Supplementary material to "The increment ratio statistic"

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These tables provide additional results for section 3 in the paper "The increment ratio statistic".

Table 1: Frequency of rejection of the null hypothesis of short memory for sequences of AR(1) + mixture trend processes, having on average 5 $\mathcal{N}(0, b^2)$-distributed jumps in a sample, ($\pi_N = 5/1000$). Test size 5%. $N = 1000$ (based on 10000 replications)

		$\hat{r}$, $\xi_t \sim$ AR(k) process						$\hat{r}$, $\xi_t \sim$ Bloomfield process				
a	b	$k=0$	$k=1$	$k=2$	$k=3$	$k=4$	$k=5$	$k=1$	$k=2$	$k=3$	$k=4$	$k=5$
0.0	0.0	0.0412	0.0796	0.0782	0.0705	0.0691	0.0655	0.0285	0.0265	0.0217	0.0206	0.0175
0.0	0.2	0.5661	0.6838	0.6977	0.6987	0.7028	0.6996	0.6005	0.6125	0.6061	0.6064	0.5980
0.0	1.0	0.9668	0.9516	0.8317	0.6868	0.5546	0.4409	0.9695	0.9699	0.9686	0.9680	0.9682
0.2	0.0	0.9993	0.0777	0.0747	0.0686	0.0674	0.0651	0.0663	0.0304	0.0216	0.0207	0.0177
0.2	0.2	0.9999	0.5974	0.6003	0.6015	0.6036	0.6016	0.5649	0.5009	0.4926	0.4899	0.4801
0.2	1.0	1.0000	0.9288	0.8515	0.7514	0.6487	0.5513	0.9647	0.9593	0.9571	0.9572	0.9546
0.4	0.0	1.0000	0.0719	0.0718	0.0675	0.0647	0.0628	0.4943	0.0704	0.0288	0.0230	0.0182
0.4	0.2	1.0000	0.4706	0.4662	0.4660	0.4617	0.4616	0.7942	0.4374	0.3627	0.3422	0.3341
0.4	1.0	1.0000	0.8945	0.8589	0.7981	0.7294	0.6570	0.9820	0.9480	0.9376	0.9335	0.9298
0.6	0.0	1.0000	0.0685	0.0671	0.0667	0.0624	0.0599	0.9980	0.4566	0.1087	0.0461	0.0278
0.6	0.2	1.0000	0.2873	0.2911	0.2841	0.2828	0.2812	0.9993	0.6784	0.3462	0.2385	0.1938
0.6	1.0	1.0000	0.8076	0.8305	0.8070	0.7719	0.7283	0.9999	0.9665	0.9175	0.8934	0.8759
0.8	0.0	1.0000	0.0940	0.0588	0.0555	0.0558	0.0549	1.0000	0.9997	0.9010	0.5236	0.2354
0.8	0.2	1.0000	0.1104	0.1159	0.1168	0.1170	0.1145	1.0000	0.9996	0.9286	0.6150	0.3315
0.8	1.0	1.0000	0.1916	0.5044	0.5735	0.5780	0.5682	1.0000	1.0000	0.9861	0.9216	0.8295
1.0	0.0	1.0000	0.1307	0.1334	0.1501	0.1605	0.1656	1.0000	1.0000	1.0000	1.0000	1.0000

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Table 2: Frequency of rejection of the null hypothesis of short memory for sequences of a process with a deterministic trend and a possible break. Test size 5%. $N = 1000$ (based on 10000 replications)

		$\hat{r}$, $\xi_t \sim$ AR(k) process						$\hat{r}$, $\xi_t \sim$ Bloomfield process				
c_0	c_1	$k=0$	$k=1$	$k=2$	$k=3$	$k=4$	$k=5$	$k=1$	$k=2$	$k=3$	$k=4$	$k=5$
0.001	0.0	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
0.001	0.002	1.0000	1.0000	1.0000	1.0000	1.0000	0.9551	1.0000	1.0000	1.0000	1.0000	1.0000

Table 3: Frequency of rejection of the null hypothesis of short memory for sequences of FARIMA$(0, d, 0)$ with memory breaks processes, with the average distance 333.3 between breaks ($\pi_N = 15/5000$). Test size 5%. $N = 5000$ (based on 10000 replications)

	$\hat{r}$, $\xi_t \sim$ AR(k) process						$\hat{r}$, $\xi_t \sim$ Bloomfield process				
d	$k=0$	$k=1$	$k=2$	$k=3$	$k=4$	$k=5$	$k=1$	$k=2$	$k=3$	$k=4$	$k=5$
0.40	1.0000	1.0000	1.0000	0.9998	0.9946	0.9772	1.0000	1.0000	1.0000	1.0000	1.0000
0.30	1.0000	1.0000	1.0000	1.0000	0.9999	0.9996	1.0000	1.0000	1.0000	1.0000	1.0000
0.20	1.0000	1.0000	1.0000	1.0000	0.9992	0.9961	1.0000	1.0000	1.0000	1.0000	1.0000
0.10	1.0000	1.0000	0.9885	0.9458	0.8823	0.8063	1.0000	0.9986	0.9926	0.9779	0.9465

Table 4: Frequency of rejection of the null hypothesis of short memory for sequences of FARIMA$(0, d, 0)$ processes with Gaussian ($\alpha = 2$) and symmetric α–stable innovations. Test size 5%. $N = 1000$ (based on 10000 replications)

		$\hat{r}$, $\xi_t \sim$ AR(k) process						$\hat{r}$, $\xi_t \sim$ Bloomfield process				
α	d	$k=0$	$k=1$	$k=2$	$k=3$	$k=4$	$k=5$	$k=1$	$k=2$	$k=3$	$k=4$	$k=5$
2.0	0.30	1.0000	0.9999	0.9866	0.9238	0.8322	0.7337	1.0000	0.9992	0.9911	0.9662	0.9193
2.0	0.20	1.0000	0.9956	0.9394	0.8361	0.7366	0.6407	0.9966	0.9541	0.8591	0.7483	0.6403
2.0	0.10	0.9826	0.8208	0.6196	0.4942	0.4090	0.3399	0.7103	0.4952	0.3558	0.2771	0.2167
2.0	0.00	0.0409	0.0814	0.0747	0.0698	0.0687	0.0655	0.0296	0.0254	0.0204	0.0203	0.0186
1.5	0.30	1.0000	0.9979	0.9855	0.9433	0.8646	0.7763	0.9998	0.9979	0.9890	0.9711	0.9358
1.5	0.20	0.9997	0.9935	0.9553	0.8773	0.7877	0.6925	0.9948	0.9640	0.8942	0.8023	0.6899
1.5	0.10	0.9841	0.8620	0.6799	0.5232	0.4076	0.3339	0.7716	0.5102	0.3183	0.2297	0.1735
1.5	0.00	0.0208	0.0508	0.0527	0.0490	0.0525	0.0493	0.0176	0.0169	0.0132	0.0152	0.0120
1.25	0.30	1.0000	0.9929	0.9799	0.9450	0.8832	0.8016	0.9994	0.9962	0.9904	0.9762	0.9487
1.25	0.20	0.9992	0.9910	0.9618	0.9011	0.8201	0.7324	0.9932	0.9701	0.9135	0.8363	0.7375
1.25	0.10	0.9866	0.8971	0.7333	0.5542	0.4089	0.3123	0.8215	0.5382	0.2916	0.2038	0.1495
1.25	0.00	0.0170	0.0387	0.0391	0.0391	0.0374	0.0383	0.0139	0.0131	0.0132	0.0120	0.0097

Table 5: Frequency of rejection of the null hypothesis of short memory for sequences of iid $\mathcal{N}(0,1)$ processes. Test size 5%. $N = 1000$ (based on 10000 replications)

	$\hat{r}$, $\xi_t \sim$ AR(k) process						$\hat{r}$, $\xi_t \sim$ Bloomfield process				
DGP	$k=0$	$k=1$	$k=2$	$k=3$	$k=4$	$k=5$	$k=1$	$k=2$	$k=3$	$k=4$	$k=5$
DGP A	0.0412	0.0796	0.0782	0.0705	0.0691	0.0655	0.0285	0.0265	0.0217	0.0206	0.0175
DGP B	0.4944	0.7253	0.7617	0.7830	0.7948	0.7980	0.5657	0.6129	0.6189	0.6274	0.6229

Table 6: Frequency of rejection of the null hypothesis of short memory for sequences of iid $\mathcal{N}(0,1)$ processes. Test size 5%. $N = 1000$ (based on 10000 replications)

	M_N			
DGP	$q=5$	$q=10$	$q=15$	$q=[15 \log N]$
DGP A	0.0000	0.0000	0.0000	0.0000
DGP B	0.0746	0.0022	0.0019	0.0001

Table 7: Frequency of rejection of the null hypothesis of short memory for sequences of squares X_t^2 of GARCH(1,1) processes with $\mathcal{N}(0,1)$ innovations. Test size 5%. $N = 1000$ (based on 10000 replications)

	$\hat{r}$, $\xi_t \sim$ AR(k) process						$\hat{r}$, $\xi_t \sim$ Bloomfield process				
DGP	$k=0$	$k=1$	$k=2$	$k=3$	$k=4$	$k=5$	$k=1$	$k=2$	$k=3$	$k=4$	$k=5$
DGP 0	1.0000	0.5621	0.1634	0.0871	0.0686	0.0585	0.8274	0.3090	0.1050	0.0521	0.0304
DGP 1	1.0000	0.9950	0.9444	0.8714	0.8179	0.7991	1.0000	0.9993	0.9967	0.9929	0.9816
DGP 2	1.0000	0.9762	0.8820	0.8052	0.7746	0.7546	0.9871	0.8905	0.7662	0.6883	0.6358
DGP 3	0.9996	0.5046	0.1655	0.0925	0.0790	0.0684	0.6248	0.2050	0.0771	0.0467	0.0305
DGP 4	1.0000	0.9951	0.9471	0.8801	0.8349	0.8192	1.0000	0.9992	0.9968	0.9928	0.9817
DGP 5	1.0000	0.9566	0.8207	0.7360	0.7018	0.6783	0.9829	0.8540	0.7031	0.6136	0.5564

Table 8: Frequency of rejection of the null hypothesis of short memory for sequences of squares X_t^2 of GARCH(1,1) processes with $t(7)$ innovations. Test size 5%. $N = 1000$ (based on 10000 replications)

	$\hat{r}$, $\xi_t \sim$ AR(k) process						$\hat{r}$, $\xi_t \sim$ Bloomfield process				
DGP	$k = 0$	$k = 1$	$k = 2$	$k = 3$	$k = 4$	$k = 5$	$k = 1$	$k = 2$	$k = 3$	$k = 4$	$k = 5$
DGP 0	0.9985	0.5414	0.1819	0.0906	0.0725	0.0557	0.6974	0.2569	0.0947	0.0456	0.0278
DGP 1	1.0000	0.9940	0.9452	0.8816	0.8329	0.7966	0.9973	0.9933	0.9775	0.9616	0.9274
DGP 2	0.9975	0.8980	0.7231	0.6170	0.5689	0.5455	0.8994	0.6991	0.5440	0.4574	0.4008
DGP 3	0.9901	0.4528	0.1639	0.0922	0.0785	0.0694	0.5069	0.1670	0.0699	0.0408	0.0281
DGP 4	1.0000	0.9939	0.9461	0.8859	0.8429	0.8093	0.9971	0.9922	0.9756	0.9588	0.9246
DGP 5	0.9985	0.8734	0.6660	0.5508	0.5051	0.4776	0.8930	0.6618	0.4798	0.3979	0.3408

Table 9: Frequency of rejection of the null hypothesis of short memory for sequences of squares X_t^2 of GARCH(1,1) processes with $t(7)$ innovations. Test size 5%. $N = 1000$ (based on 10000 replications)

	M_N			
DGP	$q = 5$	$q = 10$	$q = 15$	$q = [15 \log N]$
DGP 0	0.0007	0.0005	0.0004	0.0002
DGP 1	0.2508	0.1591	0.1146	0.0375
DGP 2	0.0145	0.0108	0.0082	0.0019
DGP 3	0.0006	0.0004	0.0003	0.0000
DGP 4	0.2648	0.1735	0.1307	0.0433
DGP 5	0.0004	0.0000	0.0000	0.0000

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