

Table 1
Rejection Ratio of Alternative Tests at $\alpha = 0.05$
No Serial Correlations

Distributions		<u>No Time Trend</u>									
		<u>T=50</u>					<u>T=100</u>				
		DF	AD	M5	RALS (2&3)	RALS (t5)	DF	AD	M5	RALS (2&3)	RALS (t5)
Normal	$\phi = 1$	.060	.043	.094	.054	.059	.051	.049	.069	.051	.051
	$\phi = 0.9$	.146	.091	.198	.132	.136	.352	.263	.346	.311	.330
Student t df=3	$\phi = 1$	.058	.045	.052	.051	.050	.053	.067	.037	.051	.051
	$\phi = 0.9$	.139	.197	.291	.270	.296	.358	.535	.649	.615	.676
Mixture Normal	$\phi = 1$	.055	.040	.178	.044	.045	.058	.049	.130	.045	.044
	$\phi = 0.9$	.145	.790	.217	.850	.916	.361	.991	.281	.995	.998
Chi-square df=1	$\phi = 1$	.046	.048	.058	.043	.045	.052	.047	.036	.041	.045
	$\phi = 0.9$	.126	.360	.332	.909	.339	.355	.796	.666	.999	.723
Distributions		<u>With Linear Trend</u>									
		<u>T=50</u>					<u>T=100</u>				
		DF	AD	M5	RALS (2&3)	RALS (t5)	DF	AD	M5	RALS (2&3)	RALS (t5)
Normal	$\phi = 1$	.062	.025	.148	.054	.057	.057	.035	.078	.054	.055
	$\phi = 0.9$	.109	.049	.204	.092	.099	.216	.129	.251	.191	.206
Student t df=3	$\phi = 1$	.064	.026	.062	.060	.052	.054	.039	.036	.049	.049
	$\phi = 0.9$	.100	.120	.231	.187	.192	.197	.386	.495	.441	.507
Mixture Normal	$\phi = 1$	.054	.024	.292	.042	.044	.053	.027	.192	.042	.043
	$\phi = 0.9$	.097	.628	.258	.669	.784	.219	.981	.255	.981	.996
Chi-square df=1	$\phi = 1$	.055	.026	.064	.045	.051	.055	.038	.048	.039	.049
	$\phi = 0.9$	.081	.251	.277	.797	.224	.202	.647	.506	.991	.529

AD and M5 denote the t-tests based on the adaptive MLE and the M-estimate assuming the error density is the student-t with 5 degrees of freedom studied by Shin and So (1999) and Lucas (1995), respectively. Mixture normal is $0.5N(-3,1) + 0.5N(3,1)$. All the figures for AD and M5 have been reproduced from Shin and So (1999).

Table 2
 Rejection Ratio of Alternative Tests at $\alpha = 0.05$
 AR(1) error with AR coefficient 0.5, No Time Trend

T = 50

Distributions		ADF			RALS(2&3)			RALS(t5)		
		p=2	p=4	SC	p=2	p=4	SC	p=2	p=4	SC
Normal	$\phi = 1$	.056	.055	.071	.053	.054	.061	.054	.053	.067
	$\phi = 0.9$	.100	.080	.116	.087	.074	.097	.093	.073	.110
Cauchy	$\phi = 1$	.075	.079	.055	.046	.053	.063	.048	.059	.051
	$\phi = 0.9$	.074	.074	.088	.664	.599	.698	.567	.504	.568
Student t df=2	$\phi = 1$	.063	.060	.056	.050	.054	.064	.049	.056	.055
	$\phi = 0.9$	.080	.069	.089	.300	.252	.326	.343	.281	.341
Double Exponential	$\phi = 1$	.051	.053	.059	.048	.050	.057	.049	.051	.058
	$\phi = 0.9$	.091	.084	.109	.131	.110	.150	.151	.120	.161
Chi-square 4 df	$\phi = 1$	.051	.058	.061	.050	.045	.032	.052	.051	.061
	$\phi = 0.9$	.094	.080	.110	.260	.202	.191	.091	.081	.106
Beta(2,2)	$\phi = 1$	.060	.055	.073	.057	.050	.059	.053	.047	.060
	$\phi = 0.9$	.100	.087	.121	.126	.101	.133	.131	.103	.149

T = 100

Distributions		p=3	p=6	SC	p=3	p=6	SC	p=3	p=6	SC
		Normal	$\phi = 1$.055	.053	.061	.056	.048	.052	.055	.051	.056
	$\phi = 0.9$	.217	.163	.243	.196	.142	.217	.207	.145	.230
Cauchy	$\phi = 1$	.080	.076	.055	.040	.042	.055	.045	.050	.042
	$\phi = 0.9$	.144	.125	.181	.907	.852	.943	.796	.775	.803
Student t df=2	$\phi = 1$	.053	.053	.050	.049	.052	.067	.050	.047	.049
	$\phi = 0.9$	.190	.134	.220	.610	.512	.678	.716	.616	.740
Double Exponential	$\phi = 1$	.059	.053	.062	.055	.050	.063	.055	.047	.056
	$\phi = 0.9$	.216	.155	.246	.321	.231	.362	.377	.273	.400
Chi-square df=4	$\phi = 1$	.052	.048	.052	.046	.048	.025	.050	.045	.047
	$\phi = 0.9$	.224	.156	.242	.629	.480	.556	.217	.157	.237
Beta(2,2)	$\phi = 1$	.057	.053	.063	.048	.048	.052	.050	.046	.054
	$\phi = 0.9$	.216	.155	.246	.324	.225	.355	.343	.235	.376

Table 3
 Rejection Ratio of Alternative Tests at $\alpha = 0.05$
 AR(1) error with AR coefficient 0.5, with Linear Time Trend

T = 50

Distributions		ADF			RALS(2&3)			RALS(t5)		
		p=2	p=4	SC	p=2	p=4	SC	p=2	p=4	SC
Normal	$\phi = 1$	.053	.048	.074	.049	.044	.060	.050	.044	.070
	$\phi = 0.9$	.080	.069	.106	.069	.056	.081	.077	.059	.097
Cauchy	$\phi = 1$	.060	.058	.055	.064	.066	.078	.099	.103	.094
	$\phi = 0.9$	.073	.067	.067	.591	.516	.631	.370	.319	.383
Student t df=2	$\phi = 1$	.057	.049	.060	.054	.060	.073	.058	.055	.063
	$\phi = 0.9$	.078	.062	.081	.252	.201	.281	.248	.195	.255
Double Exponential	$\phi = 1$	.058	.053	.075	.055	.048	.074	.056	.049	.071
	$\phi = 0.9$	.083	.064	.098	.106	.085	.130	.115	.099	.135
Chi-square df=4	$\phi = 1$	.058	.053	.073	.053	.049	.032	.053	.049	.065
	$\phi = 0.9$	.074	.066	.094	.204	.133	.128	.074	.064	.091
Beta(2,2)	$\phi = 1$	.059	.050	.080	.050	.044	.058	.052	.044	.066
	$\phi = 0.9$	.082	.065	.111	.090	.072	.095	.092	.072	.112

T = 100

Distributions		p=3	p=6	SC	p=3	p=6	SC	p=3	p=6	SC
		Normal	$\phi = 1$.055	.053	.061	.053	.048	.057	.053	.053	.058
$\phi = 0.9$	.155		.109	.175	.136	.094	.153	.139	.101	.167
Cauchy	$\phi = 1$	.061	.055	.031	.050	.057	.074	.120	.120	.108
	$\phi = 0.9$	.110	.100	.115	.867	.800	.925	.652	.627	.675
Student t df=2	$\phi = 1$	.055	.045	.042	.049	.047	.071	.050	.050	.051
	$\phi = 0.9$	.133	.090	.145	.525	.411	.608	.610	.495	.644
Double Exponential	$\phi = 1$	.059	.049	.061	.049	.045	.066	.051	.044	.059
	$\phi = 0.9$	.150	.105	.177	.223	.164	.276	.277	.196	.305
Chi-square df=4	$\phi = 1$	.060	.049	.059	.050	.046	.021	.053	.044	.056
	$\phi = 0.9$	.149	.102	.174	.524	.370	.414	.147	.100	.168
Beta(2,2)	$\phi = 1$	.052	.046	.064	.042	.036	.044	.043	.039	.047
	$\phi = 0.9$	.157	.106	.185	.235	.155	.259	.239	.159	.281

Table 4
 Rejection Ratio of Alternative Tests at $\alpha = 0.05$
 MA(1) error with MA coefficient -0.5 , No Time Trend

T = 50

Distributions		ADF			RALS(2&3)			RALS(t5)		
		p=2	p=4	SC	p=2	p=4	SC	p=2	p=4	SC
Normal	$\phi = 1$	.088	.054	.095	.079	.051	.079	.085	.052	.091
	$\phi = 0.9$	.227	.109	.231	.190	.091	.182	.205	.097	.208
Cauchy	$\phi = 1$	.102	.077	.079	.180	.092	.194	.109	.068	.108
	$\phi = 0.9$	.163	.087	.177	.853	.712	.867	.625	.557	.622
Student t df=2	$\phi = 1$	.091	.060	.079	.109	.060	.123	.102	.059	.101
	$\phi = 0.9$	.198	.089	.199	.538	.347	.547	.553	.379	.539
Double Exponential	$\phi = 1$	.083	.053	.085	.088	.050	.094	.087	.054	.090
	$\phi = 0.9$	.219	.104	.216	.285	.149	.289	.320	.168	.313
Chi-square df=4	$\phi = 1$	.085	.050	.088	.108	.054	.070	.079	.051	.082
	$\phi = 0.9$	.223	.102	.227	.522	.282	.425	.209	.098	.212
Beta(2,2)	$\phi = 1$	.095	.054	.101	.086	.051	.084	.087	.050	.090
	$\phi = 0.9$	.237	.112	.241	.259	.135	.250	.276	.140	.277

T = 100

Distributions		ADF			RALS(2&3)			RALS(t5)		
		p=3	p=6	SC	p=3	p=6	SC	p=3	p=6	SC
Normal	$\phi = 1$	.050	.049	.057	.052	.046	.053	.050	.046	.056
	$\phi = 0.9$	.260	.187	.287	.230	.172	.257	.246	.176	.269
Cauchy	$\phi = 1$	.078	.073	.049	.041	.044	.057	.040	.042	.036
	$\phi = 0.9$	.171	.134	.207	.938	.889	.962	.785	.776	.796
Student t df=2	$\phi = 1$	.053	.048	.048	.050	.047	.065	.048	.046	.050
	$\phi = 0.9$	.235	.159	.266	.682	.570	.745	.771	.666	.798
Double Exponential	$\phi = 1$	.058	.051	.059	.052	.050	.058	.053	.048	.054
	$\phi = 0.9$	.263	.187	.303	.379	.280	.444	.440	.321	.486
Chi-square df=4	$\phi = 1$	.047	.044	.050	.046	.045	.027	.041	.043	.045
	$\phi = 0.9$	.254	.183	.293	.705	.543	.650	.248	.174	.286
Beta(2,2)	$\phi = 1$	.051	.047	.059	.047	.046	.053	.049	.045	.052
	$\phi = 0.9$	.253	.186	.296	.372	.265	.407	.391	.280	.438

Table 5
Rejection Ratio of Alternative Tests at $\alpha = 0.05$
MA(1) error with MA coefficient -0.5 , with Linear Time Trend

T = 50

Distributions		ADF			RALS(2&3)			RALS(t5)		
		p=2	p=4	SC	p=2	p=4	SC	p=2	p=4	SC
Normal	$\phi = 1$	.111	.054	.127	.091	.046	.096	.096	.051	.108
	$\phi = 0.9$	.176	.076	.191	.145	.067	.148	.157	.072	.170
Cauchy	$\phi = 1$	.102	.061	.085	.262	.125	.270	.130	.094	.126
	$\phi = 0.9$	.138	.080	.126	.784	.608	.801	.423	.346	.424
Student t df=2	$\phi = 1$	.101	.055	.099	.147	.076	.166	.115	.066	.120
	$\phi = 0.9$	.158	.071	.157	.441	.263	.467	.401	.245	.397
Double Exponential	$\phi = 1$	.114	.059	.119	.116	.057	.124	.120	.061	.125
	$\phi = 0.9$	.177	.082	.184	.226	.109	.237	.250	.122	.248
Chi-square df=4	$\phi = 1$	.111	.059	.118	.144	.059	.087	.102	.052	.108
	$\phi = 0.9$	.168	.071	.171	.420	.183	.295	.153	.071	.154
Beta(2,2)	$\phi = 1$	.121	.055	.135	.101	.052	.099	.101	.051	.108
	$\phi = 0.9$	.181	.076	.199	.186	.086	.179	.201	.091	.211

T = 100

Distributions		p=3	p=6	SC	p=3	p=6	SC	p=3	p=6	SC
		Normal	$\phi = 1$.089	.052	.134	.080	.048	.122	.083	.051	.130
	$\phi = 0.9$	.260	.123	.396	.230	.112	.336	.243	.119	.359
Cauchy	$\phi = 1$	.081	.056	.067	.156	.075	.310	.134	.111	.144
	$\phi = 0.9$	.188	.111	.306	.934	.839	.972	.658	.620	.680
Student t df=2	$\phi = 1$	.079	.044	.105	.098	.050	.195	.090	.052	.133
	$\phi = 0.9$	.233	.106	.360	.684	.473	.823	.745	.556	.820
Double Exponential	$\phi = 1$	.093	.052	.135	.084	.048	.152	.086	.048	.136
	$\phi = 0.9$	.261	.125	.396	.371	.185	.533	.436	.228	.570
Chi-square df=4	$\phi = 1$	.085	.049	.127	.095	.048	.091	.080	.049	.120
	$\phi = 0.9$	.268	.128	.397	.708	.429	.725	.253	.121	.373
Beta(2,2)	$\phi = 1$	.084	.048	.136	.077	.040	.113	.078	.040	.125
	$\phi = 0.9$	.265	.135	.400	.362	.189	.483	.377	.192	.519