | 0.8792 | 0.7825 | 0.9277 | 1.3436 | 0.1957 | 0.1459 | 0.0917 | 0.1759 | 0.3539 | 0.2649 | 0.1658 | 0.4525 |
| LightGBM | PI.0.8 | 0.8960 | 0.7930 | 0.9334 | 1.3485 | 0.2022 | 0.1514 | 0.0901 | 0.1931 | 0.3272 | 0.2452 | 0.1499 | 0.4383 |
| LightGBM | PI.1 | 0.9165 | 0.8059 | 0.9397 | 1.3561 | 0.2261 | 0.1698 | 0.0965 | 0.2267 | 0.3084 | 0.2313 | 0.1372 | 0.4304 |
| LightGBM | FI.0.2 | 0.8585 | 0.7696 | 0.9184 | 1.3395 | 0.2594 | 0.1931 | 0.1243 | 0.2186 | 0.4196 | 0.3136 | 0.2022 | 0.4890 |
| LightGBM | FI.0.4 | 0.8693 | 0.7767 | 0.9249 | 1.3392 | 0.2023 | 0.1503 | 0.0977 | 0.1705 | 0.3585 | 0.2679 | 0.1713 | 0.4479 |
| LightGBM | FI.0.5 | 0.8777 | 0.7823 | 0.9291 | 1.3396 | 0.1738 | 0.1291 | 0.0842 | 0.1473 | 0.3210 | 0.2399 | 0.1527 | 0.4202 |
| LightGBM | FI.0.6 | 0.8890 | 0.7897 | 0.9342 | 1.3406 | 0.1445 | 0.1074 | 0.0702 | 0.1240 | 0.2773 | 0.2071 | 0.1312 | 0.3843 |
| LightGBM | FI.0.8 | 0.9244 | 0.8131 | 0.9482 | 1.3471 | 0.0804 | 0.0599 | 0.0391 | 0.0735 | 0.1638 | 0.1222 | 0.0766 | 0.2665 |
| LightGBM | FI.1 | 0.9904 | 0.8574 | 0.9698 | 1.3903 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| | | | | | | | | | | | | | |
| ETS | Base | 0.6558 | 0.6169 | 0.7744 | 1.2669 | 0.2631 | 0.2091 | 0.0920 | 0.1731 | 0.4529 | 0.3371 | 0.1410 | 0.3349 |
| ETS | PI.0.2 | 0.6574 | 0.6175 | 0.7742 | 1.2668 | 0.2424 | 0.1711 | 0.0752 | 0.1424 | 0.4395 | 0.3106 | 0.1291 | 0.3172 |
| ETS | PI.0.4 | 0.6644 | 0.6214 | 0.7745 | 1.2678 | 0.2072 | 0.1449 | 0.0634 | 0.1223 | 0.4048 | 0.2866 | 0.1184 | 0.3020 |
| ETS | PI.0.5 | 0.6698 | 0.6245 | 0.7749 | 1.2688 | 0.1974 | 0.1382 | 0.0602 | 0.1176 | 0.3889 | 0.2756 | 0.1136 | 0.2955 |
| ETS | PI.0.6 | 0.6764 | 0.6283 | 0.7754 | 1.2701 | 0.1933 | 0.1365 | 0.0587 | 0.1167 | 0.3742 | 0.2654 | 0.1091 | 0.2898 |
| ETS | PI.0.8 | 0.6927 | 0.6382 | 0.7769 | 1.2736 | 0.1987 | 0.1428 | 0.0604 | 0.1259 | 0.3486 | 0.2476 | 0.1016 | 0.2809 |
| ETS | PI.1 | 0.7128 | 0.6505 | 0.7790 | 1.2783 | 0.2180 | 0.1582 | 0.0668 | 0.1462 | 0.3290 | 0.2337 | 0.0960 | 0.2757 |
| ETS | FI.0.2 | 0.6568 | 0.6173 | 0.7740 | 1.2666 | 0.2397 | 0.1697 | 0.0746 | 0.1410 | 0.4333 | 0.3061 | 0.1273 | 0.3140 |
| ETS | FI.0.4 | 0.6634 | 0.6212 | 0.7740 | 1.2671 | 0.1895 | 0.1334 | 0.0582 | 0.1115 | 0.3748 | 0.2655 | 0.1096 | 0.2858 |
| ETS | FI.0.5 | 0.6697 | 0.6250 | 0.7741 | 1.2677 | 0.1643 | 0.1155 | 0.0501 | 0.0969 | 0.3377 | 0.2396 | 0.0986 | 0.2671 |
| ETS | FI.0.6 | 0.6792 | 0.6307 | 0.7744 | 1.2689 | 0.1381 | 0.0970 | 0.0419 | 0.0818 | 0.2934 | 0.2085 | 0.0855 | 0.2431 |
| ETS | FI.0.8 | 0.7145 | 0.6520 | 0.7760 | 1.2746 | 0.0791 | 0.0556 | 0.0237 | 0.0483 | 0.1753 | 0.1250 | 0.0509 | 0.1670 |
| ETS | FI.1 | 0.7901 | 0.6997 | 0.7822 | 1.3011 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| | | | | | | | | | | | | | |
| ARIMA | Base | 0.6339 | 0.6180 | 0.7847 | 1.2881 | 0.2752 | 0.2058 | 0.0997 | 0.1528 | 0.4346 | 0.3263 | 0.1261 | 0.3073 |
| ARIMA | PI.0.2 | 0.6349 | 0.6183 | 0.7835 | 1.2883 | 0.2255 | 0.1681 | 0.0793 | 0.1242 | 0.3982 | 0.2992 | 0.1124 | 0.2907 |
| ARIMA | PI.0.4 | 0.6414 | 0.6221 | 0.7832 | 1.2894 | 0.1908 | 0.1422 | 0.0638 | 0.1050 | 0.3653 | 0.2748 | 0.1003 | 0.2762 |
| ARIMA | PI.0.5 | 0.6465 | 0.6251 | 0.7833 | 1.2903 | 0.1809 | 0.1353 | 0.0587 | 0.1000 | 0.3502 | 0.2636 | 0.0949 | 0.2699 |
| ARIMA | PI.0.6 | 0.6527 | 0.6289 | 0.7836 | 1.2914 | 0.1766 | 0.1325 | 0.0560 | 0.0984 | 0.3363 | 0.2532 | 0.0901 | 0.2644 |
| ARIMA | PI.0.8 | 0.6683 | 0.6387 | 0.7848 | 1.2945 | 0.1814 | 0.1368 | 0.0563 | 0.1054 | 0.3124 | 0.2352 | 0.0825 | 0.2556 |
| ARIMA | PI.1 | 0.6877 | 0.6513 | 0.7868 | 1.2986 | 0.2004 | 0.1512 | 0.0637 | 0.1235 | 0.2945 | 0.2216 | 0.0782 | 0.2503 |
| ARIMA | FI.0.2 | 0.6347 | 0.6182 | 0.7834 | 1.2883 | 0.2235 | 0.1667 | 0.0791 | 0.1234 | 0.3926 | 0.2950 | 0.1109 | 0.2880 |
| ARIMA | FI.0.4 | 0.6416 | 0.6220 | 0.7827 | 1.2894 | 0.1758 | 0.1311 | 0.0601 | 0.0972 | 0.3384 | 0.2547 | 0.0932 | 0.2627 |
| ARIMA | FI.0.5 | 0.6481 | 0.6259 | 0.7826 | 1.2905 | 0.1520 | 0.1134 | 0.0509 | 0.0845 | 0.3044 | 0.2293 | 0.0828 | 0.2458 |
| ARIMA | FI.0.6 | 0.6576 | 0.6316 | 0.7827 | 1.2921 | 0.1274 | 0.0952 | 0.0417 | 0.0716 | 0.2640 | 0.1990 | 0.0709 | 0.2243 |
| ARIMA | FI.0.8 | 0.6916 | 0.6524 | 0.7840 | 1.2985 | 0.0725 | 0.0543 | 0.0224 | 0.0430 | 0.1572 | 0.1187 | 0.0413 | 0.1548 |
| ARIMA | FI.1 | 0.7613 | 0.6981 | 0.7886 | 1.3242 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

Table A.2: RMSSE, RMSSC and RMSSC-I results of vertical stability experiments.

| | | RMSSSE | | | | RMSSC | | | | RMSSC.I | | | |
|----------|--------|--------|--------|----------|--------|--------|--------|----------|--------|---------|--------|----------|--------|
| | | M4 | M3 | Favorita | M5 | M4 | M3 | Favorita | M5 | M4 | M3 | Favorita | M5 |
| N-BEATS | Base | 0.5607 | 0.5929 | - | - | 0.2341 | 0.2112 | - | - | 0.3781 | 0.3456 | - | - |
| N-BEATS | Stable | 0.5664 | 0.5900 | - | - | 0.1814 | 0.1573 | - | - | 0.3469 | 0.2948 | - | - |
| N-BEATS | PI.0.2 | 0.5574 | 0.5921 | - | - | 0.2214 | 0.1723 | - | - | 0.3742 | 0.3202 | - | - |
| N-BEATS | PI.0.4 | 0.5600 | 0.5945 | - | - | 0.1813 | 0.1464 | - | - | 0.3467 | 0.2984 | - | - |
| N-BEATS | PI.0.5 | 0.5634 | 0.5968 | - | - | 0.1711 | 0.1399 | - | - | 0.3354 | 0.2892 | - | - |
| N-BEATS | PI.0.6 | 0.5682 | 0.5999 | - | - | 0.1688 | 0.1381 | - | - | 0.3261 | 0.2813 | - | - |
| N-BEATS | PI.0.8 | 0.5813 | 0.6083 | - | - | 0.1863 | 0.1481 | - | - | 0.3139 | 0.2698 | - | - |
| N-BEATS | PI.1 | 0.5989 | 0.6193 | - | - | 0.2266 | 0.1739 | - | - | 0.3115 | 0.2652 | - | - |
| N-BEATS | FI.0.2 | 0.5571 | 0.5918 | - | - | 0.2206 | 0.1708 | - | - | 0.3693 | 0.3157 | - | - |
| N-BEATS | FI.0.4 | 0.5593 | 0.5936 | - | - | 0.1688 | 0.1341 | - | - | 0.3218 | 0.2765 | - | - |
| N-BEATS | FI.0.5 | 0.5631 | 0.5960 | - | - | 0.1442 | 0.1161 | - | - | 0.2918 | 0.2512 | - | - |
| N-BEATS | FI.0.6 | 0.5696 | 0.5999 | - | - | 0.1197 | 0.0976 | - | - | 0.2556 | 0.2203 | - | - |
| N-BEATS | FI.0.8 | 0.5959 | 0.6165 | - | - | 0.0674 | 0.0563 | - | - | 0.1561 | 0.1347 | - | - |
| N-BEATS | FI.1 | 0.6577 | 0.6584 | - | - | 0.0000 | 0.0000 | - | - | 0.0000 | 0.0000 | - | - |
| | | | | | | | | | | | | | |
| PR | Base | 0.6896 | 0.6886 | 0.5863 | 1.0086 | 0.1683 | 0.1527 | 0.1062 | 0.2514 | 0.3297 | 0.2543 | 0.1333 | 0.4365 |
| PR | PI.0.2 | 0.6943 | 0.6914 | 0.5848 | 1.0035 | 0.1496 | 0.1273 | 0.0839 | 0.1975 | 0.3004 | 0.2328 | 0.1192 | 0.4116 |
| PR | PI.0.4 | 0.7009 | 0.6955 | 0.5843 | 1.0015 | 0.1311 | 0.1086 | 0.0661 | 0.1613 | 0.2781 | 0.2136 | 0.1070 | 0.3917 |
| PR | PI.0.5 | 0.7047 | 0.6980 | 0.5844 | 1.0018 | 0.1253 | 0.1029 | 0.0606 | 0.1529 | 0.2680 | 0.2050 | 0.1017 | 0.3839 |
| PR | PI.0.6 | 0.7090 | 0.7009 | 0.5847 | 1.0028 | 0.1220 | 0.1000 | 0.0576 | 0.1518 | 0.2586 | 0.1973 | 0.0971 | 0.3778 |
| PR | PI.0.8 | 0.7189 | 0.7076 | 0.5861 | 1.0074 | 0.1231 | 0.1027 | 0.0591 | 0.1702 | 0.2428 | 0.1845 | 0.0905 | 0.3708 |
| PR | PI.1 | 0.7303 | 0.7157 | 0.5885 | 1.0151 | 0.1338 | 0.1148 | 0.0698 | 0.2105 | 0.2315 | 0.1764 | 0.0884 | 0.3717 |
| PR | FI.0.2 | 0.6947 | 0.6917 | 0.5848 | 1.0029 | 0.1478 | 0.1262 | 0.0838 | 0.1970 | 0.2961 | 0.2295 | 0.1177 | 0.4082 |
| PR | FI.0.4 | 0.7028 | 0.6972 | 0.5841 | 0.9988 | 0.1206 | 0.1008 | 0.0631 | 0.1501 | 0.2576 | 0.1977 | 0.0995 | 0.3734 |
| PR | FI.0.5 | 0.7086 | 0.7012 | 0.5841 | 0.9972 | 0.1061 | 0.0878 | 0.0532 | 0.1282 | 0.2329 | 0.1778 | 0.0888 | 0.3508 |
| PR | FI.0.6 | 0.7159 | 0.7063 | 0.5845 | 0.9960 | 0.0904 | 0.0740 | 0.0435 | 0.1068 | 0.2031 | 0.1542 | 0.0765 | 0.3221 |
| PR | FI.0.8 | 0.7386 | 0.7218 | 0.5871 | 0.9962 | 0.0530 | 0.0424 | 0.0234 | 0.0620 | 0.1224 | 0.0919 | 0.0452 | 0.2270 |
| PR | FI.1 | 0.7814 | 0.7497 | 0.5940 | 1.0267 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| | | | | | | | | | | | | | |
| LightGBM | Base | 0.7392 | 0.7003 | 0.6312 | 0.9871 | 0.2243 | 0.2028 | 0.0952 | 0.1796 | 0.3847 | 0.3155 | 0.1461 | 0.3550 |
| LightGBM | PI.0.2 | 0.7412 | 0.7018 | 0.6324 | 0.9853 | 0.2091 | 0.1641 | 0.0778 | 0.1444 | 0.3694 | 0.2895 | 0.1326 | 0.3372 |
| LightGBM | PI.0.4 | 0.7471 | 0.7058 | 0.6340 | 0.9852 | 0.1745 | 0.1366 | 0.0644 | 0.1212 | 0.3404 | 0.2671 | 0.1205 | 0.3227 |
| LightGBM | PI.0.5 | 0.7515 | 0.7087 | 0.6351 | 0.9858 | 0.1645 | 0.1289 | 0.0600 | 0.1158 | 0.3281 | 0.2575 | 0.1151 | 0.3168 |
| LightGBM | PI.0.6 | 0.7567 | 0.7121 | 0.6362 | 0.9869 | 0.1606 | 0.1262 | 0.0576 | 0.1157 | 0.3173 | 0.2492 | 0.1102 | 0.3118 |
| LightGBM | PI.0.8 | 0.7697 | 0.7207 | 0.6389 | 0.9903 | 0.1706 | 0.1350 | 0.0584 | 0.1281 | 0.3013 | 0.2367 | 0.1022 | 0.3050 |
| LightGBM | PI.1 | 0.7859 | 0.7314 | 0.6420 | 0.9955 | 0.2001 | 0.1589 | 0.0660 | 0.1536 | 0.2940 | 0.2310 | 0.0971 | 0.3031 |
| LightGBM | FI.0.2 | 0.7415 | 0.7020 | 0.6325 | 0.9850 | 0.2078 | 0.1632 | 0.0774 | 0.1434 | 0.3644 | 0.2856 | 0.1309 | 0.3342 |
| LightGBM | FI.0.4 | 0.7486 | 0.7070 | 0.6349 | 0.9838 | 0.1628 | 0.1275 | 0.0607 | 0.1117 | 0.3159 | 0.2477 | 0.1122 | 0.3075 |
| LightGBM | FI.0.5 | 0.7546 | 0.7112 | 0.6366 | 0.9835 | 0.1405 | 0.1099 | 0.0523 | 0.0966 | 0.2855 | 0.2238 | 0.1008 | 0.2895 |
| LightGBM | FI.0.6 | 0.7629 | 0.7169 | 0.6388 | 0.9836 | 0.1177 | 0.0920 | 0.0437 | 0.0815 | 0.2491 | 0.1953 | 0.0873 | 0.2662 |
| LightGBM | FI.0.8 | 0.7905 | 0.7359 | 0.6453 | 0.9864 | 0.0669 | 0.0523 | 0.0246 | 0.0487 | 0.1507 | 0.1181 | 0.0522 | 0.1879 |
| LightGBM | FI.1 | 0.8467 | 0.7745 | 0.6570 | 1.0139 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| | | | | | | | | | | | | | |
| ETS | Base | 0.5713 | 0.5690 | 0.5670 | 0.9332 | 0.2025 | 0.1677 | 0.0526 | 0.1017 | 0.3931 | 0.2994 | 0.0900 | 0.2123 |
| ETS | PI.0.2 | 0.5724 | 0.5695 | 0.5670 | 0.9331 | 0.1845 | 0.1384 | 0.0435 | 0.0839 | 0.3713 | 0.2788 | 0.0835 | 0.2022 |
| ETS | PI.0.4 | 0.5778 | 0.5728 | 0.5673 | 0.9337 | 0.1607 | 0.1195 | 0.0374 | 0.0727 | 0.3471 | 0.2609 | 0.0778 | 0.1936 |
| ETS | PI.0.5 | 0.5820 | 0.5754 | 0.5676 | 0.9343 | 0.1544 | 0.1149 | 0.0359 | 0.0701 | 0.3366 | 0.2531 | 0.0754 | 0.1901 |
| ETS | PI.0.6 | 0.5871 | 0.5786 | 0.5679 | 0.9351 | 0.1523 | 0.1140 | 0.0353 | 0.0698 | 0.3272 | 0.2462 | 0.0732 | 0.1870 |
| ETS | PI.0.8 | 0.5996 | 0.5867 | 0.5690 | 0.9372 | 0.1603 | 0.1220 | 0.0372 | 0.0757 | 0.3126 | 0.2356 | 0.0699 | 0.1826 |
| ETS | PI.1 | 0.6150 | 0.5969 | 0.5704 | 0.9400 | 0.1834 | 0.1411 | 0.0428 | 0.0889 | 0.3050 | 0.2301 | 0.0682 | 0.1807 |
| ETS | FI.0.2 | 0.5721 | 0.5694 | 0.5669 | 0.9330 | 0.1822 | 0.1370 | 0.0430 | 0.0830 | 0.3662 | 0.2750 | 0.0824 | 0.2002 |
| ETS | FI.0.4 | 0.5775 | 0.5729 | 0.5671 | 0.9332 | 0.1460 | 0.1092 | 0.0341 | 0.0661 | 0.3220 | 0.2421 | 0.0722 | 0.1838 |
| ETS | FI.0.5 | 0.5827 | 0.5762 | 0.5673 | 0.9335 | 0.1277 | 0.0954 | 0.0297 | 0.0577 | 0.2931 | 0.2205 | 0.0655 | 0.1727 |
| ETS | FI.0.6 | 0.5903 | 0.5812 | 0.5677 | 0.9341 | 0.1085 | 0.0810 | 0.0251 | 0.0490 | 0.2575 | 0.1939 | 0.0575 | 0.1583 |
| ETS | FI.0.8 | 0.6190 | 0.6000 | 0.5694 | 0.9370 | 0.0638 | 0.0477 | 0.0146 | 0.0295 | 0.1579 | 0.1192 | 0.0351 | 0.1110 |
| ETS | FI.1 | 0.6837 | 0.6434 | 0.5741 | 0.9524 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| | | | | | | | | | | | | | |
| ARIMA | Base | 0.5547 | 0.5683 | 0.5732 | 0.9510 | 0.2104 | 0.1685 | 0.0644 | 0.0958 | 0.3656 | 0.2921 | 0.0855 | 0.2025 |
| ARIMA | PI.0.2 | 0.5554 | 0.5686 | 0.5724 | 0.9509 | 0.1739 | 0.1387 | 0.0514 | 0.0782 | 0.3389 | 0.2708 | 0.0766 | 0.1924 |
| ARIMA | PI.0.4 | 0.5604 | 0.5717 | 0.5721 | 0.9514 | 0.1498 | 0.1193 | 0.0416 | 0.0666 | 0.3154 | 0.2520 | 0.0689 | 0.1837 |
| ARIMA | PI.0.5 | 0.5643 | 0.5743 | 0.5722 | 0.9519 | 0.1432 | 0.1142 | 0.0384 | 0.0635 | 0.3051 | 0.2438 | 0.0656 | 0.1800 |
| ARIMA | PI.0.6 | 0.5691 | 0.5776 | 0.5724 | 0.9526 | 0.1407 | 0.1125 | 0.0367 | 0.0626 | 0.2960 | 0.2365 | 0.0628 | 0.1769 |
| ARIMA | PI.0.8 | 0.5810 | 0.5858 | 0.5733 | 0.9544 | 0.1477 | 0.1186 | 0.0376 | 0.0670 | 0.2818 | 0.2251 | 0.0588 | 0.1722 |
| ARIMA | PI.1 | 0.5958 | 0.5962 | 0.5748 | 0.9569 | 0.1696 | 0.1364 | 0.0440 | 0.0790 | 0.2745 | 0.2191 | 0.0576 | 0.1699 |
| ARIMA | FI.0.2 | 0.5553 | 0.5685 | 0.5723 | 0.9509 | 0.1720 | 0.1374 | 0.0512 | 0.0776 | 0.3342 | 0.2671 | 0.0756 | 0.1907 |
| ARIMA | FI.0.4 | 0.5606 | 0.5718 | 0.5718 | 0.9513 | 0.1371 | 0.1093 | 0.0392 | 0.0614 | 0.2927 | 0.2340 | 0.0641 | 0.1751 |
| ARIMA | FI.0.5 | 0.5657 | 0.5752 | 0.5718 | 0.9518 | 0.1195 | 0.0953 | 0.0333 | 0.0535 | 0.2658 | 0.2125 | 0.0573 | 0.1647 |
| ARIMA | FI.0.6 | 0.5732 | 0.5802 | 0.5719 | 0.9525 | 0.1012 | 0.0807 | 0.0274 | 0.0455 | 0.2330 | 0.1863 | 0.0494 | 0.1512 |
| ARIMA | FI.0.8 | 0.6006 | 0.5988 | 0.5730 | 0.9556 | 0.0590 | 0.0471 | 0.0149 | 0.0276 | 0.1423 | 0.1138 | 0.0293 | 0.1064 |
| ARIMA | FI.1 | 0.6601 | 0.6409 | 0.5767 | 0.9699 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

Table A.3: sMAPE, sMAPC and sMAPC-I results of vertical stability experiments.

| | | sMAPE | | | | sMAPC | | | | sMAPC.I | | | |
|----------|--------|--------|--------|----------|--------|-------|-------|----------|--------|---------|-------|----------|--------|
| | | M4 | M3 | Favorita | M5 | M4 | M3 | Favorita | M5 | M4 | M3 | Favorita | M5 |
| N-BEATS | Base | 9.296 | 11.485 | - | - | 4.717 | 3.932 | - | - | 6.468 | 5.786 | - | - |
| N-BEATS | Stable | 9.279 | 11.390 | - | - | 3.336 | 2.820 | - | - | 5.270 | 4.705 | - | - |
| N-BEATS | PI.0.2 | 9.265 | 11.461 | - | - | 3.745 | 3.181 | - | - | 5.886 | 5.288 | - | - |
| N-BEATS | PI.0.4 | 9.324 | 11.484 | - | - | 3.050 | 2.649 | - | - | 5.386 | 4.850 | - | - |
| N-BEATS | PI.0.5 | 9.384 | 11.511 | - | - | 2.865 | 2.508 | - | - | 5.169 | 4.657 | - | - |
| N-BEATS | PI.0.6 | 9.464 | 11.553 | - | - | 2.808 | 2.451 | - | - | 4.976 | 4.485 | - | - |
| N-BEATS | PI.0.8 | 9.677 | 11.673 | - | - | 2.998 | 2.569 | - | - | 4.665 | 4.202 | - | - |
| N-BEATS | PI.1 | 9.956 | 11.831 | - | - | 3.450 | 2.889 | - | - | 4.462 | 4.000 | - | - |
| N-BEATS | FI.0.2 | 9.261 | 11.454 | - | - | 3.732 | 3.158 | - | - | 5.806 | 5.212 | - | - |
| N-BEATS | FI.0.4 | 9.318 | 11.458 | - | - | 2.851 | 2.444 | - | - | 4.991 | 4.483 | - | - |
| N-BEATS | FI.0.5 | 9.390 | 11.478 | - | - | 2.429 | 2.095 | - | - | 4.489 | 4.029 | - | - |
| N-BEATS | FI.0.6 | 9.502 | 11.518 | - | - | 2.008 | 1.743 | - | - | 3.897 | 3.492 | - | - |
| N-BEATS | FI.0.8 | 9.919 | 11.703 | - | - | 1.119 | 0.977 | - | - | 2.339 | 2.082 | - | - |
| N-BEATS | FI.1 | 10.806 | 12.219 | - | - | 0.000 | 0.000 | - | - | 0.000 | 0.000 | - | - |
| | | | | | | | | | | | | | |
| PR | Base | 10.632 | 12.622 | 103.351 | 54.964 | 3.245 | 3.518 | 29.190 | 17.559 | 5.282 | 4.896 | 36.772 | 26.876 |
| PR | PI.0.2 | 10.713 | 12.638 | 103.255 | 54.579 | 2.743 | 2.880 | 24.303 | 13.857 | 4.817 | 4.407 | 33.580 | 25.222 |
| PR | PI.0.4 | 10.822 | 12.680 | 103.173 | 54.392 | 2.350 | 2.385 | 20.319 | 11.260 | 4.390 | 3.971 | 30.665 | 23.894 |
| PR | PI.0.5 | 10.886 | 12.712 | 103.196 | 54.374 | 2.221 | 2.222 | 19.011 | 10.650 | 4.192 | 3.777 | 29.261 | 23.366 |
| PR | PI.0.6 | 10.956 | 12.751 | 103.269 | 54.406 | 2.142 | 2.132 | 18.160 | 10.565 | 4.007 | 3.604 | 27.930 | 22.935 |
| PR | PI.0.8 | 11.116 | 12.851 | 103.566 | 54.629 | 2.118 | 2.154 | 17.694 | 11.810 | 3.679 | 3.317 | 25.568 | 22.392 |
| PR | PI.1 | 11.302 | 12.981 | 104.084 | 55.087 | 2.244 | 2.388 | 18.739 | 14.375 | 3.418 | 3.128 | 23.677 | 22.273 |
| PR | FI.0.2 | 10.720 | 12.638 | 103.627 | 54.532 | 2.715 | 2.858 | 24.670 | 13.856 | 4.748 | 4.341 | 33.216 | 24.994 |
| PR | FI.0.4 | 10.860 | 12.685 | 103.530 | 54.162 | 2.177 | 2.217 | 19.386 | 10.504 | 4.064 | 3.661 | 28.954 | 22.720 |
| PR | FI.0.5 | 10.957 | 12.726 | 103.563 | 53.987 | 1.893 | 1.894 | 16.809 | 8.925 | 3.640 | 3.253 | 26.342 | 21.269 |
| PR | FI.0.6 | 11.080 | 12.783 | 103.673 | 53.812 | 1.594 | 1.565 | 13.911 | 7.361 | 3.144 | 2.786 | 23.174 | 19.446 |
| PR | FI.0.8 | 11.448 | 12.972 | 104.248 | 53.556 | 0.909 | 0.856 | 8.077 | 4.213 | 1.860 | 1.618 | 14.923 | 13.662 |
| PR | FI.1 | 12.103 | 13.333 | 105.775 | 54.936 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | | | | | | | | | | | |
| LightGBM | Base | 11.125 | 12.653 | 101.341 | 52.207 | 3.566 | 3.478 | 13.216 | 9.992 | 5.450 | 4.887 | 18.787 | 17.961 |
| LightGBM | PI.0.2 | 11.211 | 12.680 | 101.229 | 52.100 | 2.950 | 2.812 | 10.796 | 8.108 | 4.939 | 4.412 | 16.703 | 16.996 |
| LightGBM | PI.0.4 | 11.332 | 12.738 | 101.171 | 52.081 | 2.466 | 2.304 | 8.846 | 6.792 | 4.479 | 3.996 | 14.821 | 16.204 |
| LightGBM | PI.0.5 | 11.405 | 12.779 | 101.155 | 52.092 | 2.307 | 2.146 | 8.146 | 6.445 | 4.270 | 3.813 | 13.963 | 15.862 |
| LightGBM | PI.0.6 | 11.487 | 12.827 | 101.149 | 52.116 | 2.223 | 2.072 | 7.686 | 6.466 | 4.077 | 3.648 | 13.163 | 15.554 |
| LightGBM | PI.0.8 | 11.673 | 12.944 | 101.164 | 52.209 | 2.237 | 2.146 | 7.359 | 7.063 | 3.744 | 3.375 | 11.764 | 15.057 |
| LightGBM | PI.1 | 11.889 | 13.089 | 101.222 | 52.398 | 2.440 | 2.417 | 7.697 | 8.259 | 3.496 | 3.190 | 10.659 | 14.796 |
| LightGBM | FI.0.2 | 11.221 | 12.683 | 101.214 | 52.079 | 2.929 | 2.798 | 10.701 | 8.029 | 4.868 | 4.349 | 16.457 | 16.826 |
| LightGBM | FI.0.4 | 11.386 | 12.757 | 101.120 | 51.988 | 2.310 | 2.165 | 8.257 | 6.264 | 4.144 | 3.693 | 13.698 | 15.369 |
| LightGBM | FI.0.5 | 11.503 | 12.815 | 101.086 | 51.946 | 1.993 | 1.852 | 7.025 | 5.398 | 3.701 | 3.297 | 12.087 | 14.393 |
| LightGBM | FI.0.6 | 11.652 | 12.892 | 101.067 | 51.907 | 1.663 | 1.533 | 5.768 | 4.523 | 3.187 | 2.838 | 10.274 | 13.138 |
| LightGBM | FI.0.8 | 12.087 | 13.136 | 101.107 | 51.888 | 0.929 | 0.845 | 3.095 | 2.636 | 1.868 | 1.665 | 5.861 | 9.062 |
| LightGBM | FI.1 | 12.827 | 13.610 | 101.323 | 52.690 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | | | | | | | | | | | |
| ETS | Base | 9.984 | 11.344 | 104.820 | 50.866 | 3.916 | 3.210 | 14.192 | 6.450 | 6.995 | 5.011 | 20.956 | 11.689 |
| ETS | PI.0.2 | 10.007 | 11.332 | 104.752 | 50.823 | 3.652 | 2.623 | 12.224 | 5.375 | 6.632 | 4.615 | 19.505 | 11.081 |
| ETS | PI.0.4 | 10.114 | 11.369 | 104.742 | 50.821 | 3.153 | 2.213 | 10.764 | 4.682 | 6.130 | 4.265 | 18.117 | 10.560 |
| ETS | PI.0.5 | 10.195 | 11.404 | 104.762 | 50.834 | 3.015 | 2.101 | 10.332 | 4.520 | 5.900 | 4.106 | 17.454 | 10.337 |
| ETS | PI.0.6 | 10.291 | 11.449 | 104.799 | 50.858 | 2.960 | 2.077 | 10.072 | 4.488 | 5.686 | 3.958 | 16.817 | 10.138 |
| ETS | PI.0.8 | 10.530 | 11.572 | 104.928 | 50.937 | 3.038 | 2.186 | 10.001 | 4.778 | 5.306 | 3.702 | 15.616 | 9.825 |
| ETS | PI.1 | 10.823 | 11.735 | 105.120 | 51.059 | 3.292 | 2.432 | 10.328 | 5.460 | 4.996 | 3.500 | 14.373 | 9.646 |
| ETS | FI.0.2 | 9.995 | 11.328 | 104.732 | 50.811 | 3.601 | 2.600 | 12.106 | 5.313 | 6.538 | 4.552 | 19.279 | 10.968 |
| ETS | FI.0.4 | 10.086 | 11.356 | 104.653 | 50.768 | 2.862 | 2.042 | 9.982 | 4.248 | 5.682 | 3.958 | 17.022 | 10.001 |
| ETS | FI.0.5 | 10.175 | 11.392 | 104.621 | 50.751 | 2.488 | 1.764 | 8.833 | 3.707 | 5.137 | 3.581 | 15.560 | 9.354 |
| ETS | FI.0.6 | 10.312 | 11.451 | 104.600 | 50.737 | 2.101 | 1.480 | 7.612 | 3.131 | 4.485 | 3.128 | 13.820 | 8.524 |
| ETS | FI.0.8 | 10.831 | 11.695 | 104.630 | 50.750 | 1.229 | 0.854 | 4.620 | 1.848 | 2.733 | 1.909 | 8.957 | 5.892 |
| ETS | FI.1 | 11.949 | 12.303 | 105.123 | 51.212 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | | | | | | | | | | | |
| ARIMA | Base | 9.771 | 11.748 | 103.635 | 51.050 | 4.148 | 3.169 | 12.386 | 5.457 | 6.571 | 4.996 | 15.665 | 10.441 |
| ARIMA | PI.0.2 | 9.781 | 11.745 | 103.460 | 51.018 | 3.413 | 2.603 | 10.135 | 4.489 | 6.035 | 4.579 | 14.095 | 9.873 |
| ARIMA | PI.0.4 | 9.876 | 11.790 | 103.366 | 51.017 | 2.908 | 2.211 | 8.294 | 3.832 | 5.550 | 4.202 | 12.704 | 9.380 |
| ARIMA | PI.0.5 | 9.952 | 11.829 | 103.352 | 51.029 | 2.766 | 2.097 | 7.667 | 3.657 | 5.329 | 4.030 | 12.072 | 9.166 |
| ARIMA | PI.0.6 | 10.044 | 11.878 | 103.362 | 51.048 | 2.704 | 2.049 | 7.354 | 3.606 | 5.124 | 3.869 | 11.485 | 8.977 |
| ARIMA | PI.0.8 | 10.275 | 12.006 | 103.441 | 51.111 | 2.777 | 2.098 | 7.347 | 3.837 | 4.765 | 3.587 | 10.495 | 8.681 |
| ARIMA | PI.1 | 10.560 | 12.176 | 103.624 | 51.206 | 3.050 | 2.296 | 7.906 | 4.428 | 4.484 | 3.369 | 9.690 | 8.503 |
| ARIMA | FI.0.2 | 9.777 | 11.742 | 103.443 | 51.012 | 3.379 | 2.579 | 10.055 | 4.455 | 5.951 | 4.516 | 13.923 | 9.780 |
| ARIMA | FI.0.4 | 9.874 | 11.783 | 103.298 | 50.990 | 2.671 | 2.039 | 7.805 | 3.535 | 5.151 | 3.901 | 11.887 | 8.915 |
| ARIMA | FI.0.5 | 9.967 | 11.828 | 103.248 | 50.986 | 2.317 | 1.769 | 6.715 | 3.084 | 4.647 | 3.516 | 10.689 | 8.343 |
| ARIMA | FI.0.6 | 10.105 | 11.894 | 103.214 | 50.987 | 1.952 | 1.488 | 5.590 | 2.623 | 4.048 | 3.060 | 9.323 | 7.615 |
| ARIMA | FI.0.8 | 10.598 | 12.151 | 103.245 | 51.038 | 1.130 | 0.859 | 3.203 | 1.593 | 2.452 | 1.846 | 5.865 | 5.286 |
| ARIMA | FI.1 | 11.618 | 12.760 | 103.636 | 51.487 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

Tables [A.4](#), [A.5](#) and [A.6](#) respectively show the MASE, RMSSE, and sMAPE based accuracy and stability results of horizontal stability experiments across the four experimental datasets. The accuracy measures are calculated based on final forecasts and stability measures are calculated based on remainders.

Table A.6: sMAPE, sMAPC and sMAPC_I results of horizontal stability experiments.

| | | sMAPE | | | | sMAPC | | | | sMAPC.I | | | |
|----------|--------|--------|--------|----------|--------|---------|---------|----------|---------|---------|---------|----------|---------|
| | | M4 | M3 | Favorita | M5 | M4 | M3 | Favorita | M5 | M4 | M3 | Favorita | M5 |
| N-BEATS | Base | 12.072 | 14.335 | - | - | 108.159 | 117.581 | - | - | 156.298 | 157.155 | - | - |
| N-BEATS | PI_0.2 | 12.076 | 14.336 | - | - | 100.386 | 108.179 | - | - | 150.404 | 153.321 | - | - |
| N-BEATS | PI_0.4 | 12.088 | 14.339 | - | - | 94.433 | 100.549 | - | - | 143.624 | 147.908 | - | - |
| N-BEATS | PI_0.5 | 12.095 | 14.340 | - | - | 92.795 | 98.710 | - | - | 139.978 | 144.557 | - | - |
| N-BEATS | PI_0.6 | 12.103 | 14.341 | - | - | 92.398 | 98.646 | - | - | 136.218 | 140.780 | - | - |
| N-BEATS | PI_0.8 | 12.123 | 14.344 | - | - | 92.428 | 99.887 | - | - | 128.432 | 132.068 | - | - |
| N-BEATS | PI_1 | 12.145 | 14.346 | - | - | 91.560 | 99.001 | - | - | 120.178 | 121.740 | - | - |
| N-BEATS | FI_0.2 | 12.076 | 14.336 | - | - | 100.337 | 108.747 | - | - | 149.312 | 152.661 | - | - |
| N-BEATS | FI_0.4 | 12.088 | 14.338 | - | - | 93.264 | 100.379 | - | - | 137.745 | 144.304 | - | - |
| N-BEATS | FI_0.5 | 12.097 | 14.339 | - | - | 88.640 | 95.846 | - | - | 128.731 | 137.574 | - | - |
| N-BEATS | FI_0.6 | 12.110 | 14.340 | - | - | 80.242 | 89.790 | - | - | 115.818 | 127.704 | - | - |
| N-BEATS | FI_0.8 | 12.152 | 14.343 | - | - | 37.434 | 56.336 | - | - | 69.065 | 87.017 | - | - |
| N-BEATS | FI_1 | 12.233 | 14.347 | - | - | 0.000 | 0.000 | - | - | 0.000 | 0.000 | - | - |
| | | | | | | | | | | | | | |
| PR | Base | 12.823 | 14.716 | 123.639 | 70.398 | 112.223 | 126.150 | 141.205 | 127.812 | 160.959 | 155.614 | 162.814 | 172.046 |
| PR | PI_0.2 | 12.811 | 14.712 | 123.638 | 70.414 | 105.292 | 116.008 | 134.031 | 121.223 | 155.714 | 152.627 | 163.914 | 172.290 |
| PR | PI_0.4 | 12.803 | 14.714 | 123.737 | 70.443 | 99.659 | 105.596 | 123.615 | 115.695 | 149.297 | 147.943 | 161.724 | 171.250 |
| PR | PI_0.5 | 12.799 | 14.717 | 123.821 | 70.461 | 97.911 | 102.311 | 119.676 | 114.908 | 145.637 | 144.779 | 158.939 | 170.165 |
| PR | PI_0.6 | 12.796 | 14.722 | 123.924 | 70.482 | 96.877 | 101.129 | 117.799 | 115.123 | 141.696 | 140.914 | 155.165 | 168.643 |
| PR | PI_0.8 | 12.791 | 14.737 | 124.185 | 70.531 | 95.781 | 102.232 | 115.845 | 116.719 | 133.153 | 131.967 | 144.815 | 164.614 |
| PR | PI_1 | 12.789 | 14.759 | 124.524 | 70.592 | 94.120 | 101.900 | 111.655 | 117.791 | 123.858 | 121.658 | 132.355 | 159.924 |
| PR | FI_0.2 | 12.810 | 14.718 | 123.669 | 70.417 | 105.709 | 117.247 | 135.071 | 121.516 | 154.853 | 151.827 | 163.580 | 172.810 |
| PR | FI_0.4 | 12.798 | 14.741 | 123.903 | 70.469 | 100.622 | 108.428 | 127.158 | 115.529 | 144.648 | 143.869 | 160.859 | 173.815 |
| PR | FI_0.5 | 12.791 | 14.763 | 124.125 | 70.518 | 97.735 | 103.744 | 123.593 | 113.266 | 136.591 | 137.069 | 156.906 | 173.831 |
| PR | FI_0.6 | 12.787 | 14.795 | 124.444 | 70.599 | 93.543 | 97.252 | 118.409 | 109.228 | 124.900 | 126.784 | 148.979 | 172.215 |
| PR | FI_0.8 | 12.788 | 14.908 | 125.578 | 71.032 | 39.543 | 49.569 | 70.872 | 55.345 | 73.186 | 79.909 | 101.283 | 143.614 |
| PR | FI_1 | 12.839 | 15.148 | 127.890 | 73.509 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | | | | | | | | | | | |
| LightGBM | Base | 12.658 | 14.569 | 124.022 | 70.406 | 105.129 | 114.501 | 116.152 | 107.264 | 154.178 | 155.055 | 150.049 | 148.920 |
| LightGBM | PI_0.2 | 12.634 | 14.551 | 124.009 | 70.394 | 97.356 | 105.099 | 108.565 | 105.942 | 148.284 | 151.221 | 148.601 | 149.383 |
| LightGBM | PI_0.4 | 12.613 | 14.543 | 124.017 | 70.390 | 91.403 | 97.469 | 101.347 | 104.658 | 141.504 | 145.808 | 144.975 | 148.655 |
| LightGBM | PI_0.5 | 12.603 | 14.543 | 124.032 | 70.392 | 89.765 | 95.630 | 98.419 | 103.933 | 137.858 | 142.457 | 142.107 | 147.794 |
| LightGBM | PI_0.6 | 12.594 | 14.546 | 124.055 | 70.396 | 89.368 | 95.566 | 96.401 | 103.186 | 134.098 | 138.680 | 138.717 | 146.623 |
| LightGBM | PI_0.8 | 12.578 | 14.558 | 124.116 | 70.411 | 89.398 | 96.807 | 94.034 | 101.842 | 126.312 | 129.968 | 130.685 | 143.541 |
| LightGBM | PI_1 | 12.564 | 14.580 | 124.194 | 70.435 | 88.530 | 95.921 | 90.811 | 100.106 | 118.058 | 119.640 | 121.037 | 139.313 |
| LightGBM | FI_0.2 | 12.630 | 14.548 | 124.016 | 70.390 | 97.307 | 105.667 | 108.578 | 106.149 | 147.192 | 150.561 | 148.261 | 150.178 |
| LightGBM | FI_0.4 | 12.591 | 14.534 | 124.067 | 70.380 | 90.234 | 97.299 | 99.444 | 105.687 | 135.625 | 142.204 | 142.656 | 152.467 |
| LightGBM | FI_0.5 | 12.567 | 14.529 | 124.128 | 70.381 | 85.610 | 92.766 | 93.028 | 105.429 | 126.611 | 135.474 | 137.074 | 154.007 |
| LightGBM | FI_0.6 | 12.539 | 14.527 | 124.223 | 70.391 | 77.212 | 86.710 | 84.062 | 104.886 | 113.698 | 125.604 | 128.122 | 155.273 |
| LightGBM | FI_0.8 | 12.478 | 14.555 | 124.585 | 70.485 | 34.404 | 53.256 | 50.244 | 84.171 | 66.945 | 84.917 | 90.047 | 142.331 |
| LightGBM | FI_1 | 12.442 | 14.689 | 125.388 | 71.169 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | | | | | | | | | | | |
| ETS | Base | 12.095 | 14.358 | 122.399 | 70.365 | 9.500 | 0.727 | 81.620 | 35.587 | 13.033 | 0.976 | 97.368 | 35.751 |
| ETS | PI_0.2 | 12.099 | 14.359 | 122.279 | 70.331 | 8.918 | 0.690 | 77.446 | 33.836 | 12.733 | 0.967 | 96.244 | 37.235 |
| ETS | PI_0.4 | 12.111 | 14.362 | 122.432 | 70.316 | 8.357 | 0.591 | 71.906 | 32.086 | 12.335 | 0.937 | 93.788 | 37.727 |
| ETS | PI_0.5 | 12.118 | 14.363 | 122.592 | 70.314 | 8.131 | 0.561 | 68.795 | 31.523 | 12.066 | 0.919 | 92.092 | 37.590 |
| ETS | PI_0.6 | 12.126 | 14.364 | 122.810 | 70.318 | 8.043 | 0.583 | 67.050 | 31.380 | 11.761 | 0.904 | 90.145 | 37.219 |
| ETS | PI_0.8 | 12.146 | 14.367 | 123.341 | 70.339 | 7.948 | 0.595 | 67.089 | 32.168 | 11.052 | 0.842 | 85.733 | 35.867 |
| ETS | PI_1 | 12.168 | 14.369 | 124.040 | 70.381 | 7.662 | 0.574 | 65.360 | 33.274 | 10.117 | 0.749 | 78.119 | 33.420 |
| ETS | FI_0.2 | 12.099 | 14.359 | 122.263 | 70.326 | 8.926 | 0.683 | 77.940 | 34.135 | 12.681 | 0.954 | 95.969 | 37.259 |
| ETS | FI_0.4 | 12.111 | 14.361 | 122.328 | 70.295 | 8.280 | 0.607 | 73.617 | 33.069 | 12.058 | 0.917 | 92.697 | 38.278 |
| ETS | FI_0.5 | 12.120 | 14.362 | 122.444 | 70.282 | 7.850 | 0.557 | 70.492 | 32.525 | 11.549 | 0.879 | 89.708 | 38.682 |
| ETS | FI_0.6 | 12.133 | 14.363 | 122.652 | 70.271 | 7.295 | 0.520 | 66.764 | 32.004 | 10.814 | 0.831 | 85.277 | 39.060 |
| ETS | FI_0.8 | 12.175 | 14.366 | 123.476 | 70.257 | 5.038 | 0.369 | 48.776 | 27.871 | 7.883 | 0.638 | 64.328 | 36.683 |
| ETS | FI_1 | 12.256 | 14.370 | 125.483 | 70.313 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | | | | | | | | | | | | |
| ARIMA | Base | 12.741 | 14.729 | 124.112 | 70.769 | 118.195 | 128.660 | 129.235 | 129.085 | 151.142 | 152.250 | 165.513 | 174.413 |
| ARIMA | PI_0.2 | 12.672 | 14.672 | 124.457 | 70.871 | 111.258 | 125.315 | 120.771 | 121.352 | 146.357 | 147.546 | 162.845 | 174.215 |
| ARIMA | PI_0.4 | 12.630 | 14.646 | 124.845 | 70.993 | 104.654 | 119.112 | 112.656 | 115.004 | 141.286 | 144.042 | 158.691 | 173.267 |
| ARIMA | PI_0.5 | 12.618 | 14.643 | 125.037 | 71.060 | 102.276 | 117.045 | 109.946 | 113.752 | 138.271 | 141.769 | 155.688 | 172.185 |
| ARIMA | PI_0.6 | 12.612 | 14.647 | 125.250 | 71.131 | 100.933 | 116.009 | 108.362 | 114.833 | 134.976 | 139.241 | 152.034 | 170.595 |
| ARIMA | PI_0.8 | 12.616 | 14.675 | 125.729 | 71.285 | 99.504 | 115.189 | 106.394 | 118.215 | 127.851 | 133.463 | 143.081 | 166.463 |
| ARIMA | PI_1 | 12.643 | 14.721 | 126.251 | 71.450 | 97.112 | 113.036 | 103.625 | 120.608 | 119.772 | 126.663 | 133.113 | 161.841 |
| ARIMA | FI_0.2 | 12.664 | 14.669 | 124.560 | 70.900 | 109.693 | 123.646 | 121.894 | 122.359 | 145.347 | 146.572 | 162.416 | 174.364 |
| ARIMA | FI_0.4 | 12.588 | 14.623 | 125.363 | 71.152 | 97.906 | 112.762 | 114.944 | 115.388 | 135.942 | 139.429 | 155.416 | 173.695 |
| ARIMA | FI_0.5 | 12.548 | 14.605 | 125.960 | 71.367 | 90.845 | 106.256 | 111.004 | 111.698 | 128.414 | 133.566 | 148.717 | 172.532 |
| ARIMA | FI_0.6 | 12.506 | 14.592 | 126.752 | 71.699 | 81.791 | 98.183 | 104.948 | 107.916 | 117.690 | 125.126 | 137.568 | 169.705 |
| ARIMA | FI_0.8 | 12.430 | 14.592 | 129.089 | 73.296 | 49.708 | 73.412 | 48.383 | 49.302 | 79.044 | 95.329 | 84.225 | 137.414 |
| ARIMA | FI_1 | 12.448 | 14.708 | 132.640 | 80.491 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |