7 APPENDIX

Table 2 lists the SMAPE values (mean and standard deviations over ten repetitions) for three models: the original GPR, the transferred model, and the one trained from scratch measured on each target function in 2D and 10D. We also include the results for two sizes of transfer data: $|\mathcal{T}| \in \{50, 50d\}$. Using the Kruskal-Wallis test and Dunn's posthoc procedure with a 5% significance level, we compare the SMAPE values of the three models and indicate the statistical significance as follows: the transferred model is underlined if it outperforms the original model; Among the transferred model and the one trained from scratch, the better one is indicated with boldface.

Figure 6 and 7 illustrate SMAPE scores (y-axis) of the original, transferred GPRs, and the one trained directly on the transfer data set ("Trained from scratch") as a function of the size of the transfer data set on 2D and 10D BBOB functions. Sample sizes of transfer data for 2D (x-axis) are 10, 20, 30, 50, and 100. For 10D (x-axis), they are 10, 20, 30, 50, 100, 250, 500.

Figure 8 presents experimental outcomes consistent with our earlier findings: as the number of transfer data samples increases, the performance of the transferred GPR gradually becomes inferior to that of the GPR trained from scratch. Furthermore, in most BBOB functions, the performance gap between the transferred GPR and scratch-trained GPR tends to widen once the latter starts outperforming the former.

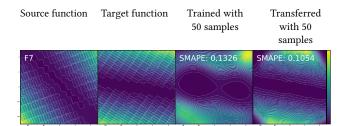


Figure 5: A case study on the transfer learning result, showing the target, trained from scratch and transferred versions of F7 (StepEllipsoid) function in dimensionality 2.

2D	Original GPR	Train from scratch	Transferred	Train from scratch	Transferred
		50 samples		100 samples	
F1	0.2973 ± 0.0770	0.0431 ± 0.0090	0.0099 ± 0.0105	0.0180 ± 0.0041	0.0055 ± 0.0115
F2	0.1172 ± 0.0310	0.0633 ± 0.0095	0.0353 ± 0.0186	0.0542 ± 0.0073	0.0360 ± 0.0187
F3	0.2494 ± 0.0798	0.0499 ± 0.0132	0.0368 ± 0.0041	0.0410 ± 0.0067	0.0356 ± 0.0030
F4	0.2286 ± 0.0777	0.0448 ± 0.0097	0.0454 ± 0.0331	0.0350 ± 0.0030	0.0343 ± 0.0109
F5	0.2455 ± 0.0788	0.0126 ± 0.0072	0.0348 ± 0.0258	0.0101 ± 0.0051	0.0350 ± 0.0255
F6	0.3778 ± 0.0950	0.1046 ± 0.0212	0.0623 ± 0.0319	0.0755 ± 0.0159	0.0583 ± 0.0303
F7	0.3623 ± 0.1175	0.1521 ± 0.0239	0.0739 ± 0.0198	0.1080 ± 0.0115	0.0739 ± 0.0195
F8	0.3166 ± 0.0703	0.1400 ± 0.0136	0.0850 ± 0.0460	0.1057 ± 0.0136	0.0882 ± 0.0545
F9	0.2830 ± 0.0728	0.1215 ± 0.0096	0.0895 ± 0.0504	0.1083 ± 0.0099	$\overline{0.0863 \pm 0.0509}$
F10	0.1676 ± 0.0428	0.0615 ± 0.0102	0.0362 ± 0.0163	0.0509 ± 0.0064	$\overline{0.0373 \pm 0.0194}$
F11	0.1824 ± 0.0571	0.0486 ± 0.0056	0.0340 ± 0.0195	0.0414 ± 0.0070	$\overline{0.0328 \pm 0.0211}$
F12	0.3180 ± 0.1046	0.0494 ± 0.0085	0.0578 ± 0.0321	0.0426 ± 0.0125	$\overline{0.0565 \pm 0.0308}$
F13	0.1754 ± 0.0411	0.0676 ± 0.0109	0.0377 ± 0.0249	0.0500 ± 0.0060	$\overline{0.0402 \pm 0.0302}$
F14	0.5325 ± 0.1454	0.0714 ± 0.0149	$\overline{0.0287 \pm 0.0262}$	0.0498 ± 0.0060	$\overline{0.0280 \pm 0.0247}$
F15	0.3241 ± 0.0990	0.0508 ± 0.0126	$\overline{0.0481 \pm 0.0537}$	0.0388 ± 0.0039	$\overline{0.0303 \pm 0.0039}$
F16	0.2171 ± 0.0255	0.1648 ± 0.0090	0.1440 ± 0.0082	0.1560 ± 0.0033	$\overline{0.1433 \pm 0.0080}$
F17	0.5335 ± 0.1625	0.1402 ± 0.0123	$\overline{0.1187 \pm 0.0049}$	0.1333 ± 0.0084	0.1184 ± 0.0046
F18	0.4117 ± 0.1253	0.1045 ± 0.0083	0.0883 ± 0.0054	0.1013 ± 0.0093	0.0881 ± 0.0050
F19	0.3465 ± 0.0795	0.1926 ± 0.0290	$\overline{0.1779 \pm 0.0114}$	0.1812 ± 0.0090	$\overline{0.1735 \pm 0.0044}$
F20	0.4315 ± 0.1291	0.1299 ± 0.0174	0.0623 ± 0.0304	0.0856 ± 0.0070	0.0681 ± 0.0413
F21	0.3317 ± 0.0294	0.2489 ± 0.0128	0.1885 ± 0.1028	0.2364 ± 0.0131	$\overline{0.1805 \pm 0.0941}$
F22	0.3432 ± 0.0386	0.2309 ± 0.0245	$\overline{0.1621 \pm 0.0788}$	0.2080 ± 0.0223	$\overline{0.1573 \pm 0.0810}$
F23	0.1527 ± 0.0043	0.1577 ± 0.0099	0.1527 ± 0.0043	0.1548 ± 0.0062	0.1526 ± 0.0042
F24	0.1876 ± 0.0411	0.1399 ± 0.0228	0.1458 ± 0.0354	0.1183 ± 0.0144	0.1405 ± 0.0374
10D	Original GPR	Train from scratch	Transferred	Train from scratch	Transferred
10D	Original GPR 	Train from scratch 50 sam		Train from scratch 500 sar	
F1	Original GPR 0.0700 ± 0.0119				
F1 F2		50 sam	nples	500 sar	nples
F1 F2 F3	0.0700 ± 0.0119	50 sam 1.4140 ± 0.8951	nples 0.0043 ± 0.0013	500 sar 0.0079 ± 0.0006	mples 0.0033 ± 0.0013
F1 F2 F3 F4	$ \begin{vmatrix} 0.0700 \pm 0.0119 \\ 0.0809 \pm 0.0132 \end{vmatrix} $	50 sam 1.4140 ± 0.8951 1.2238 ± 0.9507	piples	500 sar 0.0079 ± 0.0006 0.0252 ± 0.0048	mples
F1 F2 F3 F4 F5	$ \begin{vmatrix} 0.0700 \pm 0.0119 \\ 0.0809 \pm 0.0132 \\ 0.0648 \pm 0.0026 \\ 0.1188 \pm 0.0048 \\ 0.0481 \pm 0.0083 \end{vmatrix} $	50 sam 1.4140 ± 0.8951 1.2238 ± 0.9507 1.4149 ± 0.8936	nples	500 sar 0.0079 ± 0.0006 0.0252 ± 0.0048 0.0154 ± 0.0022	$ \frac{\textbf{0.0033} \pm \textbf{0.0013}}{0.0221 \pm 0.0071} \\ \underline{0.0137 \pm 0.0015} $
F1 F2 F3 F4 F5 F6	$ \begin{vmatrix} 0.0700 \pm 0.0119 \\ 0.0809 \pm 0.0132 \\ 0.0648 \pm 0.0026 \\ 0.1188 \pm 0.0048 \end{vmatrix} $	50 sam 1.4140 ± 0.8951 1.2238 ± 0.9507 1.4149 ± 0.8936 1.4282 ± 0.8734	$\begin{array}{c} \text{nples} \\ \hline 0.0043 \pm 0.0013 \\ \hline 0.0276 \pm 0.0059 \\ \hline 0.0370 \pm 0.0066 \\ \hline 0.0915 \pm 0.0041 \\ \hline \end{array}$	500 sar 0.0079 ± 0.0006 0.0252 ± 0.0048 0.0154 ± 0.0022 0.0466 ± 0.0038	mples $\begin{array}{c} 0.0033 \pm 0.0013 \\ 0.0221 \pm 0.0071 \\ 0.0137 \pm 0.0015 \\ 0.0554 \pm 0.0037 \end{array}$
F1 F2 F3 F4 F5 F6 F7	$ \begin{vmatrix} 0.0700 \pm 0.0119 \\ 0.0809 \pm 0.0132 \\ 0.0648 \pm 0.0026 \\ 0.1188 \pm 0.0048 \\ 0.0481 \pm 0.0083 \\ 0.0638 \pm 0.0064 \\ 0.1072 \pm 0.0104 \end{vmatrix} $	50 sam 1.4140 ± 0.8951 1.2238 ± 0.9507 1.4149 ± 0.8936 1.4282 ± 0.8734 1.4013 ± 0.9144 1.2098 ± 0.9678 1.4140 ± 0.8950	$\begin{array}{c} \text{oples} \\ \hline 0.0043 \pm 0.0013 \\ 0.0276 \pm 0.0059 \\ 0.0370 \pm 0.0066 \\ 0.0915 \pm 0.0041 \\ 0.0034 \pm 0.0008 \\ 0.0202 \pm 0.0028 \\ 0.0294 \pm 0.0048 \\ \hline \end{array}$	500 sar 0.0079 ± 0.0006 0.0252 ± 0.0048 0.0154 ± 0.0022 0.0466 ± 0.0038 0.0025 ± 0.0003 0.0140 ± 0.0022 0.0195 ± 0.0029	mples $\begin{array}{c} \textbf{0.0033} \pm \textbf{0.0013} \\ 0.0221 \pm 0.0071 \\ 0.0137 \pm 0.0015 \\ 0.0554 \pm 0.0037 \\ 0.0030 \pm 0.0003 \\ 0.0137 \pm 0.0015 \\ \textbf{0.0113} \pm \textbf{0.0012} \\ \end{array}$
F1 F2 F3 F4 F5 F6 F7 F8	$ \begin{vmatrix} 0.0700 \pm 0.0119 \\ 0.0809 \pm 0.0132 \\ 0.0648 \pm 0.0026 \\ 0.1188 \pm 0.0048 \\ 0.0481 \pm 0.0083 \\ 0.0638 \pm 0.0064 \\ 0.1072 \pm 0.0104 \\ 0.0653 \pm 0.0074 \\ \end{vmatrix} $	50 sam 1.4140 ± 0.8951 1.2238 ± 0.9507 1.4149 ± 0.8936 1.4282 ± 0.8734 1.4013 ± 0.9144 1.2098 ± 0.9678 1.4140 ± 0.8950 1.2178 ± 0.9579	$\begin{array}{c} \text{nples} \\ \hline 0.0043 \pm 0.0013 \\ 0.0276 \pm 0.0059 \\ 0.0370 \pm 0.0066 \\ 0.0915 \pm 0.0041 \\ 0.0034 \pm 0.0008 \\ 0.0202 \pm 0.0028 \\ 0.0294 \pm 0.0048 \\ 0.0360 \pm 0.0027 \\ \end{array}$	500 sar 0.0079 ± 0.0006 0.0252 ± 0.0048 0.0154 ± 0.0022 0.0466 ± 0.0038 0.0025 ± 0.0003 0.0140 ± 0.0022 0.0195 ± 0.0029 0.0200 ± 0.0020	mples $\begin{array}{c} \textbf{0.0033} \pm \textbf{0.0013} \\ \textbf{0.0221} \pm 0.0071 \\ \textbf{0.0137} \pm 0.0015 \\ \textbf{0.0554} \pm 0.0037 \\ \textbf{0.0030} \pm 0.0003 \\ \textbf{0.0137} \pm 0.0015 \\ \textbf{0.0113} \pm \textbf{0.0012} \\ \textbf{0.0182} \pm 0.0012 \\ \end{array}$
F1 F2 F3 F4 F5 F6 F7 F8 F9	$ \begin{vmatrix} 0.0700 \pm 0.0119 \\ 0.0809 \pm 0.0132 \\ 0.0648 \pm 0.0026 \\ 0.1188 \pm 0.0048 \\ 0.0481 \pm 0.0083 \\ 0.0638 \pm 0.0064 \\ 0.1072 \pm 0.0104 \\ 0.0653 \pm 0.0074 \\ 0.0435 \pm 0.0013 \\ \end{vmatrix} $	50 sam 1.4140 ± 0.8951 1.2238 ± 0.9507 1.4149 ± 0.8936 1.4282 ± 0.8734 1.4013 ± 0.9144 1.2098 ± 0.9678 1.4140 ± 0.8950 1.2178 ± 0.9579 1.2220 ± 0.9529	$\begin{array}{c} \text{nples} \\ \hline 0.0043 \pm 0.0013 \\ 0.0276 \pm 0.0059 \\ 0.0370 \pm 0.0066 \\ 0.0915 \pm 0.0041 \\ \hline 0.0034 \pm 0.0008 \\ 0.0202 \pm 0.0028 \\ \hline 0.0294 \pm 0.0048 \\ 0.0360 \pm 0.0027 \\ \hline 0.0359 \pm 0.0034 \\ \hline \end{array}$	500 sar 0.0079 ± 0.0006 0.0252 ± 0.0048 0.0154 ± 0.0022 0.0466 ± 0.0038 0.0025 ± 0.0003 0.0140 ± 0.0022 0.0195 ± 0.0029 0.0200 ± 0.0020 0.0285 ± 0.0050	mples $\begin{array}{c} \textbf{0.0033} \pm \textbf{0.0013} \\ \textbf{0.0221} \pm 0.0071 \\ \textbf{0.0137} \pm 0.0015 \\ \textbf{0.0554} \pm 0.0037 \\ \textbf{0.0030} \pm 0.0003 \\ \textbf{0.0137} \pm 0.0015 \\ \textbf{0.0113} \pm \textbf{0.0012} \\ \textbf{0.0182} \pm 0.0012 \\ \textbf{0.0166} \pm \textbf{0.0008} \\ \end{array}$
F1 F2 F3 F4 F5 F6 F7 F8 F9 F10	$ \begin{vmatrix} 0.0700 \pm 0.0119 \\ 0.0809 \pm 0.0132 \\ 0.0648 \pm 0.0026 \\ 0.1188 \pm 0.0048 \\ 0.0481 \pm 0.0083 \\ 0.0638 \pm 0.0064 \\ 0.1072 \pm 0.0104 \\ 0.0653 \pm 0.0074 \\ 0.0435 \pm 0.0013 \\ 0.0759 \pm 0.0138 \\ \end{vmatrix} $	50 sam 1.4140 ± 0.8951 1.2238 ± 0.9507 1.4149 ± 0.8936 1.4282 ± 0.8734 1.4013 ± 0.9144 1.2098 ± 0.9678 1.4140 ± 0.8950 1.2178 ± 0.9579 1.2220 ± 0.9529 1.0156 ± 0.9844	$\begin{array}{c} \text{nples} \\ \hline 0.0043 \pm 0.0013 \\ 0.0276 \pm 0.0059 \\ 0.0370 \pm 0.0066 \\ 0.0915 \pm 0.0041 \\ \hline 0.0034 \pm 0.0008 \\ 0.0202 \pm 0.0028 \\ \hline 0.0294 \pm 0.0048 \\ \hline 0.0360 \pm 0.0027 \\ \hline 0.0359 \pm 0.0034 \\ \hline 0.0153 \pm 0.0029 \\ \hline \end{array}$	500 sar 0.0079 ± 0.0006 0.0252 ± 0.0048 0.0154 ± 0.0022 0.0466 ± 0.0038 0.0025 ± 0.0003 0.0140 ± 0.0022 0.0195 ± 0.0029 0.0200 ± 0.0020 0.0285 ± 0.0050 0.0187 ± 0.0049	mples $\begin{array}{c} \textbf{0.0033} \pm \textbf{0.0013} \\ \textbf{0.0221} \pm 0.0071 \\ \textbf{0.0137} \pm 0.0015 \\ \textbf{0.0554} \pm 0.0037 \\ \textbf{0.0030} \pm 0.0003 \\ \textbf{0.0137} \pm 0.0015 \\ \textbf{0.0113} \pm \textbf{0.0012} \\ \textbf{0.0182} \pm 0.0012 \\ \textbf{0.0166} \pm \textbf{0.0008} \\ \textbf{0.0123} \pm 0.0037 \\ \end{array}$
F1 F2 F3 F4 F5 F6 F7 F8 F9 F10	$ \begin{vmatrix} 0.0700 \pm 0.0119 \\ 0.0809 \pm 0.0132 \\ 0.0648 \pm 0.0026 \\ 0.1188 \pm 0.0048 \\ 0.0481 \pm 0.0083 \\ 0.0638 \pm 0.0064 \\ 0.1072 \pm 0.0104 \\ 0.0653 \pm 0.0074 \\ 0.0435 \pm 0.0013 \\ 0.0759 \pm 0.0138 \\ 0.1429 \pm 0.0118 \\ \end{vmatrix} $	50 sam 1.4140 ± 0.8951 1.2238 ± 0.9507 1.4149 ± 0.8936 1.4282 ± 0.8734 1.4013 ± 0.9144 1.2098 ± 0.9678 1.4140 ± 0.8950 1.2178 ± 0.9579 1.2220 ± 0.9529 1.0156 ± 0.9844 1.2462 ± 0.9232	$\begin{array}{c} \text{nples} \\ \hline 0.0043 \pm 0.0013 \\ 0.0276 \pm 0.0059 \\ 0.0370 \pm 0.0066 \\ \hline 0.0915 \pm 0.0041 \\ 0.0034 \pm 0.0008 \\ \hline 0.0202 \pm 0.0028 \\ \hline 0.0294 \pm 0.0048 \\ \hline 0.0360 \pm 0.0027 \\ \hline 0.0359 \pm 0.0034 \\ \hline 0.0153 \pm 0.0029 \\ \hline 0.0766 \pm 0.0033 \\ \hline \end{array}$	500 sar 0.0079 ± 0.0006 0.0252 ± 0.0048 0.0154 ± 0.0022 0.0466 ± 0.0038 0.0025 ± 0.0003 0.0140 ± 0.0022 0.0195 ± 0.0029 0.0200 ± 0.0020 0.0285 ± 0.0050 0.0187 ± 0.0049 0.0913 ± 0.0116	$\begin{array}{c} \text{mples} \\ \hline \textbf{0.0033} \pm \textbf{0.0013} \\ \hline \textbf{0.0221} \pm \textbf{0.0071} \\ \hline \textbf{0.0137} \pm \textbf{0.0015} \\ \hline \textbf{0.0554} \pm \textbf{0.0037} \\ \hline \textbf{0.0030} \pm \textbf{0.0003} \\ \hline \textbf{0.0137} \pm \textbf{0.0015} \\ \hline \textbf{0.0113} \pm \textbf{0.0015} \\ \hline \textbf{0.0113} \pm \textbf{0.0012} \\ \hline \textbf{0.0182} \pm \textbf{0.0012} \\ \hline \textbf{0.0166} \pm \textbf{0.0008} \\ \hline \textbf{0.0123} \pm \textbf{0.0037} \\ \hline \textbf{0.0734} \pm \textbf{0.0025} \\ \hline \end{array}$
F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12	$ \begin{vmatrix} 0.0700 \pm 0.0119 \\ 0.0809 \pm 0.0132 \\ 0.0648 \pm 0.0026 \\ 0.1188 \pm 0.0048 \\ 0.0481 \pm 0.0083 \\ 0.0638 \pm 0.0064 \\ 0.1072 \pm 0.0104 \\ 0.0653 \pm 0.0074 \\ 0.0435 \pm 0.0013 \\ 0.0759 \pm 0.0138 \\ 0.1429 \pm 0.0118 \\ 0.0659 \pm 0.0057 \\ \end{vmatrix} $	50 sam 1.4140 ± 0.8951 1.2238 ± 0.9507 1.4149 ± 0.8936 1.4282 ± 0.8734 1.4013 ± 0.9144 1.2098 ± 0.9678 1.4140 ± 0.8950 1.2178 ± 0.9579 1.2220 ± 0.9529 1.0156 ± 0.9844 1.2462 ± 0.9232 1.0222 ± 0.9778	$\begin{array}{c} \text{nples} \\ \hline 0.0043 \pm 0.0013 \\ 0.0276 \pm 0.0059 \\ 0.0370 \pm 0.0066 \\ \hline 0.0915 \pm 0.0041 \\ 0.0034 \pm 0.0008 \\ \hline 0.0202 \pm 0.0028 \\ \hline 0.0294 \pm 0.0048 \\ \hline 0.0360 \pm 0.0027 \\ \hline 0.0359 \pm 0.0034 \\ \hline 0.0153 \pm 0.0029 \\ \hline 0.0766 \pm 0.0033 \\ \hline 0.0211 \pm 0.0038 \\ \hline \end{array}$	500 sar 0.0079 ± 0.0006 0.0252 ± 0.0048 0.0154 ± 0.0022 0.0466 ± 0.0038 0.0025 ± 0.0003 0.0140 ± 0.0022 0.0195 ± 0.0029 0.0200 ± 0.0020 0.0285 ± 0.0050 0.0187 ± 0.0049 0.0913 ± 0.0116 0.0117 ± 0.0010	$\begin{array}{c} \text{mples} \\ \hline \textbf{0.0033} \pm \textbf{0.0013} \\ \hline \textbf{0.0221} \pm \textbf{0.0071} \\ \hline \textbf{0.0137} \pm \textbf{0.0015} \\ \hline \textbf{0.0554} \pm \textbf{0.0037} \\ \hline \textbf{0.0030} \pm \textbf{0.0003} \\ \hline \textbf{0.0137} \pm \textbf{0.0015} \\ \hline \textbf{0.0113} \pm \textbf{0.0015} \\ \hline \textbf{0.0113} \pm \textbf{0.0012} \\ \hline \textbf{0.0182} \pm \textbf{0.0012} \\ \hline \textbf{0.0166} \pm \textbf{0.0008} \\ \hline \textbf{0.0123} \pm \textbf{0.0037} \\ \hline \textbf{0.0734} \pm \textbf{0.0025} \\ \hline \textbf{0.0106} \pm \textbf{0.0021} \\ \hline \end{array}$
F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12 F13	$ \begin{vmatrix} 0.0700 \pm 0.0119 \\ 0.0809 \pm 0.0132 \\ 0.0648 \pm 0.0026 \\ 0.1188 \pm 0.0048 \\ 0.0481 \pm 0.0083 \\ 0.0638 \pm 0.0064 \\ 0.1072 \pm 0.0104 \\ 0.0653 \pm 0.0074 \\ 0.0435 \pm 0.0013 \\ 0.0759 \pm 0.0138 \\ 0.1429 \pm 0.0118 \\ 0.0659 \pm 0.0057 \\ 0.0357 \pm 0.0052 \\ \end{tabular} $	50 sam 1.4140 ± 0.8951 1.2238 ± 0.9507 1.4149 ± 0.8936 1.4282 ± 0.8734 1.4013 ± 0.9144 1.2098 ± 0.9678 1.4140 ± 0.8950 1.2178 ± 0.9579 1.2220 ± 0.9529 1.0156 ± 0.9844 1.2462 ± 0.9232 1.0222 ± 0.9778 1.4045 ± 0.9095	$\begin{array}{c} \text{nples} \\ \hline 0.0043 \pm 0.0013 \\ 0.0276 \pm 0.0059 \\ 0.0370 \pm 0.0066 \\ 0.0915 \pm 0.0041 \\ \hline 0.0034 \pm 0.0008 \\ 0.0202 \pm 0.0028 \\ \hline 0.0294 \pm 0.0048 \\ \hline 0.0360 \pm 0.0027 \\ \hline 0.0359 \pm 0.0034 \\ \hline 0.0153 \pm 0.0029 \\ \hline 0.0766 \pm 0.0033 \\ \hline 0.0211 \pm 0.0038 \\ \hline 0.0119 \pm 0.0015 \\ \hline \end{array}$	500 sar 0.0079 ± 0.0006 0.0252 ± 0.0048 0.0154 ± 0.0022 0.0466 ± 0.0038 0.0025 ± 0.0003 0.0140 ± 0.0022 0.0195 ± 0.0029 0.0200 ± 0.0020 0.0285 ± 0.0050 0.0187 ± 0.0049 0.0913 ± 0.0116 0.0117 ± 0.0010 0.0201 ± 0.0488	$\begin{array}{c} \text{mples} \\ \hline \textbf{0.0033} \pm \textbf{0.0013} \\ \hline \textbf{0.0221} \pm \textbf{0.0071} \\ \hline \textbf{0.0137} \pm \textbf{0.0015} \\ \hline \textbf{0.0554} \pm \textbf{0.0037} \\ \hline \textbf{0.0030} \pm \textbf{0.0003} \\ \hline \textbf{0.0137} \pm \textbf{0.0015} \\ \hline \textbf{0.0113} \pm \textbf{0.0015} \\ \hline \textbf{0.0113} \pm \textbf{0.0012} \\ \hline \textbf{0.0182} \pm \textbf{0.0012} \\ \hline \textbf{0.0166} \pm \textbf{0.0008} \\ \hline \textbf{0.0123} \pm \textbf{0.0037} \\ \hline \textbf{0.0734} \pm \textbf{0.0025} \\ \hline \textbf{0.0106} \pm \textbf{0.0006} \\ \hline \textbf{0.0036} \pm \textbf{0.0006} \\ \hline \end{array}$
F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12 F13 F14	$ \begin{vmatrix} 0.0700 \pm 0.0119 \\ 0.0809 \pm 0.0132 \\ 0.0648 \pm 0.0026 \\ 0.1188 \pm 0.0048 \\ 0.0481 \pm 0.0083 \\ 0.0638 \pm 0.0064 \\ 0.1072 \pm 0.0104 \\ 0.0653 \pm 0.0074 \\ 0.0435 \pm 0.0013 \\ 0.0759 \pm 0.0138 \\ 0.1429 \pm 0.0118 \\ 0.0659 \pm 0.0057 \\ 0.0357 \pm 0.0052 \\ 0.1921 \pm 0.0246 \\ 0.0132 \\ 0.01192 \\ $	50 sam 1.4140 ± 0.8951 1.2238 ± 0.9507 1.4149 ± 0.8936 1.4282 ± 0.8734 1.4013 ± 0.9144 1.2098 ± 0.9678 1.4140 ± 0.8950 1.2178 ± 0.9579 1.2220 ± 0.9529 1.0156 ± 0.9844 1.2462 ± 0.9232 1.0222 ± 0.9778 1.4045 ± 0.9095 1.4246 ± 0.8789	$\begin{array}{c} \text{nples} \\ \hline 0.0043 \pm 0.0013 \\ 0.0276 \pm 0.0059 \\ 0.0370 \pm 0.0066 \\ 0.0915 \pm 0.0041 \\ \hline 0.0034 \pm 0.0008 \\ 0.0202 \pm 0.0028 \\ \hline 0.0294 \pm 0.0048 \\ \hline 0.0360 \pm 0.0027 \\ \hline 0.0359 \pm 0.0034 \\ \hline 0.0153 \pm 0.0029 \\ \hline 0.0766 \pm 0.0033 \\ \hline 0.0211 \pm 0.0038 \\ \hline 0.0119 \pm 0.0015 \\ \hline 0.0574 \pm 0.0087 \\ \hline \end{array}$	500 sar 0.0079 ± 0.0006 0.0252 ± 0.0048 0.0154 ± 0.0022 0.0466 ± 0.0038 0.0025 ± 0.0003 0.0140 ± 0.0022 0.0195 ± 0.0029 0.0200 ± 0.0020 0.0285 ± 0.0050 0.0187 ± 0.0049 0.0913 ± 0.0116 0.0117 ± 0.0010 0.0201 ± 0.0488 0.0342 ± 0.0031	$\begin{array}{c} \text{mples} \\ \hline \textbf{0.0033} \pm \textbf{0.0013} \\ \hline \textbf{0.0221} \pm \textbf{0.0071} \\ \hline \textbf{0.0137} \pm \textbf{0.0015} \\ \hline \textbf{0.0554} \pm \textbf{0.0037} \\ \hline \textbf{0.0030} \pm \textbf{0.0003} \\ \hline \textbf{0.0137} \pm \textbf{0.0015} \\ \hline \textbf{0.0113} \pm \textbf{0.0015} \\ \hline \textbf{0.0113} \pm \textbf{0.0012} \\ \hline \textbf{0.0182} \pm \textbf{0.0012} \\ \hline \textbf{0.0166} \pm \textbf{0.0008} \\ \hline \textbf{0.0123} \pm \textbf{0.0037} \\ \hline \textbf{0.0734} \pm \textbf{0.0025} \\ \hline \textbf{0.0106} \pm \textbf{0.0021} \\ \hline \textbf{0.0036} \pm \textbf{0.0006} \\ \hline \textbf{0.0240} \pm \textbf{0.0054} \\ \hline \end{array}$
F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12 F13 F14 F15	$ \begin{vmatrix} 0.0700 \pm 0.0119 \\ 0.0809 \pm 0.0132 \\ 0.0648 \pm 0.0026 \\ 0.1188 \pm 0.0048 \\ 0.0481 \pm 0.0083 \\ 0.0638 \pm 0.0064 \\ 0.1072 \pm 0.0104 \\ 0.0653 \pm 0.0074 \\ 0.0435 \pm 0.0013 \\ 0.0759 \pm 0.0138 \\ 0.1429 \pm 0.0118 \\ 0.0659 \pm 0.0057 \\ 0.0357 \pm 0.0052 \\ 0.1921 \pm 0.0246 \\ 0.0831 \pm 0.0082 \\ \end{tabular} $	50 sam 1.4140 ± 0.8951 1.2238 ± 0.9507 1.4149 ± 0.8936 1.4282 ± 0.8734 1.4013 ± 0.9144 1.2098 ± 0.9678 1.4140 ± 0.8950 1.2178 ± 0.9579 1.2220 ± 0.9529 1.0156 ± 0.9844 1.2462 ± 0.9232 1.0222 ± 0.9778 1.4045 ± 0.9095 1.4246 ± 0.8789 1.4205 ± 0.8853	$\begin{array}{c} \text{nples} \\ \hline 0.0043 \pm 0.0013 \\ 0.0276 \pm 0.0059 \\ 0.0370 \pm 0.0066 \\ \hline 0.0915 \pm 0.0041 \\ 0.0034 \pm 0.0008 \\ \hline 0.0202 \pm 0.0028 \\ \hline 0.0294 \pm 0.0048 \\ \hline 0.0360 \pm 0.0027 \\ \hline 0.0359 \pm 0.0034 \\ \hline 0.0153 \pm 0.0029 \\ \hline 0.0766 \pm 0.0033 \\ \hline 0.0211 \pm 0.0038 \\ \hline 0.0119 \pm 0.0015 \\ \hline 0.0574 \pm 0.0087 \\ \hline 0.0418 \pm 0.0038 \\ \hline \end{array}$	500 sar 0.0079 ± 0.0006 0.0252 ± 0.0048 0.0154 ± 0.0022 0.0466 ± 0.0038 0.0025 ± 0.0003 0.0140 ± 0.0022 0.0195 ± 0.0029 0.0200 ± 0.0020 0.0285 ± 0.0050 0.0187 ± 0.0049 0.0913 ± 0.0116 0.0117 ± 0.0010 0.0201 ± 0.0488 0.0342 ± 0.0031 0.0156 ± 0.0017	$\begin{array}{c} \textbf{mples} \\ \hline \textbf{0.0033} \pm \textbf{0.0013} \\ \hline 0.0221 \pm 0.0071 \\ \hline 0.0137 \pm 0.0015 \\ \hline 0.0554 \pm 0.0037 \\ \hline 0.0030 \pm 0.0003 \\ \hline 0.0137 \pm 0.0015 \\ \hline \textbf{0.0113} \pm \textbf{0.0012} \\ \hline \textbf{0.0182} \pm 0.0012 \\ \hline \textbf{0.0166} \pm \textbf{0.0008} \\ \hline 0.0123 \pm 0.0037 \\ \hline \textbf{0.0734} \pm \textbf{0.0025} \\ \hline 0.0106 \pm 0.0021 \\ \hline 0.0036 \pm 0.0006 \\ \hline 0.0240 \pm 0.0054 \\ \hline 0.0175 \pm 0.0054 \\ \hline \end{array}$
F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12 F13 F14 F15 F16	$ \begin{vmatrix} 0.0700 \pm 0.0119 \\ 0.0809 \pm 0.0132 \\ 0.0648 \pm 0.0026 \\ 0.1188 \pm 0.0048 \\ 0.0481 \pm 0.0083 \\ 0.0638 \pm 0.0064 \\ 0.1072 \pm 0.0104 \\ 0.0653 \pm 0.0074 \\ 0.0435 \pm 0.0013 \\ 0.0759 \pm 0.0138 \\ 0.1429 \pm 0.0118 \\ 0.0659 \pm 0.0057 \\ 0.0357 \pm 0.0052 \\ 0.1921 \pm 0.0246 \\ 0.0831 \pm 0.0082 \\ 0.0745 \pm 0.0135 \\ \end{tabular} $	50 sam 1.4140 ± 0.8951 1.2238 ± 0.9507 1.4149 ± 0.8936 1.4282 ± 0.8734 1.4013 ± 0.9144 1.2098 ± 0.9678 1.4140 ± 0.8950 1.2178 ± 0.9579 1.2220 ± 0.9529 1.0156 ± 0.9844 1.2462 ± 0.9232 1.0222 ± 0.9778 1.4045 ± 0.9095 1.4246 ± 0.8789 1.4205 ± 0.8853 1.4214 ± 0.8838	$\begin{array}{c} \text{nples} \\ \hline 0.0043 \pm 0.0013 \\ 0.0276 \pm 0.0059 \\ 0.0370 \pm 0.0066 \\ 0.0915 \pm 0.0041 \\ \hline 0.0034 \pm 0.0008 \\ 0.0202 \pm 0.0028 \\ \hline 0.0294 \pm 0.0048 \\ \hline 0.0360 \pm 0.0027 \\ \hline 0.0359 \pm 0.0034 \\ \hline 0.0153 \pm 0.0029 \\ \hline 0.0766 \pm 0.0033 \\ \hline 0.0211 \pm 0.0038 \\ \hline 0.0119 \pm 0.0015 \\ \hline 0.0574 \pm 0.0087 \\ \hline 0.0418 \pm 0.0038 \\ \hline 0.0748 \pm 0.0141 \\ \hline \end{array}$	500 sar 0.0079 ± 0.0006 0.0252 ± 0.0048 0.0154 ± 0.0022 0.0466 ± 0.0038 0.0025 ± 0.0003 0.0140 ± 0.0022 0.0195 ± 0.0029 0.0200 ± 0.0020 0.0285 ± 0.0050 0.0187 ± 0.0049 0.0913 ± 0.0116 0.0117 ± 0.0010 0.0201 ± 0.0488 0.0342 ± 0.0031 0.0156 ± 0.0017 0.0700 ± 0.0007	$\begin{array}{c} \textbf{mples} \\ \hline \textbf{0.0033} \pm \textbf{0.0013} \\ \hline 0.0221 \pm 0.0071 \\ \hline 0.0137 \pm 0.0015 \\ \hline 0.0554 \pm 0.0037 \\ \hline 0.0030 \pm 0.0003 \\ \hline 0.0137 \pm 0.0015 \\ \hline \textbf{0.0113} \pm \textbf{0.0012} \\ \hline \textbf{0.0182} \pm 0.0012 \\ \hline \textbf{0.0166} \pm \textbf{0.0008} \\ \hline 0.0123 \pm 0.0037 \\ \hline \textbf{0.0734} \pm \textbf{0.0025} \\ \hline 0.0106 \pm 0.0021 \\ \hline 0.0036 \pm 0.0006 \\ \hline 0.0240 \pm 0.0054 \\ \hline 0.0175 \pm 0.0054 \\ \hline 0.0748 \pm 0.0142 \\ \hline \end{array}$
F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12 F13 F14 F15 F16 F17	$ \begin{vmatrix} 0.0700 \pm 0.0119 \\ 0.0809 \pm 0.0132 \\ 0.0648 \pm 0.0026 \\ 0.1188 \pm 0.0048 \\ 0.0481 \pm 0.0083 \\ 0.0638 \pm 0.0064 \\ 0.1072 \pm 0.0104 \\ 0.0653 \pm 0.0074 \\ 0.0435 \pm 0.0013 \\ 0.0759 \pm 0.0138 \\ 0.1429 \pm 0.0118 \\ 0.0659 \pm 0.0057 \\ 0.0357 \pm 0.0052 \\ 0.1921 \pm 0.0246 \\ 0.0831 \pm 0.0082 \\ 0.0745 \pm 0.0135 \\ 0.2301 \pm 0.0267 \\ \endaligned$	50 sam 1.4140 ± 0.8951 1.2238 ± 0.9507 1.4149 ± 0.8936 1.4282 ± 0.8734 1.4013 ± 0.9144 1.2098 ± 0.9678 1.4140 ± 0.8950 1.2178 ± 0.9579 1.2220 ± 0.9529 1.0156 ± 0.9844 1.2462 ± 0.9232 1.0222 ± 0.9778 1.4045 ± 0.9095 1.4246 ± 0.8789 1.4205 ± 0.8853 1.4214 ± 0.8838 1.4332 ± 0.8657	$\begin{array}{c} \text{nples} \\ \hline 0.0043 \pm 0.0013 \\ 0.0276 \pm 0.0059 \\ 0.0370 \pm 0.0066 \\ 0.0915 \pm 0.0041 \\ \hline 0.0034 \pm 0.0008 \\ 0.0202 \pm 0.0028 \\ \hline 0.0294 \pm 0.0048 \\ \hline 0.0360 \pm 0.0027 \\ \hline 0.0359 \pm 0.0034 \\ \hline 0.0153 \pm 0.0029 \\ \hline 0.0766 \pm 0.0033 \\ \hline 0.0211 \pm 0.0038 \\ \hline 0.0119 \pm 0.0015 \\ \hline 0.0574 \pm 0.0087 \\ \hline 0.0418 \pm 0.0038 \\ \hline 0.0748 \pm 0.0141 \\ \hline 0.0977 \pm 0.0163 \\ \hline \end{array}$	500 sar 0.0079 ± 0.0006 0.0252 ± 0.0048 0.0154 ± 0.0022 0.0466 ± 0.0038 0.0025 ± 0.0003 0.0140 ± 0.0022 0.0195 ± 0.0029 0.0200 ± 0.0020 0.0285 ± 0.0050 0.0187 ± 0.0049 0.0913 ± 0.0116 0.0117 ± 0.0010 0.0201 ± 0.0488 0.0342 ± 0.0031 0.0156 ± 0.0017 0.0700 ± 0.0007 0.0585 ± 0.0021	$\begin{array}{c} \text{mples} \\ \hline \textbf{0.0033} \pm \textbf{0.0013} \\ \hline \textbf{0.0221} \pm \textbf{0.0071} \\ \hline \textbf{0.0137} \pm \textbf{0.0015} \\ \hline \textbf{0.0554} \pm \textbf{0.0037} \\ \hline \textbf{0.0030} \pm \textbf{0.0003} \\ \hline \textbf{0.0137} \pm \textbf{0.0015} \\ \hline \textbf{0.0137} \pm \textbf{0.0015} \\ \hline \textbf{0.0113} \pm \textbf{0.0015} \\ \hline \textbf{0.0113} \pm \textbf{0.0012} \\ \hline \textbf{0.0182} \pm \textbf{0.0012} \\ \hline \textbf{0.0166} \pm \textbf{0.0008} \\ \hline \textbf{0.0123} \pm \textbf{0.0037} \\ \hline \textbf{0.0734} \pm \textbf{0.0025} \\ \hline \textbf{0.0106} \pm \textbf{0.0021} \\ \hline \textbf{0.0036} \pm \textbf{0.0006} \\ \hline \textbf{0.0240} \pm \textbf{0.0054} \\ \hline \textbf{0.0175} \pm \textbf{0.0054} \\ \hline \textbf{0.0748} \pm \textbf{0.0142} \\ \hline \textbf{0.0664} \pm \textbf{0.0138} \\ \hline \end{array}$
F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12 F13 F14 F15 F16 F17 F18	$ \begin{vmatrix} 0.0700 \pm 0.0119 \\ 0.0809 \pm 0.0132 \\ 0.0648 \pm 0.0026 \\ 0.1188 \pm 0.0048 \\ 0.0481 \pm 0.0083 \\ 0.0638 \pm 0.0064 \\ 0.1072 \pm 0.0104 \\ 0.0653 \pm 0.0074 \\ 0.0435 \pm 0.0013 \\ 0.0759 \pm 0.0138 \\ 0.1429 \pm 0.0118 \\ 0.0659 \pm 0.0057 \\ 0.0357 \pm 0.0052 \\ 0.1921 \pm 0.0246 \\ 0.0831 \pm 0.0082 \\ 0.0745 \pm 0.0135 \\ 0.2301 \pm 0.0267 \\ 0.1841 \pm 0.0231 \\ 0.0132 \\ 0.0132 \\ 0.0132 \\ 0.0133 \\ 0.0267 \\ 0.0132 $	50 sam 1.4140 ± 0.8951 1.2238 ± 0.9507 1.4149 ± 0.8936 1.4282 ± 0.8734 1.4013 ± 0.9144 1.2098 ± 0.9678 1.4140 ± 0.8950 1.2178 ± 0.9579 1.2220 ± 0.9529 1.0156 ± 0.9844 1.2462 ± 0.9232 1.0222 ± 0.9778 1.4045 ± 0.9095 1.4246 ± 0.8789 1.4205 ± 0.8853 1.4214 ± 0.8838 1.4332 ± 0.8657 1.4261 ± 0.8766	$\begin{array}{c} \text{nples} \\ \hline 0.0043 \pm 0.0013 \\ \hline 0.0276 \pm 0.0059 \\ \hline 0.0370 \pm 0.0066 \\ \hline 0.0915 \pm 0.0041 \\ \hline 0.0034 \pm 0.0008 \\ \hline 0.0202 \pm 0.0028 \\ \hline 0.0294 \pm 0.0048 \\ \hline 0.0360 \pm 0.0027 \\ \hline 0.0359 \pm 0.0034 \\ \hline 0.0153 \pm 0.0029 \\ \hline 0.0766 \pm 0.0033 \\ \hline 0.0211 \pm 0.0038 \\ \hline 0.0119 \pm 0.0015 \\ \hline 0.0574 \pm 0.0087 \\ \hline 0.0418 \pm 0.0038 \\ \hline 0.0748 \pm 0.0141 \\ \hline 0.0977 \pm 0.0163 \\ \hline 0.0654 \pm 0.0115 \\ \hline \end{array}$	500 sar 0.0079 ± 0.0006 0.0252 ± 0.0048 0.0154 ± 0.0022 0.0466 ± 0.0038 0.0025 ± 0.0003 0.0140 ± 0.0022 0.0195 ± 0.0029 0.0200 ± 0.0020 0.0285 ± 0.0050 0.0187 ± 0.0049 0.0913 ± 0.0116 0.0117 ± 0.0010 0.0201 ± 0.0488 0.0342 ± 0.0031 0.0156 ± 0.0017 0.0700 ± 0.0007 0.0585 ± 0.0021 0.0403 ± 0.0010	$\begin{array}{c} \textbf{mples} \\ \hline \textbf{0.0033} \pm \textbf{0.0013} \\ \hline 0.0221 \pm 0.0071 \\ \hline 0.0137 \pm 0.0015 \\ \hline 0.0554 \pm 0.0037 \\ \hline 0.0030 \pm 0.0003 \\ \hline 0.0137 \pm 0.0015 \\ \hline \textbf{0.0137} \pm 0.0015 \\ \hline \textbf{0.0113} \pm \textbf{0.0012} \\ \hline \textbf{0.0182} \pm 0.0012 \\ \hline \textbf{0.0166} \pm \textbf{0.0008} \\ \hline 0.0123 \pm 0.0037 \\ \hline \textbf{0.0734} \pm \textbf{0.0025} \\ \hline 0.0106 \pm 0.0021 \\ \hline 0.0036 \pm 0.0006 \\ \hline 0.0240 \pm 0.0054 \\ \hline 0.0175 \pm 0.0054 \\ \hline 0.0748 \pm 0.0142 \\ \hline 0.0664 \pm 0.0138 \\ \hline \textbf{0.0370} \pm \textbf{0.0014} \\ \hline \end{array}$
F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12 F13 F14 F15 F16 F17 F18	$ \begin{vmatrix} 0.0700 \pm 0.0119 \\ 0.0809 \pm 0.0132 \\ 0.0648 \pm 0.0026 \\ 0.1188 \pm 0.0048 \\ 0.0481 \pm 0.0083 \\ 0.0638 \pm 0.0064 \\ 0.1072 \pm 0.0104 \\ 0.0653 \pm 0.0074 \\ 0.0435 \pm 0.0013 \\ 0.0759 \pm 0.0138 \\ 0.1429 \pm 0.0118 \\ 0.0659 \pm 0.0057 \\ 0.0357 \pm 0.0052 \\ 0.1921 \pm 0.0246 \\ 0.0831 \pm 0.0082 \\ 0.0745 \pm 0.0135 \\ 0.2301 \pm 0.0267 \\ 0.1841 \pm 0.0231 \\ 0.0986 \pm 0.0031 \\ 0.0800132 \\ 0.0986 \pm 0.0031 \\ 0.000132 \\ 0.00132 $	50 sam 1.4140 ± 0.8951 1.2238 ± 0.9507 1.4149 ± 0.8936 1.4282 ± 0.8734 1.4013 ± 0.9144 1.2098 ± 0.9678 1.4140 ± 0.8950 1.2178 ± 0.9579 1.2220 ± 0.9529 1.0156 ± 0.9844 1.2462 ± 0.9232 1.0222 ± 0.9778 1.4045 ± 0.9095 1.4246 ± 0.8789 1.4205 ± 0.8853 1.4214 ± 0.8838 1.4332 ± 0.8657 1.4261 ± 0.8766 1.6226 ± 0.7547	$\begin{array}{c} \text{nples} \\ \hline 0.0043 \pm 0.0013 \\ 0.0276 \pm 0.0059 \\ 0.0370 \pm 0.0066 \\ 0.0915 \pm 0.0041 \\ 0.0034 \pm 0.0008 \\ 0.0202 \pm 0.0028 \\ 0.0294 \pm 0.0048 \\ 0.0360 \pm 0.0027 \\ 0.0359 \pm 0.0034 \\ 0.0153 \pm 0.0029 \\ 0.0766 \pm 0.0033 \\ 0.0211 \pm 0.0038 \\ 0.0119 \pm 0.0015 \\ 0.0574 \pm 0.0087 \\ 0.0418 \pm 0.0038 \\ 0.0748 \pm 0.0141 \\ 0.0977 \pm 0.0163 \\ 0.0654 \pm 0.0115 \\ 0.0850 \pm 0.0070 \\ \hline \end{array}$	500 sar 0.0079 ± 0.0006 0.0252 ± 0.0048 0.0154 ± 0.0022 0.0466 ± 0.0038 0.0025 ± 0.0003 0.0140 ± 0.0022 0.0195 ± 0.0029 0.0200 ± 0.0020 0.0285 ± 0.0050 0.0187 ± 0.0049 0.0913 ± 0.0116 0.0117 ± 0.0010 0.0201 ± 0.0488 0.0342 ± 0.0031 0.0156 ± 0.0017 0.0700 ± 0.0007 0.0585 ± 0.0021 0.0403 ± 0.0010 0.0527 ± 0.0016	$\begin{array}{c} \textbf{mples} \\ \hline \textbf{0.0033} \pm \textbf{0.0013} \\ \hline 0.0221 \pm 0.0071 \\ \hline 0.0137 \pm 0.0015 \\ \hline 0.0554 \pm 0.0037 \\ \hline 0.0030 \pm 0.0003 \\ \hline 0.0137 \pm 0.0015 \\ \hline \textbf{0.0137} \pm 0.0015 \\ \hline \textbf{0.0113} \pm \textbf{0.0012} \\ \hline \textbf{0.0182} \pm 0.0012 \\ \hline \textbf{0.0166} \pm \textbf{0.0008} \\ \hline 0.0123 \pm 0.0037 \\ \hline \textbf{0.0734} \pm \textbf{0.0025} \\ \hline 0.0106 \pm 0.0021 \\ \hline 0.0036 \pm 0.0006 \\ \hline 0.0240 \pm 0.0054 \\ \hline 0.0748 \pm 0.0142 \\ \hline 0.0664 \pm 0.0138 \\ \hline \textbf{0.0370} \pm \textbf{0.0014} \\ \hline \textbf{0.0337} \pm \textbf{0.0013} \\ \hline \end{array}$
F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12 F13 F14 F15 F16 F17 F18 F19 F20	$ \begin{vmatrix} 0.0700 \pm 0.0119 \\ 0.0809 \pm 0.0132 \\ 0.0648 \pm 0.0026 \\ 0.1188 \pm 0.0048 \\ 0.0481 \pm 0.0083 \\ 0.0638 \pm 0.0064 \\ 0.1072 \pm 0.0104 \\ 0.0653 \pm 0.0074 \\ 0.0435 \pm 0.0013 \\ 0.0759 \pm 0.0138 \\ 0.1429 \pm 0.0118 \\ 0.0659 \pm 0.0057 \\ 0.0357 \pm 0.0052 \\ 0.1921 \pm 0.0246 \\ 0.0831 \pm 0.0082 \\ 0.0745 \pm 0.0135 \\ 0.2301 \pm 0.0267 \\ 0.1841 \pm 0.0231 \\ 0.0986 \pm 0.0031 \\ 0.0730 \pm 0.0088 \\ \end{aligned} $	50 sam 1.4140 ± 0.8951 1.2238 ± 0.9507 1.4149 ± 0.8936 1.4282 ± 0.8734 1.4013 ± 0.9144 1.2098 ± 0.9678 1.4140 ± 0.8950 1.2178 ± 0.9579 1.2220 ± 0.9529 1.0156 ± 0.9844 1.2462 ± 0.9232 1.0222 ± 0.9778 1.4045 ± 0.9095 1.4246 ± 0.8789 1.4205 ± 0.8853 1.4214 ± 0.8838 1.4332 ± 0.8657 1.4261 ± 0.8766 1.6226 ± 0.7547 1.4112 ± 0.8994	$\begin{array}{c} \text{nples} \\ \hline 0.0043 \pm 0.0013 \\ 0.0276 \pm 0.0059 \\ 0.0370 \pm 0.0066 \\ 0.0915 \pm 0.0041 \\ \hline 0.0034 \pm 0.0008 \\ 0.0202 \pm 0.0028 \\ \hline 0.0294 \pm 0.0048 \\ \hline 0.0360 \pm 0.0027 \\ \hline 0.0359 \pm 0.0034 \\ \hline 0.0153 \pm 0.0029 \\ \hline 0.0766 \pm 0.0033 \\ \hline 0.0211 \pm 0.0038 \\ \hline 0.0119 \pm 0.0015 \\ \hline 0.0574 \pm 0.0087 \\ \hline 0.0418 \pm 0.0038 \\ \hline 0.0748 \pm 0.0141 \\ \hline 0.0977 \pm 0.0163 \\ \hline 0.0654 \pm 0.0115 \\ \hline 0.0850 \pm 0.0070 \\ \hline 0.0290 \pm 0.0041 \\ \hline \end{array}$	500 sar 0.0079 ± 0.0006 0.0252 ± 0.0048 0.0154 ± 0.0022 0.0466 ± 0.0038 0.0025 ± 0.0003 0.0140 ± 0.0022 0.0195 ± 0.0029 0.0200 ± 0.0020 0.0285 ± 0.0050 0.0187 ± 0.0049 0.0913 ± 0.0116 0.0117 ± 0.0010 0.0201 ± 0.0488 0.0342 ± 0.0031 0.0156 ± 0.0017 0.0700 ± 0.0007 0.0585 ± 0.0021 0.0403 ± 0.0010 0.0527 ± 0.0010 0.0160 ± 0.0025	$\begin{array}{c} \textbf{mples} \\ \hline \textbf{0.0033} \pm \textbf{0.0013} \\ \hline 0.0221 \pm 0.0071 \\ \hline 0.0137 \pm 0.0015 \\ \hline 0.0554 \pm 0.0037 \\ \hline 0.0030 \pm 0.0003 \\ \hline 0.0137 \pm 0.0015 \\ \hline \textbf{0.0137} \pm 0.0015 \\ \hline \textbf{0.0113} \pm \textbf{0.0012} \\ \hline \textbf{0.0182} \pm 0.0012 \\ \hline \textbf{0.0166} \pm \textbf{0.0008} \\ \hline 0.0123 \pm 0.0037 \\ \hline \textbf{0.0734} \pm \textbf{0.0025} \\ \hline 0.0106 \pm 0.0021 \\ \hline 0.0036 \pm 0.0006 \\ \hline 0.0240 \pm 0.0054 \\ \hline 0.0748 \pm 0.0142 \\ \hline 0.0664 \pm 0.0138 \\ \hline \textbf{0.0370} \pm \textbf{0.0014} \\ \hline \textbf{0.0337} \pm \textbf{0.0013} \\ \hline \textbf{0.0135} \pm \textbf{0.0013} \\ \hline \end{array}$
F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12 F13 F14 F15 F16 F17 F18 F19 F20 F21	$ \begin{vmatrix} 0.0700 \pm 0.0119 \\ 0.0809 \pm 0.0132 \\ 0.0648 \pm 0.0026 \\ 0.1188 \pm 0.0048 \\ 0.0481 \pm 0.0083 \\ 0.0638 \pm 0.0064 \\ 0.1072 \pm 0.0104 \\ 0.0653 \pm 0.0074 \\ 0.0435 \pm 0.0013 \\ 0.0759 \pm 0.0138 \\ 0.1429 \pm 0.0118 \\ 0.0659 \pm 0.0057 \\ 0.0357 \pm 0.0052 \\ 0.1921 \pm 0.0246 \\ 0.0831 \pm 0.0082 \\ 0.0745 \pm 0.0135 \\ 0.2301 \pm 0.0267 \\ 0.1841 \pm 0.0231 \\ 0.0986 \pm 0.0031 \\ 0.0730 \pm 0.0088 \\ 0.0156 \pm 0.0004 \\ 0.01182 \\ 0.01183 \\ 0.01184 \\ 0.01184 \\ 0.01185 \\ 0.0$	50 sam 1.4140 ± 0.8951 1.2238 ± 0.9507 1.4149 ± 0.8936 1.4282 ± 0.8734 1.4013 ± 0.9144 1.2098 ± 0.9678 1.4140 ± 0.8950 1.2178 ± 0.9579 1.2220 ± 0.9529 1.0156 ± 0.9844 1.2462 ± 0.9232 1.0222 ± 0.9778 1.4045 ± 0.9095 1.4246 ± 0.8789 1.4205 ± 0.8853 1.4214 ± 0.8838 1.4332 ± 0.8657 1.4261 ± 0.8766 1.6226 ± 0.7547 1.4112 ± 0.8994 1.4041 ± 0.9103	$\begin{array}{c} \text{nples} \\ \hline 0.0043 \pm 0.0013 \\ \hline 0.0276 \pm 0.0059 \\ \hline 0.0370 \pm 0.0066 \\ \hline 0.0915 \pm 0.0041 \\ \hline 0.0034 \pm 0.0008 \\ \hline 0.0202 \pm 0.0028 \\ \hline 0.0294 \pm 0.0048 \\ \hline 0.0360 \pm 0.0027 \\ \hline 0.0359 \pm 0.0034 \\ \hline 0.0153 \pm 0.0029 \\ \hline 0.0766 \pm 0.0033 \\ \hline 0.0211 \pm 0.0038 \\ \hline 0.0119 \pm 0.0015 \\ \hline 0.0574 \pm 0.0087 \\ \hline 0.0418 \pm 0.0038 \\ \hline 0.0748 \pm 0.0141 \\ \hline 0.0977 \pm 0.0163 \\ \hline 0.0654 \pm 0.0115 \\ \hline 0.0850 \pm 0.0070 \\ \hline 0.0290 \pm 0.0041 \\ \hline 0.0155 \pm 0.0005 \\ \hline \end{array}$	500 sar 0.0079 ± 0.0006 0.0252 ± 0.0048 0.0154 ± 0.0022 0.0466 ± 0.0038 0.0025 ± 0.0003 0.0140 ± 0.0022 0.0195 ± 0.0029 0.0200 ± 0.0020 0.0285 ± 0.0050 0.0187 ± 0.0049 0.0913 ± 0.0116 0.0117 ± 0.0010 0.0201 ± 0.0488 0.0342 ± 0.0031 0.0156 ± 0.0017 0.0700 ± 0.0007 0.0585 ± 0.0021 0.0403 ± 0.0010 0.0527 ± 0.0010 0.0160 ± 0.0025 0.0122 ± 0.0007	$\begin{array}{c} \textbf{mples} \\ \hline \textbf{0.0033} \pm \textbf{0.0013} \\ \hline 0.0221 \pm 0.0071 \\ \hline 0.0137 \pm 0.0015 \\ \hline 0.0554 \pm 0.0037 \\ \hline 0.0030 \pm 0.0003 \\ \hline 0.0137 \pm \textbf{0.0015} \\ \hline \textbf{0.0137} \pm \textbf{0.0015} \\ \hline \textbf{0.013} \pm \textbf{0.0012} \\ \hline \textbf{0.0113} \pm \textbf{0.0012} \\ \hline \textbf{0.0123} \pm \textbf{0.0003} \\ \hline \textbf{0.0123} \pm \textbf{0.0037} \\ \hline \textbf{0.0106} \pm \textbf{0.00021} \\ \hline \textbf{0.0106} \pm \textbf{0.0021} \\ \hline \textbf{0.0036} \pm \textbf{0.0006} \\ \hline \textbf{0.0240} \pm \textbf{0.0054} \\ \hline \textbf{0.0175} \pm \textbf{0.0054} \\ \hline \textbf{0.0748} \pm \textbf{0.0142} \\ \hline \textbf{0.0370} \pm \textbf{0.0014} \\ \hline \textbf{0.0337} \pm \textbf{0.0013} \\ \hline \textbf{0.0135} \pm \textbf{0.0012} \\ \hline \textbf{0.0135} \pm \textbf{0.0012} \\ \hline \textbf{0.0148} \pm \textbf{0.0004} \\ \hline \end{array}$
F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12 F13 F14 F15 F16 F17 F18 F19 F20 F21 F22	$ \begin{vmatrix} 0.0700 \pm 0.0119 \\ 0.0809 \pm 0.0132 \\ 0.0648 \pm 0.0026 \\ 0.1188 \pm 0.0048 \\ 0.0481 \pm 0.0083 \\ 0.0638 \pm 0.0064 \\ 0.1072 \pm 0.0104 \\ 0.0653 \pm 0.0074 \\ 0.0435 \pm 0.0013 \\ 0.0759 \pm 0.0138 \\ 0.1429 \pm 0.0118 \\ 0.0659 \pm 0.0057 \\ 0.0357 \pm 0.0052 \\ 0.1921 \pm 0.0246 \\ 0.0831 \pm 0.0082 \\ 0.0745 \pm 0.0135 \\ 0.2301 \pm 0.0267 \\ 0.1841 \pm 0.0231 \\ 0.0986 \pm 0.0031 \\ 0.0730 \pm 0.0088 \\ 0.0156 \pm 0.0004 \\ 0.0118 \pm 0.0005 \\ 0.0004 \\ 0.0004 \\ 0.0118 \pm 0.0005 \\ 0.0004 \\ 0.0004 \\ 0.0004 \\ 0.0005 \\ 0.0004 \\ 0.0005 \\ 0.0004 \\ 0.0005 \\ 0.0004 \\ 0.0005 \\ 0.0004 \\ 0.0005 $	50 sam 1.4140 ± 0.8951 1.2238 ± 0.9507 1.4149 ± 0.8936 1.4282 ± 0.8734 1.4013 ± 0.9144 1.2098 ± 0.9678 1.4140 ± 0.8950 1.2178 ± 0.9579 1.2220 ± 0.9529 1.0156 ± 0.9844 1.2462 ± 0.9232 1.0222 ± 0.9778 1.4045 ± 0.9095 1.4246 ± 0.8789 1.4205 ± 0.8853 1.4214 ± 0.8838 1.4332 ± 0.8657 1.4261 ± 0.8766 1.6226 ± 0.7547 1.4112 ± 0.8994 1.4041 ± 0.9103 1.4036 ± 0.9110	$\begin{array}{c} \text{nples} \\ \hline 0.0043 \pm 0.0013 \\ \hline 0.0276 \pm 0.0059 \\ \hline 0.0370 \pm 0.0066 \\ \hline 0.0915 \pm 0.0041 \\ \hline 0.0034 \pm 0.0008 \\ \hline 0.0202 \pm 0.0028 \\ \hline 0.0294 \pm 0.0048 \\ \hline 0.0360 \pm 0.0027 \\ \hline 0.0359 \pm 0.0034 \\ \hline 0.0153 \pm 0.0029 \\ \hline 0.0766 \pm 0.0033 \\ \hline 0.0211 \pm 0.0038 \\ \hline 0.0119 \pm 0.0015 \\ \hline 0.0574 \pm 0.0087 \\ \hline 0.0418 \pm 0.0041 \\ \hline 0.0977 \pm 0.0163 \\ \hline 0.0654 \pm 0.0115 \\ \hline 0.0850 \pm 0.0070 \\ \hline 0.0290 \pm 0.0041 \\ \hline 0.0155 \pm 0.0005 \\ \hline 0.0116 \pm 0.0005 \\ \hline \end{array}$	500 sar 0.0079 ± 0.0006 0.0252 ± 0.0048 0.0154 ± 0.0022 0.0466 ± 0.0038 0.0025 ± 0.0003 0.0140 ± 0.0022 0.0195 ± 0.0029 0.0200 ± 0.0020 0.0285 ± 0.0050 0.0187 ± 0.0049 0.0913 ± 0.0116 0.0117 ± 0.0010 0.0201 ± 0.0488 0.0342 ± 0.0031 0.0156 ± 0.0017 0.0700 ± 0.0007 0.0585 ± 0.0021 0.0403 ± 0.0010 0.0527 ± 0.0010 0.0160 ± 0.0025 0.0122 ± 0.0007 0.0090 ± 0.0024	$\begin{array}{c} \textbf{mples} \\ \hline \textbf{0.0033} \pm \textbf{0.0013} \\ \hline 0.0221 \pm 0.0071 \\ \hline 0.0137 \pm 0.0015 \\ \hline 0.0554 \pm 0.0037 \\ \hline 0.0030 \pm 0.0003 \\ \hline 0.0137 \pm 0.0015 \\ \hline \textbf{0.013} \pm \textbf{0.0012} \\ \hline \textbf{0.0113} \pm \textbf{0.0012} \\ \hline \textbf{0.0123} \pm \textbf{0.0021} \\ \hline \textbf{0.0123} \pm \textbf{0.0025} \\ \hline \textbf{0.0106} \pm \textbf{0.0021} \\ \hline \textbf{0.0036} \pm \textbf{0.0006} \\ \hline \textbf{0.0214} \pm \textbf{0.0054} \\ \hline \textbf{0.0175} \pm \textbf{0.0054} \\ \hline \textbf{0.0175} \pm \textbf{0.0014} \\ \hline \textbf{0.037} \pm \textbf{0.0014} \\ \hline \textbf{0.037} \pm \textbf{0.0013} \\ \hline \textbf{0.0135} \pm \textbf{0.0014} \\ \hline \textbf{0.0135} \pm \textbf{0.0014} \\ \hline \textbf{0.0135} \pm \textbf{0.0013} \\ \hline \textbf{0.0135} \pm \textbf{0.0015} \\ \hline \textbf{0.0148} \pm \textbf{0.0004} \\ \hline \textbf{0.0105} \pm \textbf{0.0005} \\ \hline \end{array}$
F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12 F13 F14 F15 F16 F17 F18 F19 F20 F21	$ \begin{vmatrix} 0.0700 \pm 0.0119 \\ 0.0809 \pm 0.0132 \\ 0.0648 \pm 0.0026 \\ 0.1188 \pm 0.0048 \\ 0.0481 \pm 0.0083 \\ 0.0638 \pm 0.0064 \\ 0.1072 \pm 0.0104 \\ 0.0653 \pm 0.0074 \\ 0.0435 \pm 0.0013 \\ 0.0759 \pm 0.0138 \\ 0.1429 \pm 0.0118 \\ 0.0659 \pm 0.0057 \\ 0.0357 \pm 0.0052 \\ 0.1921 \pm 0.0246 \\ 0.0831 \pm 0.0082 \\ 0.0745 \pm 0.0135 \\ 0.2301 \pm 0.0267 \\ 0.1841 \pm 0.0231 \\ 0.0986 \pm 0.0031 \\ 0.0730 \pm 0.0088 \\ 0.0156 \pm 0.0004 \\ 0.01182 \\ 0.01183 \\ 0.01184 \\ 0.01184 \\ 0.01185 \\ 0.0$	50 sam 1.4140 ± 0.8951 1.2238 ± 0.9507 1.4149 ± 0.8936 1.4282 ± 0.8734 1.4013 ± 0.9144 1.2098 ± 0.9678 1.4140 ± 0.8950 1.2178 ± 0.9579 1.2220 ± 0.9529 1.0156 ± 0.9844 1.2462 ± 0.9232 1.0222 ± 0.9778 1.4045 ± 0.9095 1.4246 ± 0.8789 1.4205 ± 0.8853 1.4214 ± 0.8838 1.4332 ± 0.8657 1.4261 ± 0.8766 1.6226 ± 0.7547 1.4112 ± 0.8994 1.4041 ± 0.9103	$\begin{array}{c} \text{nples} \\ \hline 0.0043 \pm 0.0013 \\ \hline 0.0276 \pm 0.0059 \\ \hline 0.0370 \pm 0.0066 \\ \hline 0.0915 \pm 0.0041 \\ \hline 0.0034 \pm 0.0008 \\ \hline 0.0202 \pm 0.0028 \\ \hline 0.0294 \pm 0.0048 \\ \hline 0.0360 \pm 0.0027 \\ \hline 0.0359 \pm 0.0034 \\ \hline 0.0153 \pm 0.0029 \\ \hline 0.0766 \pm 0.0033 \\ \hline 0.0211 \pm 0.0038 \\ \hline 0.0119 \pm 0.0015 \\ \hline 0.0574 \pm 0.0087 \\ \hline 0.0418 \pm 0.0038 \\ \hline 0.0748 \pm 0.0141 \\ \hline 0.0977 \pm 0.0163 \\ \hline 0.0654 \pm 0.0115 \\ \hline 0.0850 \pm 0.0070 \\ \hline 0.0290 \pm 0.0041 \\ \hline 0.0155 \pm 0.0005 \\ \hline \end{array}$	500 sar 0.0079 ± 0.0006 0.0252 ± 0.0048 0.0154 ± 0.0022 0.0466 ± 0.0038 0.0025 ± 0.0003 0.0140 ± 0.0022 0.0195 ± 0.0029 0.0200 ± 0.0020 0.0285 ± 0.0050 0.0187 ± 0.0049 0.0913 ± 0.0116 0.0117 ± 0.0010 0.0201 ± 0.0488 0.0342 ± 0.0031 0.0156 ± 0.0017 0.0700 ± 0.0007 0.0585 ± 0.0021 0.0403 ± 0.0010 0.0527 ± 0.0010 0.0160 ± 0.0025 0.0122 ± 0.0007	$\begin{array}{c} \textbf{mples} \\ \hline \textbf{0.0033} \pm \textbf{0.0013} \\ \hline 0.0221 \pm 0.0071 \\ \hline 0.0137 \pm 0.0015 \\ \hline 0.0554 \pm 0.0037 \\ \hline 0.0030 \pm 0.0003 \\ \hline 0.0137 \pm \textbf{0.0015} \\ \hline \textbf{0.0137} \pm \textbf{0.0015} \\ \hline \textbf{0.013} \pm \textbf{0.0012} \\ \hline \textbf{0.0113} \pm \textbf{0.0012} \\ \hline \textbf{0.0123} \pm \textbf{0.0003} \\ \hline \textbf{0.0123} \pm \textbf{0.0037} \\ \hline \textbf{0.0106} \pm \textbf{0.00021} \\ \hline \textbf{0.0106} \pm \textbf{0.0021} \\ \hline \textbf{0.0036} \pm \textbf{0.0006} \\ \hline \textbf{0.0240} \pm \textbf{0.0054} \\ \hline \textbf{0.0175} \pm \textbf{0.0054} \\ \hline \textbf{0.0748} \pm \textbf{0.0142} \\ \hline \textbf{0.0370} \pm \textbf{0.0014} \\ \hline \textbf{0.0337} \pm \textbf{0.0013} \\ \hline \textbf{0.0135} \pm \textbf{0.0012} \\ \hline \textbf{0.0135} \pm \textbf{0.0012} \\ \hline \textbf{0.0148} \pm \textbf{0.0004} \\ \hline \end{array}$

Table 2: On 2D and 10D BBOB functions, the mean and standard deviation (over ten repetitions) of the SMAPE value measured for the original and the transferred models, and the one trained with the transfer data set ("trained from scratch"). We include results obtained with two sample sizes of the transfer data: $|\mathcal{T}| \in \{50, 50d\}$. Using the Kruskal-Wallis test and Dunn's posthoc procedure at a 5% significance level, we compare the three models and indicate the statistical significance as follows: the transferred model is underlined if it significantly outperforms the original model, while among the transferred model and the one trained from scratch, the significantly better one is indicated with boldface.

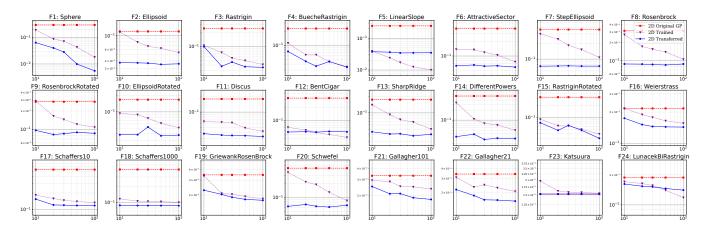


Figure 6: SMAPE scores (y-axis) of the original, transferred GPRs, and the one trained directly on the transfer data set ("Trained from scratch") as a function of the size of the transfer data set on 2D BBOB functions. Sample sizes of transfer data for 2D (x-axis) are 10, 20, 30, 50, and 100.

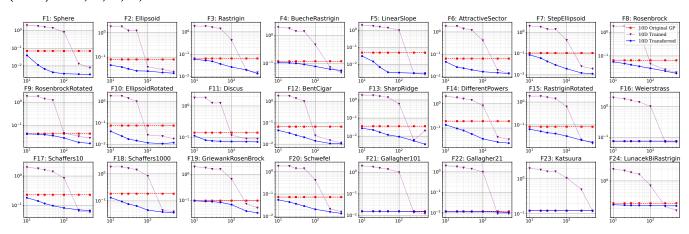


Figure 7: SMAPE scores (y-axis) of the original, transferred GPRs, and the one trained directly on the transfer data set ("Trained from scratch") as a function of the size of the transfer data set on 10D BBOB functions. Sample sizes of transfer data for 10D (x-axis) are 10, 20, 30, 50, 100, 250, and 500.

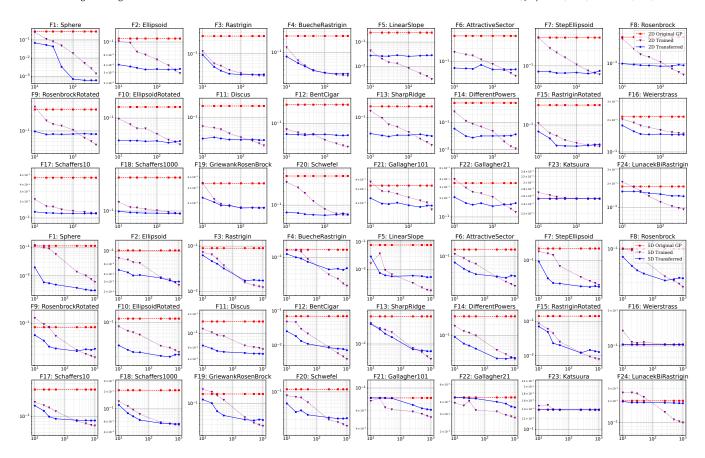


Figure 8: SMAPE scores (y-axis) of the original, transferred GPRs, and the one trained directly on the transfer data set ("Trained from scratch") as a function of the size of the transfer data set on 2D and 5D BBOB functions based on relatively larger sample sizes. Sample sizes of transfer data for both 2D and 5D are 10, 20, 30, 50, 50d, 100d, 150d, 200d.