

Portmanteau

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Portmanteau

Ljung-Box (L-B)

Huitema-McKean(H-M) Li-McLeod (L-M)

()

PACF

ACF

.1948 Moran $-r_k$

Portmanteau

PACF

Portmanteau

Comparison of Some Portmanteau Tests by Using Simulation

Abstract

Passing the chosen diagnosed candidate model is considered an employed modeled gate and the possibility of data presentation to be used in prediction and control. Also the research has dealt with different tests for Portmanteau and because the wide spread test in the ready made Programs is the L-B test, and

since many studies mentioned that this test suffers from huge differences in variation this led us to deal with the most recent tests like H-M and L-M trying to study its trial empirical power and its statistical specification (mean, variance) and applying some modification through adopting the partial autocorrelation coefficient PACF instead of the autocorrelation coefficients ACF, when calculated and suggesting a new test depending on the mean of the autocorrelation coefficient $-r_k$ that was suggest by Moran 1948 .

To reach this target simulation technique was used to comparieson Portmanteau tests in addition to the suggested test .The study showed that the use of the PACF in portmanteau tests contributed to increase it's empirical power and at the same time decrease it's variance.

[1]

(Arranz, 2005)

.(1992)

Model Identification

.(Cryer & Chan, 2008)

(Diagnostic tests of residuals)

. Portmanteau

portmanteau) portmanteau (WN)
 (Tsay, 2002) : (statistic

$$\left. \begin{aligned} H_o : \rho_1 = K = \rho_m = 0 \\ H_a : \rho_k \neq 0 \quad ; k \in \{1, K, m\} \end{aligned} \right\} \quad (1)$$

(Davies & portmanteau
 B-P . Newbold,1979)
 .(Arranz,2005) L-B
 (Makridakis, et al.,1998)

portmanteau . portmanteau
 (m)
 .(1992)

.(Li-McLeod, Monti, Dufour-Roy, ...,ect)

. Moran (1948)
 PACF . ACF
 [2]

Portmanteau
 Li-McLeod, .
 Monti, Huitema-McKean

Minitab SPSS

Minitab

χ^2

0.05

Portmanteau

Portmanteau [3]

Ljung-Box (L-B) .1.3

portmanteau Box & Pierce 1970

.(Levich & Rizzo,1998) Q

$(n - k) / \{n(n + 2)\}$

r_k

-: B-P

$$Q_{B-P} = n \sum_{k=1}^m r_k^2 \sim \chi^2_{(m-p-q)} \quad (2)$$

(Shumway

.& Stoffer, 2011)

:

:n

: r_k

m 1

:k

Davies,)

) .

1977 (Triggs & Newbold

.(Ljung & Box,1978) (χ^2_{m-p-q})

(2)

$$\chi^2_{m-p-q} \quad Q_{B-P}$$

Ljung & Box

Box

B-P

1978

r_k & Pierce

(Ljung & Box, 1978) : $(n-k)/\{n(n+2)\}$

$$r_k \sim N\left(0, \frac{(n-k)}{n(n+2)}\right) \tag{3}$$

$$\sqrt{\frac{n(n+2)}{n-k}} r_k \sim N(0,1) \tag{4}$$

$$\frac{n(n+2)}{(n-k)} r_k^2 \sim \chi^2_{(1)} \tag{5}$$

q , p

m

-:

$$\left[n(n+2) \sum_{k=1}^m \frac{r_k^2}{(n-k)} \right] \sim \chi^2_{m-p-q} \tag{6}$$

: Q_{L-B} L-B

$$Q_{L-B} = n(n+2) \sum_{k=1}^m \frac{r_k^2}{n-k} \sim \chi^2_{m-p-q} \tag{7}$$

Ljung & Box

B-P

χ^2

B-P

(Davies & Newbold,1979)

(Yaffee & McGee,2000)

(m-p-q)

χ^2

Q_{L-B}

(Yaffee &

L-B

McGee,2000;Davies & Newbold,1979)

.(Arranz,2005 ; Ljung & Box, 1978)

Li-McLeod (L-M) .2.3

portmanteau

Li & McLeod

1981

(Li &

ARMA

B-P

McLeod,1981)

:

$$\left. \begin{aligned}
 Q_{L-M}^* &= \frac{k^2 m(m+1)}{2n} + Q_{B-P} \\
 &= \frac{k^2 m(m+1)}{2n} + n \sum_{k=1}^m \hat{r}_k^2
 \end{aligned} \right\} \tag{8}$$

$$\cdot y_i^T = (y_{1,t}, y_{2,t}, \dots, y_{k,t}) \tag{k}$$

k :m

:n

:r_k

$$k^2(m-p-q) \quad \chi^2$$

: L-M Univariate

$$Q_{L-M} = \frac{m(m+1)}{2n} + \sum_{k=1}^m r_k^2 \tag{9}$$

Q_{L-B}

Q_{L-M}

Q_{B-P}

Arranz,) Q_{L-B}

.(2005

Monti (Mt) .3.3

Portmanteau

(1994)

Monti

.(2009)

(Chand &

.Kamal,2006; Monti,1994)

L-B Portmanteau ϕ_{kk} (n-k)/[n(n+2)]

$$Q_{Mt} = n(n+2) \sum_{k=1}^m \frac{\phi_{kk}^2}{n-k} \quad (10)$$

. m-p-q χ^2

Huitema-McKean (H-M) .4.3

Huitema & McKean 2007

portmanteau

L-B B-P

m

r_k

1

m

B-P

.(Huitema & McKean ,2007)

r_k

(Huitema & : 1948 Moran

.McKean,2007; Decarlo & Trayon,1993; Moran, 1948)

$$SE(r_1) = \frac{n-2}{n\sqrt{n-1}} \quad (11)$$

$H_o : \phi_1 = 0$

:(Huitema & McKean,2009)

$$Z_{H-M} = \frac{r_1 + \frac{p}{n}}{\sqrt{\frac{(n-2)^2}{n^2(n-1)}}} \tag{12}$$

Z_{H-M} Q_{H-M}

:(Huitema & McKean,2007)

$$H_0 : \phi_1 = \phi_2 = \dots = \phi_m = 0 \quad VS \quad H_1 : \phi_m \neq 0$$

:

$$Q_{H-M} = \frac{n^3(n-1)}{(n-2)^2} \sum_{k=1}^m \frac{\left\{ r_k + \left[\frac{p(n-k+1)}{n^2} \right] \right\}^2}{n-k} \tag{13}$$

:

: p

B-

m

Q_{H-M}

.(m-p-q)

L-B P

χ_m^2

.m

χ^2

χ_m^2

The Suggested Test (S)

[4]

L-B

Statistical Packages

(Huitema & McKean,2007) (Minitab & SPSS)

$^2_{m-p}$

(Arranz,2005;Ljung & Box,1978)

r_k

1948

Moran

· χ_q

(Dufour & Roy,1986;Declaro &

: r_k Tryon,1993)

$$E(r_k) = \mu_k = -(n-k)/n(n-1)$$

(Ljung & Box, 1978)

: r_k

$$\text{var}(r_k) = (n-k)/n(n+2)$$

:

$$r_k \sim N\left(\frac{-(n-k)}{n(n-1)}, \frac{(n-k)}{n(n+2)}\right) \tag{14}$$

$$\frac{r_k + \frac{(n-k)}{n(n-1)}}{\sqrt{\frac{n-k}{n(n+2)}}} \sim N(0,1) \tag{15}$$

:

$$\sqrt{\frac{n(n+2)}{n-k}} \left[r_k + \frac{(n-k)}{n(n-1)} \right] \sim N(0,1) \tag{16}$$

$$\frac{n(n+2)}{(n-k)} \left[r_k + \frac{(n-k)}{n(n-1)} \right]^2 \sim \chi^2_{(1)} \tag{17}$$

: $k=1, \dots, m$

$$Q_S = n(n+2) \sum_{k=1}^m \frac{\left\{ r_k + \frac{[n-k]}{n(n-1)} \right\}^2}{n-k} \sim \chi^2_{(m-p-q)} \tag{18}$$

(r_k)

:

(ϕ_{kk})

$$Q_{Sp} = n(n+2) \sum_{k=1}^m \frac{\left\{ \phi_{kk} + \frac{[n-k]}{n(n-1)} \right\}^2}{n-k} \tag{19}$$

Modified Tests -: [5]

Monti

(10) (1994) portmanteau

(ϕ_{kk})

: (r_k)

: L-Mp **L-M** -1

$$Q_{L-Mp} = \frac{m(m+1)}{2n} + \sum_{k=1}^m \phi_{kk}^2 \quad (20)$$

: H-Mp **H-M** -2

$$Q_{H-Mp} = \frac{n^3(n-1)}{(n-2)^2} \sum_{k=1}^m \frac{\left\{ \phi_{kk} + \left[\frac{p(n-k+1)}{n^2} \right] \right\}^2}{n-k} \quad (21)$$

: [6]

0.05 Portmanteau

PACF ACF

Portmanteau

Portmanteau

Portmanteau

-:

(35 55 105)

MA(2) AR(2) MA(1) AR(1)

.(0.1 0.3 0.5 0.7 0.9)
 1.0 1.4 1.8)
 (-0.9, -0.5 , -0.1, 0.3, 0.7) (0.2 0.6

PACF ACF .
 Minitab
 .(10) Mt (7) L-B
 (9) L-M
 H-M PACF (20)
 .(21) (13)
 (18) ACF (S)
 .(19) PACF
 χ^2
 H-M (m-p-q) 0.05
 .(m) χ^2
 χ^2
 . 1000 .
 . 1000
 : [7]
 PACF ACF
 $\alpha = 0.05$ χ^2
 (30,50,100) Portmanteau
 -: (8) (1)

L-M	H-M	-1
L-B	L-Mp H-Mp	

		Mt		-2
(Chand & L-B			L-B .Kamal, 2006)	
	Mt		100	
	S			-3
.L-B		PACF	ACF	
	.S			
				-4
H-	$-\chi^2$	$-(m-p-q)$		
	.(m)		M	
	.100			
		L-B		-5
	.S		H-M	
- H-Mp	L-Mp			-6
		-	PACF	
-	ACF		-	
PACF				
		Sp		
		ACF	S	
MA(1)	AR(1)			-7
:		PACF	ACF	

PAFC			AFC		
L-	H-Mp	-1	H-M		-1
		Mp		L-M	
	.Mt		.L-B		
	Sp	-2	S		-2
	.Mt		.L-B		
	.		.		
	Mt	-1	L-B		-1
	.		.		
	L-Mp	-2	L-M		-2
	.		.		

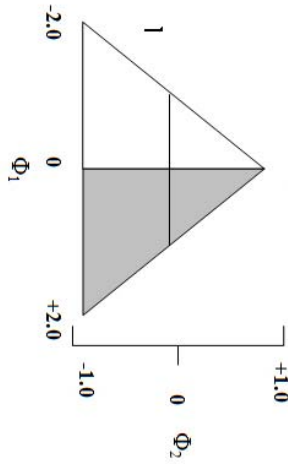
الجدول (1): يمثل النسبة المئوية للقوة التجريبية والوسط، والتباين التجريبيين لبعض إحصاءات Portmanteau من ضمنها الإحصاءات المعدلة والمقترحة لبواقي بيانات مولدة وفق نموذج AR(1) عند أحجام عينات (30,50,100) وفي قيم معاملات مختلفة.

ϕ_1	test	n=30			n=50			n=100		
		power	mean	VAR	power	mean	VAR	power	mean	VAR
0.1	Q_{L-n}	93.0	6.50108	14.8629	93.5	11.1462	27.0709	92.6	24.0615	59.0977
	Q_{L-M}	95.7	6.14134	9.5515	96.0	10.7928	18.7170	95.4	23.6585	42.9838
	Q_{M-M}	95.9	6.22643	14.5356	95.2	10.9008	26.7374	94.8	23.7927	58.6686
	Q_5	93.6	6.21997	14.5039	94.3	10.9102	26.7801	93.1	23.8169	58.7824
	Q_{Mn}	93.4	6.78096	12.7141	93.1	11.6525	24.5549	95.8	24.3672	43.9490
	Q_{L-Mn}	96.6	6.36738	8.2304	95.7	11.2087	17.0280	98.0	23.9290	32.1266
	Q_{M-Mn}	97.2	6.26627	11.2139	96.2	11.1139	22.5503	98.0	23.7888	41.9580
	Q_{Mn}	95.3	6.26072	11.1911	94.6	11.1244	22.5892	97.0	23.8133	42.0402
0.3	Q_{L-n}	93.2	6.27415	13.8627	94.5	11.1429	23.2999	92.6	24.0613	71.1487
	Q_{L-M}	96.5	5.97729	8.9949	96.8	10.8065	16.0599	95.0	23.6831	51.2658
	Q_{M-M}	96.3	5.98920	13.5077	95.9	10.8542	23.0615	93.8	23.7916	70.9135
	Q_5	94.3	5.98225	13.4733	94.6	10.8632	23.0997	92.9	23.8154	71.0584
	Q_{Mn}	94.2	6.51940	11.8500	93.9	11.6242	21.0295	94.1	24.2352	52.8217
	Q_{L-Mn}	96.7	6.17290	7.7138	97.7	11.2018	14.4578	96.8	23.8502	38.3374
	Q_{M-Mn}	97.7	6.03371	10.4838	97.6	11.0494	19.3177	96.5	23.6789	50.9315
	Q_{Mn}	95.7	6.02764	10.4594	96.2	11.0595	19.3548	95.4	23.7028	51.0342
0.5	Q_{L-n}	93.5	6.54241	14.0312	93.6	11.2305	25.3004	92.6	24.1122	68.0599
	Q_{L-M}	96.9	6.20164	9.1424	96.2	10.8863	17.4744	95.5	23.7329	49.0974
	Q_{M-M}	96.8	6.18329	13.5305	95.8	10.9351	25.1611	94.2	23.8435	68.8624
	Q_5	94.6	6.17605	13.4955	94.0	10.9441	25.2026	92.7	23.8673	69.0004
	Q_{Mn}	93.6	6.70081	12.7221	94.9	11.5897	21.0915	94.3	24.4296	50.6597
	Q_{L-Mn}	97.0	6.32945	8.3384	97.6	11.1796	14.6233	97.1	24.0099	36.8431
	Q_{M-Mn}	97.5	6.15279	11.0248	97.8	11.0318	19.5036	96.8	23.8639	49.5678
	Q_{Mn}	96.2	6.14638	10.9987	96.8	11.0417	19.5375	95.2	23.8881	49.6653
0.7	Q_{L-n}	92.2	6.71459	15.0035	91.5	11.7509	32.0425	91.9	24.3827	70.8324
	Q_{L-M}	95.5	6.34853	9.7997	94.0	11.3487	22.4831	94.3	23.9924	51.8244
	Q_{M-M}	95.3	6.36538	14.3608	93.8	11.4204	31.4494	93.6	24.0805	70.2426
	Q_5	92.8	6.35756	14.3234	91.8	11.4291	31.4908	92.4	24.1042	70.3752
	Q_{Mn}	92.2	6.89727	13.0032	92.3	11.7116	23.9195	95.1	24.3235	44.3829
	Q_{L-Mn}	96.3	6.49514	8.5070	95.1	11.3199	16.8780	97.3	23.9563	32.9126
	Q_{M-Mn}	97.2	6.37428	11.4565	95.5	11.1531	21.8967	97.7	23.7369	42.6655
	Q_{Mn}	94.7	6.36722	11.4299	93.8	11.1621	21.9269	96.1	23.7605	42.7421
0.9	Q_{L-n}	91.2	6.96399	16.5865	91.4	11.9205	28.4176	90.4	25.2853	80.4741
	Q_{L-M}	94.0	6.57603	10.8918	94.2	11.5054	19.8995	93.6	24.7564	58.1372
	Q_{M-M}	94.0	6.72378	15.7567	93.6	11.6562	28.1448	92.3	24.9661	79.7997
	Q_5	92.2	6.71389	15.7123	92.0	11.6645	28.1830	90.6	24.9908	79.9615
	Q_{Mn}	91.4	7.17329	13.9954	94.0	11.9963	21.0540	93.4	24.9094	50.5111
	Q_{L-Mn}	95.3	6.74664	9.2111	96.6	11.5813	14.9611	96.5	24.4613	36.9957
	Q_{M-Mn}	96.4	6.73487	12.0721	97.2	11.5191	19.9683	96.0	24.4097	49.3725
	Q_{Mn}	93.3	6.72572	12.0425	94.7	11.5276	19.9914	94.4	24.4338	49.4668

الجدول (2): يمثل النسبة المئوية للقوة التجريبية والوسط، والتباين التجريبيين لبعض إحصاءات Portmanteau من ضمنها الإحصاءات المعدلة والمقترحة لبواقي بيانات مولدة وفق نموذج MA(1) عند أحجام عينات (30,50,100) وقيم معالم مختلفة.

θ_1	test	n=30			n=50			n=100		
		power	mean	var	power	mean	var	power	mean	var
0.1	Q_{L-n}	94.3	5.96511	12.3665	93.8	11.0494	26.8321	92.9	23.9543	62.1414
	Q_{L-M}	97.0	5.69486	7.8723	96.0	10.6953	18.4049	95.4	23.5298	44.6241
	Q_{H-M}	97.2	5.71489	11.7146	95.7	10.7768	26.0471	94.6	23.7153	61.8289
	Q_5	94.8	5.70967	11.6949	94.5	10.7866	26.0943	93.2	23.7398	61.9579
	Q_{MA}	94.5	6.27084	12.5680	93.1	11.4165	23.5127	94.8	24.3750	46.5955
	Q_{L-Mn}	97.4	5.93846	8.0150	97.1	11.0050	16.2305	97.3	23.9133	33.8683
	Q_{H-Mn}	97.8	5.84389	10.9260	97.5	10.8647	21.4786	97.0	23.8336	44.7048
	Q_{en}	96.4	5.83936	10.9109	95.4	10.8753	21.5187	95.6	23.8584	44.7944
0.3	Q_{L-n}	94.8	6.14996	12.2038	94.3	10.8419	25.4245	92.6	23.7951	63.5995
	Q_{L-M}	97.3	5.86703	7.8616	96.8	10.5407	17.5653	95.4	23.4289	45.8587
	Q_{H-M}	97.2	5.95156	11.9953	96.3	10.6071	24.9946	94.3	23.5432	62.7038
	Q_5	95.6	5.94476	11.9679	94.6	10.6162	25.0347	93.0	23.5672	62.8321
	Q_{MA}	95.7	6.38528	10.2382	95.1	11.2612	21.3135	96.1	23.8874	45.5781
	Q_{L-Mn}	98.4	6.05563	6.6734	97.4	10.8796	14.5966	97.5	23.5392	33.2978
	Q_{H-Mn}	98.4	6.02108	9.3551	97.3	10.7895	19.7507	97.1	23.3654	43.6815
	Q_{en}	97.1	6.01494	9.3320	96.4	10.7997	19.7893	96.5	23.3891	43.7668
0.5	Q_{L-n}	93.0	6.49713	14.4250	93.8	11.1902	26.7090	92.4	23.8048	62.6265
	Q_{L-M}	95.5	6.14346	9.2495	96.4	10.8564	18.5945	95.3	23.4621	45.9397
	Q_{H-M}	95.7	6.28878	13.8345	96.1	10.9673	26.1907	94.4	23.5816	62.0654
	Q_5	93.9	6.28180	13.8072	94.2	10.9761	26.2295	92.8	23.6052	62.1801
	Q_{MA}	93.1	6.66552	13.3665	94.1	11.3762	21.4935	95.9	23.8507	46.0818
	Q_{L-Mn}	96.1	6.27931	8.5542	96.4	11.0129	14.9730	97.2	23.5220	34.0780
	Q_{H-Mn}	96.8	6.30618	11.8385	96.7	10.9556	19.9242	97.3	23.3659	44.2753
	Q_{en}	94.1	6.29980	11.8205	95.5	10.9648	19.9560	96.4	23.3894	44.3554
0.7	Q_{L-n}	94.3	6.45329	14.6961	91.8	11.4640	31.0006	93.0	24.0134	65.9318
	Q_{L-M}	96.6	6.13739	9.4906	95.1	11.0925	21.4391	95.4	23.6609	47.5623
	Q_{H-M}	96.3	6.22244	14.1991	94.5	11.2389	30.1201	94.4	23.7755	65.6684
	Q_5	94.8	6.21434	14.1679	92.7	11.2476	30.1691	93.7	23.7990	65.8017
	Q_{MA}	92.8	6.75595	12.7900	93.7	11.6198	23.4022	95.3	24.0268	48.1168
	Q_{L-Mn}	96.9	6.38049	8.3192	97.0	11.2276	16.3260	97.8	23.6842	34.9362
	Q_{H-Mn}	97.0	6.33923	11.3063	97.1	11.2268	21.4969	97.3	23.5699	46.3940
	Q_{en}	94.2	6.33179	11.2822	94.8	11.2359	21.5303	96.2	23.5934	46.4870
0.9	Q_{L-n}	93.0	6.88529	16.4449	92.1	11.8502	30.3437	93.2	24.2154	65.3845
	Q_{L-M}	95.9	6.50809	10.8860	94.6	11.4423	21.1240	95.3	23.8503	47.6199
	Q_{H-M}	95.5	6.56073	15.7908	93.9	11.5556	29.8478	94.9	23.9900	64.7562
	Q_5	93.5	6.55160	15.7423	92.5	11.5640	29.8927	93.7	24.0136	64.8825
	Q_{MA}	93.7	7.03700	11.8881	94.2	11.8201	20.7739	95.4	24.1504	48.1476
	Q_{L-Mn}	96.8	6.63597	7.8650	96.6	11.4293	14.6045	97.2	23.8109	35.2307
	Q_{H-Mn}	97.4	6.49854	10.4016	97.2	11.2878	19.0210	96.9	23.7505	46.6073
	Q_{en}	95.0	6.49015	10.3742	95.5	11.2964	19.0494	95.9	23.7739	46.6977

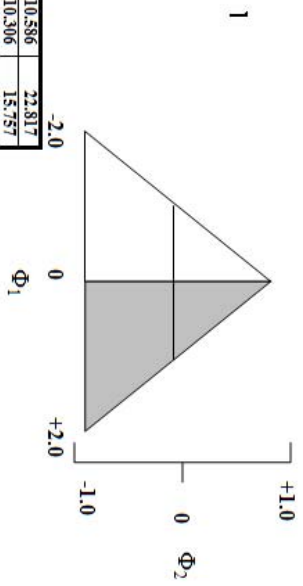
الجدول (3) يمثل النسبة المئوية للقوة التحريبية والوسطية التحويلية التحويلية لبعض إحصاءات Portmanteau من ضمنها الإحصاءات المعتادة والمقترحة لبرقي بيانات مولدة وفق نموذج AR(2) عند حجم عينة (30) وقدم مقادير مختلفة من الجانب المائل اللات الذي يمثل المدى المسموح به لهجمات هذا النموذج.



test	0.2			0.6			1.0			1.4			1.8			Φ_2
	power	mean	Y&F	power	mean	Y&F	power	mean	Y&F	power	mean	Y&F	power	mean	Y&F	
Q ₋₈	91.3	6.054	13.254	91.4	5.817	10.956	91.7	5.947	12.062	90.8	6.140	14.266	85.9	7.091	17.720	-0.7
Q _{-M}	94.2	5.787	8.540	96.6	5.253	6.772	98.1	4.964	5.722	98.1	4.964	5.722	98.1	4.964	5.722	
Q _M	96.3	6.122	13.066	98.4	5.257	10.100	97.6	5.860	10.982	97.4	5.122	6.139	97.4	5.122	6.139	
Q _s	91.7	5.852	12.700	98.4	5.257	10.100	97.6	5.860	10.982	97.4	5.122	6.139	97.4	5.122	6.139	
Q _M	89.9	6.315	12.450	95.1	5.126	10.107	93.0	5.603	10.562	97.0	5.938	12.054	97.0	5.938	12.054	
Q _{-M}	93.8	6.000	8.082	93.4	5.767	10.937	88.8	6.294	12.716	91.6	5.707	11.731	91.6	5.707	11.731	
Q _M	98.1	5.943	10.737	95.8	5.499	6.887	94.0	5.954	8.131	95.3	5.933	7.516	95.3	5.933	7.516	
Q _M	92.3	5.893	10.566	98.9	5.284	8.780	97.8	5.914	10.923	98.4	5.856	10.144	98.4	5.856	10.144	
Q ₋₈	93.8	5.452	10.704	94.8	5.292	9.334	91.7	5.869	11.134	92.9	5.824	10.299	93.4	5.742	10.436	
Q _{-M}	96.6	5.253	6.772	95.4	5.108	9.190	95.2	5.288	9.773	95.2	5.288	9.773	95.2	5.288	9.773	
Q _M	98.4	5.257	10.100	98.1	4.964	5.722	97.4	5.122	6.139	97.4	5.122	6.139	97.4	5.122	6.139	
Q _s	95.1	5.126	10.107	98.5	5.076	9.588	98.6	5.172	9.471	97.0	5.938	12.054	97.0	5.938	12.054	
Q _M	93.4	5.767	10.937	96.1	4.858	8.963	96.3	4.996	9.297	91.6	5.707	11.731	91.6	5.707	11.731	
Q _{-M}	95.8	5.499	6.887	93.4	5.582	10.604	93.0	5.626	10.557	90.7	6.262	11.687	90.7	6.262	11.687	
Q _M	98.9	5.284	8.780	96.9	5.331	6.588	96.7	5.382	6.596	95.3	5.933	7.516	95.3	5.933	7.516	
Q _M	94.8	5.146	9.181	98.6	5.175	9.088	98.6	5.215	9.103	98.4	5.856	10.144	98.4	5.856	10.144	
Q ₋₈	94.4	5.359	11.400	95.4	5.146	9.181	95.2	5.187	9.320	92.9	5.824	10.299	92.9	5.824	10.299	
Q _{-M}	96.6	5.190	7.206	94.4	5.359	11.400	93.3	5.533	11.651	93.2	5.532	10.955	93.2	5.532	10.955	
Q _M	97.3	5.464	11.662	96.6	5.190	7.206	96.7	5.332	7.371	95.7	5.353	6.986	93.8	5.872	9.227	
Q _s	94.9	5.176	10.976	94.9	5.176	10.976	94.2	5.262	11.033	97.3	5.496	11.275	96.1	6.044	13.818	
Q _M	92.2	5.756	12.066	91.9	5.499	7.607	91.7	5.860	11.863	94.0	5.279	10.697	91.4	5.856	13.787	
Q _{-M}	94.9	5.421	10.096	92.2	5.756	12.066	95.4	5.884	7.419	92.0	5.784	10.312	91.6	6.217	11.804	
Q _M	97.9	5.421	10.096	94.4	5.355	10.325	94.2	5.383	9.929	96.9	5.545	6.598	95.8	5.929	7.652	
Q ₋₈	88.1	6.518	14.197	94.4	5.355	10.325	94.2	5.383	9.929	94.5	5.365	9.447	93.4	5.742	10.436	
Q _{-M}	92.8	6.190	9.253	92.8	6.190	9.253	90.8	6.414	11.593	83.0	6.566	14.780	87.3	6.689	16.890	
Q _M	95.6	6.515	13.880	95.6	6.515	13.880	93.6	6.743	17.643	93.1	6.244	9.709	91.4	6.370	11.219	
Q _s	89.4	6.280	13.534	89.4	6.280	13.534	87.7	6.504	16.969	89.4	6.337	14.204	88.4	6.463	16.277	
Q _M	88.9	6.704	12.280	88.9	6.704	12.280	86.3	6.980	14.911	85.9	6.889	14.059	85.9	6.963	14.062	
Q _{-M}	93.2	6.348	8.049	93.2	6.348	8.049	90.5	6.594	9.380	91.1	6.496	9.163	91.5	6.588	9.386	
Q _M	97.9	6.215	10.368	97.9	6.215	10.368	97.1	6.367	12.490	96.7	6.348	11.445	96.3	6.474	12.164	
Q ₋₈	91.4	6.223	10.561	91.4	6.223	10.561	89.5	6.438	12.881	89.8	6.383	11.884	90.5	6.482	12.281	

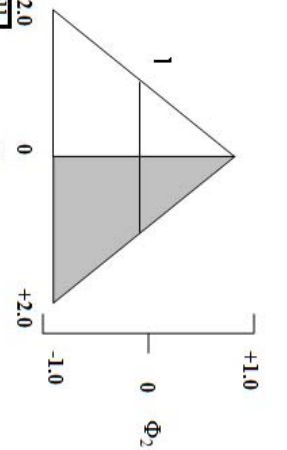
الجدول (4): يمثل النسبة المئوية للقرّة التحريية والوسط من التباين التحيييين لبعض إحصاءات الـ Portmanteau من ضمنها الإحصاءات المصنفة والمقترحة لبرافي بيانات مولدة وفق نموذج AR(2) عند حجم عينة (50) لقيم معاملات مختلفة من الجانب المطلق المثلث الذي يمثل المدى المسموح به لمعاملات هذا النموذج.

test	0.2			0.6			1.0			1.4			1.8			Φ_2
	power	mean	VAR	power	mean	VAR	power	mean	VAR	power	mean	VAR	power	mean	VAR	
$Q_{a,b}$	91.0	11.233	24.447	92.5	10.702	26.185	93.3	10.586	22.817	90.7	10.895	24.953	92.7	11.303	32.352	0.7
$Q_{a,M}$	94.2	10.851	16.717	95.8	10.390	18.020	95.8	10.306	15.757	94.1	10.590	17.222	92.7	10.999	22.700	
Q_s	91.4	11.028	24.286	95.8	10.603	25.889	96.3	10.551	22.206	96.0	10.760	23.915	93.8	11.294	31.650	0.3
$Q_{M,s}$	91.2	11.610	22.266	93.1	10.430	25.730	94.0	10.346	22.241	91.8	10.605	24.219	90.1	11.075	31.735	
$Q_{M,s}$	94.8	11.161	15.214	93.3	10.662	24.297	93.5	11.002	21.096	92.5	11.130	20.991	92.4	11.156	21.447	-0.9
$Q_{M,s}$	97.2	11.186	20.927	96.4	10.315	16.748	97.9	10.092	15.205	96.5	10.774	14.402	95.7	10.972	15.095	
$Q_{s,b}$	92.8	11.176	20.941	97.7	10.069	18.868	96.8	10.708	21.235	97.9	10.570	18.922	97.4	10.699	19.827	-0.1
$Q_{s,b}$	94.1	10.126	21.850	94.9	10.144	19.610	92.4	10.763	22.198	94.4	10.564	19.478	93.8	10.704	20.131	
$Q_{a,b}$	96.6	9.885	14.713	94.4	10.092	22.562	93.3	10.586	22.817	90.7	10.895	24.953	92.7	11.303	32.352	-0.5
$Q_{a,M}$	97.2	9.959	21.161	96.8	9.851	15.205	95.8	10.306	15.757	94.1	10.590	17.222	92.7	10.999	22.700	
$Q_{s,b}$	94.6	9.820	21.224	97.1	9.929	22.022	96.3	10.551	22.206	96.0	10.760	23.915	93.8	11.294	31.650	0.7
Q_s	96.1	9.577	18.802	94.9	9.788	21.979	94.0	10.346	22.241	91.8	10.605	24.219	90.1	11.075	31.735	
$Q_{M,s}$	93.3	10.662	24.297	93.6	10.638	21.210	93.5	11.002	21.096	92.5	11.130	20.991	92.4	11.156	21.447	0.3
$Q_{M,s}$	96.4	10.315	14.338	94.2	10.847	16.748	97.9	10.092	15.205	96.5	10.774	14.402	95.7	10.972	15.095	
$Q_{s,b}$	97.7	10.069	18.868	96.8	10.708	21.235	97.9	10.570	18.922	97.4	10.699	19.827	97.4	10.699	19.827	-0.1
$Q_{s,b}$	94.9	10.144	19.610	92.4	10.763	22.198	94.4	10.564	19.478	94.4	10.564	19.478	93.8	10.704	20.131	
$Q_{a,b}$	95.8	9.814	18.740	94.4	10.092	22.562	93.3	10.586	22.817	90.7	10.895	24.953	92.7	11.303	32.352	-0.5
$Q_{a,M}$	97.9	9.594	12.648	96.8	9.851	15.205	95.8	10.306	15.757	94.1	10.590	17.222	92.7	10.999	22.700	
$Q_{s,b}$	98.3	9.783	19.643	97.1	9.929	22.022	96.3	10.551	22.206	96.0	10.760	23.915	93.8	11.294	31.650	0.7
Q_s	96.1	9.577	18.802	94.9	9.788	21.979	94.0	10.346	22.241	91.8	10.605	24.219	90.1	11.075	31.735	
$Q_{M,s}$	95.4	10.490	19.418	93.6	10.638	21.210	93.5	11.002	21.096	92.5	11.130	20.991	92.4	11.156	21.447	0.3
$Q_{M,s}$	97.2	10.146	13.175	96.7	10.283	14.367	96.3	10.645	14.524	96.3	10.645	14.524	96.3	10.645	14.524	
$Q_{s,b}$	98.7	9.941	17.810	98.4	9.978	18.056	97.9	10.570	18.922	97.4	10.699	19.827	97.4	10.699	19.827	-0.1
$Q_{s,b}$	96.3	9.995	17.988	94.7	10.082	19.030	94.4	10.564	19.478	94.4	10.564	19.478	93.8	10.704	20.131	
$Q_{a,b}$	95.5	9.859	18.916	93.9	10.326	20.605	92.3	10.659	26.312	90.7	10.895	24.953	92.7	11.303	32.352	-0.5
$Q_{a,M}$	97.8	9.664	12.851	97.1	10.066	14.071	94.6	10.362	18.022	94.1	10.590	17.222	92.7	10.999	22.700	
$Q_{s,b}$	97.8	9.845	19.298	97.2	10.346	21.269	96.3	10.570	26.382	96.0	10.760	23.915	93.8	11.294	31.650	0.7
$Q_{s,b}$	96.0	9.630	18.668	94.3	10.114	20.475	92.8	10.392	26.008	91.8	10.605	24.219	90.1	11.075	31.735	
Q_s	94.0	10.521	19.325	93.5	10.812	19.092	92.6	11.057	22.615	92.5	11.130	20.991	92.4	11.156	21.447	0.3
$Q_{M,s}$	97.0	10.194	13.046	97.1	10.464	12.994	96.1	10.688	15.520	96.5	10.774	14.402	95.7	10.972	15.095	
$Q_{M,s}$	98.7	9.935	17.079	98.6	10.263	17.197	98.1	10.400	20.040	98.3	10.595	18.879	98.3	10.595	18.879	-0.1
$Q_{s,b}$	95.4	10.007	17.496	95.5	10.316	17.422	94.5	10.507	20.678	95.0	10.641	19.486	95.0	10.641	19.486	
$Q_{a,b}$	90.9	11.104	26.887	91.2	11.044	26.979	89.2	11.376	32.024	89.3	11.095	30.939	89.5	11.303	32.352	0.7
$Q_{a,M}$	93.6	10.798	18.686	94.1	10.759	18.888	92.6	11.053	22.535	93.4	10.797	21.506	92.7	10.999	22.700	
$Q_{s,b}$	95.0	11.107	27.308	95.0	10.992	27.534	94.0	11.297	32.269	95.4	11.044	31.171	93.8	11.294	31.650	-0.9
Q_s	91.3	10.883	26.574	92.0	10.795	26.810	89.9	11.113	31.677	90.5	10.847	30.590	90.1	11.075	31.735	
$Q_{M,s}$	91.1	11.320	20.252	91.3	11.306	20.765	89.9	11.606	24.840	91.6	11.304	21.686	92.4	11.156	21.447	0.3
$Q_{M,s}$	95.4	10.984	14.234	94.7	10.974	14.404	93.6	11.243	17.452	95.7	10.972	15.095	95.1	10.883	15.183	
$Q_{s,b}$	97.7	10.697	18.584	97.8	10.633	19.189	97.0	10.859	21.614	98.5	10.596	18.728	97.4	10.699	19.827	-0.1
$Q_{s,b}$	94.0	10.786	18.613	92.7	10.747	19.210	92.4	11.010	22.421	94.0	10.728	19.402	93.8	10.704	20.131	



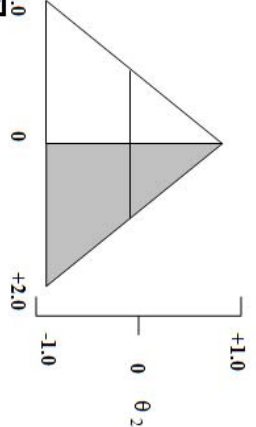
الجدول (5): يمثل النسبة المئوية للقوة التجريبية والوسط والتباين التوزيعيين لبعض إحصاءات Portmanteau من ضمنها الإحصاءات المتجانسة والمقترحة لبقية بيانات مولدة وفق نموذج AR(2) عند حجم عينة (100) وقيم معاملات مختلفة من الجانب المطلق المنطق الذي يفسر المدى المسموح به لمعاملات هذا النموذج.

test	power	mean	YAR	power	mean	YAR	power	mean	YAR	power	mean	YAR	power	mean	YAR	Φ_1
Q_{ns}	92.9	23.518	59.757	92.7	23.520	62.356	92.5	23.279	58.611	93.3	22.943	54.704	90.4	23.938	67.842	-0.9
Q_{LM}	94.8	23.164	43.096	95.4	23.139	44.860	95.6	22.957	42.173	96.0	22.690	39.900	93.7	23.598	49.432	-0.9
Q_{EM}	95.1	23.443	57.593	95.8	23.361	60.688	95.9	23.123	57.703	96.5	22.809	54.671	93.9	23.902	67.077	-0.9
Q_s	93.1	23.266	58.439	93.2	23.226	61.334	93.3	22.986	57.944	94.1	22.661	54.455	90.7	23.705	67.144	-0.9
Q_{ML}	94.3	23.647	45.379	94.4	23.538	47.755	94.4	23.491	44.695	94.9	23.388	44.199	91.5	23.759	46.237	-0.9
Q_{MLB}	96.8	23.293	33.199	96.5	23.491	34.409	96.5	23.491	34.409	97.0	23.042	32.089	96.6	23.462	33.728	-0.9
Q_{MLB}	98.2	23.204	42.680	97.7	22.829	44.654	97.7	22.829	44.654	97.7	23.357	47.621	97.7	23.201	44.012	-0.9
Q_{SB}	95.0	23.210	43.538	94.5	23.429	45.725	94.5	23.429	45.725	95.8	22.888	42.910	94.9	23.265	44.505	-0.9
Q_{LS}	92.6	23.002	54.879	92.7	22.298	56.319	92.5	23.279	58.611	93.3	22.943	54.704	90.4	23.938	67.842	-0.9
Q_{LM}	95.9	22.687	39.180	95.4	23.139	44.860	95.6	22.957	42.173	96.0	22.690	39.900	93.7	23.598	49.432	-0.9
Q_{EM}	95.9	22.887	54.767	95.8	23.361	60.688	95.9	23.123	57.703	96.5	22.809	54.671	93.9	23.902	67.077	-0.9
Q_s	93.0	22.730	54.564	93.2	23.226	61.334	93.3	22.986	57.944	94.1	22.661	54.455	90.7	23.705	67.144	-0.9
Q_{ML}	94.4	23.459	44.934	94.4	23.538	47.755	94.4	23.491	44.695	94.9	23.388	44.199	91.5	23.759	46.237	-0.9
Q_{MLB}	97.5	23.088	32.315	96.5	23.491	34.409	96.5	23.491	34.409	97.0	23.042	32.089	96.6	23.462	33.728	-0.9
Q_{MLB}	97.7	22.829	43.604	96.7	23.356	44.654	97.7	22.829	44.654	97.7	23.357	47.621	97.7	23.201	44.012	-0.9
Q_{SB}	95.5	22.930	43.603	94.5	23.429	45.725	94.5	23.429	45.725	95.8	22.888	42.910	94.9	23.265	44.505	-0.9
Q_{LS}	93.9	23.044	53.006	93.7	22.298	56.319	92.5	23.279	58.611	93.3	22.943	54.704	90.4	23.938	67.842	-0.9
Q_{LM}	96.7	22.722	38.185	95.4	22.073	40.595	95.6	22.957	42.173	96.0	22.690	39.900	93.7	23.598	49.432	-0.9
Q_{EM}	97.0	22.967	53.096	95.7	22.242	56.624	95.9	23.123	57.703	96.5	22.809	54.671	93.9	23.902	67.077	-0.9
Q_s	94.2	22.791	52.743	94.1	22.055	56.167	93.3	22.986	57.944	94.1	22.661	54.455	90.7	23.705	67.144	-0.9
Q_{ML}	95.4	23.499	42.919	94.6	22.921	46.836	95.4	23.578	44.695	94.9	23.388	44.199	91.5	23.759	46.237	-0.9
Q_{MLB}	97.6	23.130	31.078	97.8	22.604	34.066	96.8	23.211	32.213	97.0	23.056	42.704	96.5	22.809	54.671	-0.9
Q_{MLB}	98.7	22.838	41.063	98.2	22.351	45.187	97.4	23.056	42.704	97.7	22.942	42.910	94.1	22.661	54.455	-0.9
Q_{SB}	96.4	22.954	41.345	95.3	22.421	45.403	95.7	23.101	43.246	96.0	22.690	39.900	93.7	23.598	49.432	-0.9
Q_{LS}	94.7	22.728	53.937	92.9	22.782	56.010	92.1	23.220	61.028	93.3	22.943	54.704	90.4	23.938	67.842	-0.9
Q_{LM}	97.1	22.429	38.598	95.4	22.505	40.529	94.2	22.894	43.983	96.0	22.690	39.900	93.7	23.598	49.432	-0.9
Q_{EM}	96.8	22.700	54.067	95.5	22.719	56.545	94.8	23.093	59.860	96.5	22.809	54.671	93.9	23.902	67.077	-0.9
Q_{EM}	95.3	22.499	53.555	93.4	22.536	55.879	92.7	22.942	60.093	94.1	22.661	54.455	90.7	23.705	67.144	-0.9
Q_s	95.3	23.377	43.433	94.4	23.489	45.473	94.0	23.682	47.178	94.9	23.388	44.199	91.5	23.759	46.237	-0.9
Q_{ML}	97.3	22.983	31.277	96.5	23.109	33.071	96.1	23.287	34.238	97.0	23.042	32.089	96.6	23.462	33.728	-0.9
Q_{MLB}	98.2	22.687	40.106	97.5	22.779	42.253	96.7	22.936	44.548	97.4	22.818	42.677	96.6	23.462	33.728	-0.9
Q_{MLB}	96.0	22.818	41.002	95.4	22.919	43.073	95.0	23.095	45.168	95.8	22.888	42.910	94.9	23.265	44.505	-0.9
Q_{SB}	92.9	23.037	58.385	91.9	23.543	63.033	90.8	23.650	64.683	91.4	23.494	73.114	90.4	23.938	67.842	-0.9
Q_{LM}	95.7	22.826	41.993	94.4	23.233	45.452	94.1	23.332	46.804	93.6	23.209	52.662	93.7	23.598	49.432	-0.9
Q_{EM}	95.7	22.940	56.920	94.4	23.522	63.998	93.8	23.673	64.512	93.4	23.495	73.599	93.9	23.902	67.077	-0.9
Q_s	93.5	22.773	57.257	92.2	23.318	62.804	91.5	23.446	64.161	91.8	23.279	72.977	90.7	23.705	67.144	-0.9
Q_{ML}	94.4	23.420	44.677	94.4	23.555	43.674	92.2	23.959	51.026	93.2	23.579	49.439	94.5	23.759	46.237	-0.9
Q_{MLB}	97.2	23.158	32.141	96.7	23.276	32.000	95.8	23.609	37.083	96.2	23.299	35.890	96.6	23.462	33.728	-0.9
Q_{MLB}	98.3	22.679	40.672	97.6	22.853	41.499	97.2	23.357	47.622	97.0	22.977	47.621	97.7	23.201	44.012	-0.9
Q_{SB}	96.2	22.834	41.929	95.5	22.989	41.814	93.6	23.443	48.574	93.7	23.063	47.806	94.9	23.265	44.505	-0.9



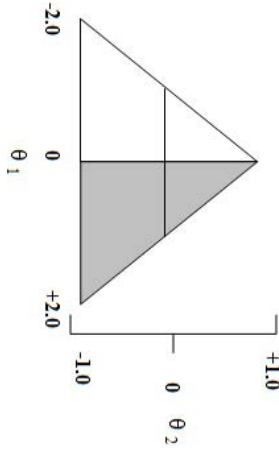
الجداول (6): يعطي النسبة المئوية للفترة التحريبية و الوسط و التباين التحريبيين لبعض إحصاءات الممثل للمطابق الذي يعطى المدى المسموح به لمعاملات هذا النموذج. بيانات مولدة وفق نموذج MA(2) عند حجم عينة (30) وفق معاملات مختلفة من الجانب الممثل للمطابق الذي يعطى المدى المسموح به لمعاملات هذا النموذج.

test	0.2			0.6			1.0			1.4			1.8			θ_2 θ_1
	power	mean	YAR	power	mean	YAR	power	mean	YAR	power	mean	YAR	power	mean	YAR	
Q ₈	91.1	6.058	12.302	94.0	5.719	9.891	93.7	5.807	9.914	88.7	6.339	14.148	78.4	8.571	24.081	0.7
Q _{8M}	94.9	5.782	7.813	96.9	5.495	6.314	96.6	5.568	6.334	93.4	6.031	9.198	83.3	7.990	16.161	
Q _{8M}	96.9	5.869	11.744	98.9	5.483	8.872	97.9	5.612	9.789	96.3	6.142	13.799	89.3	7.973	23.195	0.5
Q ₈	97.8	5.728	11.704	94.8	5.366	9.098	94.7	5.474	9.562	90.1	6.000	13.676	80.5	8.032	23.406	
Q _{8M}	89.8	6.433	13.214	90.4	6.338	11.837	91.8	6.170	10.534	88.4	6.618	13.443	71.4	9.226	21.177	-0.9
Q _{8M}	94.1	6.079	7.838	94.9	5.905	7.508	93.7	6.219	8.074	92.4	6.291	8.759	77.4	8.558	14.646	
Q _{8M}	98.5	5.724	9.252	93.7	5.546	8.885	98.6	5.576	9.020	95.5	6.624	12.632	94.7	7.283	13.725	0.3
Q _{8M}	97.6	5.839	10.089	93.5	5.659	9.765	94.1	5.639	9.246	89.7	6.386	12.408	80.9	8.017	16.556	
Q ₈	96.0	5.012	8.548	94.0	4.971	8.043	93.7	5.807	9.914	88.7	6.339	14.148	78.4	8.571	24.081	-0.1
Q _{8M}	98.0	4.906	5.353	96.9	5.495	6.314	96.6	5.568	6.334	93.4	6.031	9.198	83.3	7.990	16.161	
Q _{8M}	98.7	5.104	8.236	98.9	5.483	8.872	97.9	5.612	9.789	96.3	6.142	13.799	89.3	7.973	23.195	0.7
Q ₈	96.5	4.823	8.078	94.8	5.366	9.098	94.7	5.474	9.562	90.1	6.000	13.676	80.5	8.032	23.406	
Q _{8M}	95.1	5.337	9.374	90.4	6.338	11.837	91.8	6.170	10.534	88.4	6.618	13.443	71.4	9.226	21.177	-0.5
Q _{8M}	98.0	5.169	5.923	94.9	5.905	7.508	93.7	6.219	8.074	92.4	6.291	8.759	77.4	8.558	14.646	
Q _{8M}	99.7	5.119	7.865	93.7	5.546	8.885	98.6	5.576	9.020	95.5	6.624	12.632	94.7	7.283	13.725	0.3
Q _{8M}	96.7	4.994	8.070	93.5	5.659	9.765	94.1	5.639	9.246	89.7	6.386	12.408	80.9	8.017	16.556	
Q ₈	97.2	4.826	7.691	96.1	4.971	8.043	93.7	5.807	9.914	88.7	6.339	14.148	78.4	8.571	24.081	-0.1
Q _{8M}	98.7	4.742	4.749	98.3	4.877	5.077	96.6	5.568	6.334	93.4	6.031	9.198	83.3	7.990	16.161	
Q _{8M}	99.1	4.808	7.654	99.1	5.033	7.822	97.9	5.612	9.789	96.3	6.142	13.799	89.3	7.973	23.195	0.7
Q ₈	97.7	4.583	7.337	96.7	4.768	7.598	94.7	5.474	9.562	90.1	6.000	13.676	80.5	8.032	23.406	
Q _{8M}	94.2	5.325	9.576	94.6	5.389	9.262	91.8	6.170	10.534	88.4	6.618	13.443	71.4	9.226	21.177	-0.5
Q _{8M}	97.2	5.139	5.968	97.2	5.207	5.823	96.3	5.858	6.719	93.3	6.283	8.773	77.4	8.558	14.646	
Q _{8M}	99.0	4.971	8.261	92.2	5.154	8.003	98.6	5.576	9.020	95.5	6.624	12.632	94.7	7.283	13.725	0.3
Q _{8M}	96.4	4.915	8.359	96.1	5.038	8.077	94.1	5.639	9.246	89.7	6.386	12.408	80.9	8.017	16.556	
Q ₈	95.2	5.197	9.032	96.8	4.827	7.772	93.3	5.812	12.018	88.7	6.339	14.148	78.4	8.571	24.081	-0.1
Q _{8M}	97.4	5.078	5.688	98.5	4.783	4.900	95.9	5.182	7.659	93.4	6.031	9.198	83.3	7.990	16.161	
Q _{8M}	98.9	5.186	9.535	99.0	4.779	8.037	97.5	5.497	11.645	96.3	6.142	13.799	89.3	7.973	23.195	0.7
Q ₈	95.9	4.957	8.826	97.1	4.569	7.472	94.0	5.169	11.422	90.1	6.000	13.676	80.5	8.032	23.406	
Q _{8M}	93.3	5.756	10.140	95.1	5.401	9.039	92.3	5.760	11.572	88.4	6.618	13.443	71.4	9.226	21.177	-0.5
Q _{8M}	96.3	5.527	6.484	97.4	5.235	5.700	96.1	5.532	7.374	93.3	6.283	8.773	77.4	8.558	14.646	
Q _{8M}	99.0	5.271	9.092	99.5	4.945	7.748	98.0	5.665	10.307	97.6	5.976	11.118	94.7	7.283	13.725	0.3
Q _{8M}	95.0	5.280	8.896	97.0	4.940	7.710	93.3	5.477	10.365	91.7	6.062	11.690	80.9	8.017	16.556	
Q ₈	90.3	6.203	13.417	90.9	6.300	14.030	89.6	6.390	14.765	88.8	6.594	16.956	78.4	8.571	24.081	-0.9
Q _{8M}	93.8	5.928	8.824	94.4	6.011	9.225	92.6	6.089	9.784	92.3	6.276	11.159	83.3	7.990	16.161	
Q _{8M}	94.8	6.418	14.309	95.6	6.368	14.844	95.0	6.419	15.416	94.7	6.930	16.990	89.3	7.973	23.195	0.7
Q ₈	91.2	6.073	13.447	91.2	6.097	13.853	90.5	6.168	14.528	89.3	6.524	16.533	80.5	8.032	23.406	
Q _{8M}	90.7	6.333	11.716	89.4	6.600	12.539	88.4	6.710	12.837	88.4	6.633	13.412	71.4	9.226	21.177	-0.5
Q _{8M}	94.9	6.046	7.625	93.5	6.242	8.149	93.7	6.319	8.074	92.4	6.291	8.759	77.4	8.558	14.646	
Q _{8M}	96.8	6.170	11.232	97.2	6.190	11.544	96.9	6.288	11.336	95.5	6.624	12.632	94.7	7.283	13.725	0.3
Q _{8M}	92.9	6.015	10.716	91.8	6.160	11.282	90.6	6.264	11.215	89.7	6.386	12.408	80.9	8.017	16.556	



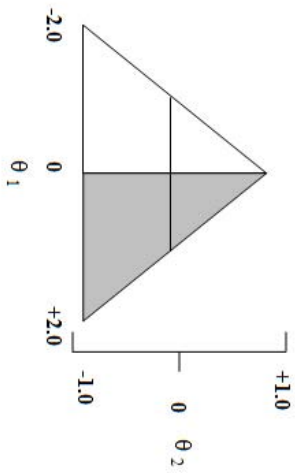
الجدول (7) يبين النسبة المئوية للقرء التجريبية والوسط والتباين التجريبيين لبعض إحصاءات Portmanteau من ضمنها الإحصاءات المعتادة والمقترحة لقرء بيانات مولدة وفق نموذج MA(2) عند حجم عينة (50) وقيم محتملات مختلفة من الجانب المائل للسطح الذي يمتلئ السموذج به لمعاملات هذا النموذج.

test	0.2			0.6			1.0			1.4			1.8			θ_1	θ_2
	power	mean	Y&R	power	mean	Y&R	power	mean	Y&R	power	mean	Y&R	power	mean	Y&R		
Q_{-s}	92.9	10.811	25.458	93.2	10.531	22.576	91.7	10.733	23.999	90.3	11.229	26.688	82.0	13.258	52.649	-0.7	
Q_{-M}	95.0	10.512	17.503	95.7	10.270	15.430	94.7	10.428	16.379	93.1	10.938	19.190	85.8	12.770	38.313		
Q_{-M}	96.0	10.576	24.296	97.0	10.394	21.679	96.8	10.576	23.034	94.6	11.070	25.396	89.4	13.404	50.376		
Q_s	93.4	10.471	24.616	94.2	10.240	21.868	92.9	10.433	23.469	91.1	10.926	25.770	82.5	13.106	51.181		
Q_{-s}	92.5	11.198	20.958	93.1	11.025	21.136	92.5	11.063	22.563	90.7	11.639	24.242	79.9	13.523	42.647		
Q_{-M}	95.8	10.842	14.579	96.1	10.683	14.469	94.4	10.708	15.465	93.7	11.280	17.521	84.1	13.068	32.951		
Q_{-M}	97.5	10.429	17.935	98.3	10.382	18.367	97.5	10.413	19.389	96.9	10.906	20.627	90.2	12.939	33.853		
Q_{-M}	97.5	10.592	18.932	94.7	10.482	19.183	93.7	10.516	20.438	92.7	11.564	23.589	82.7	13.006	37.203		
Q_{-s}	96.1	9.896	18.873	95.7	9.509	18.016	91.7	10.733	23.999	90.3	11.229	26.688	82.0	13.258	52.649		
Q_{-M}	97.7	9.704	12.924	97.0	10.394	21.679	94.7	10.428	16.379	93.1	10.938	19.190	85.8	12.770	38.313		
Q_{-M}	98.2	9.935	18.721	97.0	10.394	21.679	96.8	10.576	23.034	94.6	11.070	25.396	89.4	13.404	50.376		
Q_s	96.3	9.693	18.487	94.2	10.240	21.868	92.9	10.433	23.469	91.1	10.926	25.770	82.5	13.106	51.181		
Q_{-s}	95.2	10.389	18.163	93.1	11.025	21.136	92.5	11.063	22.563	90.7	11.639	24.242	79.9	13.523	42.647		
Q_{-M}	97.7	10.103	12.397	96.1	10.683	14.469	94.4	10.708	15.465	93.7	11.280	17.521	84.1	13.068	32.951		
Q_{-M}	98.9	10.045	16.392	98.3	10.382	18.367	97.5	10.413	19.389	96.9	10.906	20.627	90.2	12.939	33.853		
Q_{-M}	96.8	9.995	16.718	94.7	10.482	19.183	93.7	10.516	20.438	92.7	11.564	23.589	82.7	13.006	37.203		
Q_{-s}	96.6	9.570	16.680	95.7	9.509	18.016	91.7	10.733	23.999	90.3	11.229	26.688	82.0	13.258	52.649		
Q_{-M}	98.6	9.395	11.173	98.0	9.360	12.161	94.7	10.428	16.379	93.1	10.938	19.190	85.8	12.770	38.313		
Q_{-M}	98.7	9.684	17.591	98.4	9.577	17.551	96.8	10.576	23.034	94.6	11.070	25.396	89.4	13.404	50.376		
Q_s	96.9	9.408	16.698	96.5	9.321	17.429	92.9	10.433	23.469	91.1	10.926	25.770	82.5	13.106	51.181		
Q_{-s}	94.8	10.329	19.454	94.9	10.135	20.104	92.5	11.063	22.563	90.7	11.639	24.242	79.9	13.523	42.647		
Q_{-M}	97.5	10.010	13.029	97.4	9.870	13.596	94.4	10.708	15.465	93.7	11.280	17.521	84.1	13.068	32.951		
Q_{-M}	98.4	9.944	18.273	98.5	9.804	17.239	97.5	10.413	19.389	96.9	10.906	20.627	90.2	12.939	33.853		
Q_{-M}	96.0	9.916	18.163	96.4	9.748	18.093	93.7	10.516	20.438	92.7	11.564	23.589	82.7	13.006	37.203		
Q_{-s}	96.1	9.684	18.681	96.0	9.517	18.876	94.4	9.917	21.193	90.3	11.229	26.688	82.0	13.258	52.649		
Q_{-M}	97.4	9.528	12.625	97.5	9.397	12.771	97.1	9.734	14.427	93.1	10.938	19.190	85.8	12.770	38.313		
Q_{-M}	98.3	9.595	18.816	97.8	9.493	19.253	97.7	9.880	21.373	94.6	11.070	25.396	89.4	13.404	50.376		
Q_s	96.6	9.417	18.323	96.3	9.282	18.647	95.3	9.676	20.890	91.1	10.926	25.770	82.5	13.106	51.181		
Q_{-s}	94.3	10.512	19.936	94.6	10.318	18.757	94.1	10.544	20.592	90.7	11.639	24.242	79.9	13.523	42.647		
Q_{-M}	96.9	10.213	13.633	97.6	10.056	12.769	96.9	10.245	13.920	93.7	11.280	17.521	84.1	13.068	32.951		
Q_{-M}	98.8	9.814	17.404	98.7	9.730	16.433	98.5	10.007	18.727	96.9	10.906	20.627	90.2	12.939	33.853		
Q_{-M}	96.0	9.942	17.930	96.2	9.802	16.897	95.5	10.054	19.020	93.2	11.050	21.804	82.0	13.258	52.649		
Q_{-s}	92.1	11.042	24.007	90.7	11.159	27.539	91.2	11.269	29.993	88.8	11.791	31.111	82.0	13.258	52.649		
Q_{-M}	94.0	10.753	16.745	94.3	10.847	19.104	93.9	10.942	20.678	92.6	11.373	21.599	85.8	12.770	38.313		
Q_{-M}	95.5	11.088	24.862	95.1	11.157	27.372	94.5	11.378	30.461	93.4	11.850	31.968	89.4	13.404	50.376		
Q_s	92.4	10.842	23.944	91.2	10.995	27.018	91.8	11.100	29.694	89.4	11.597	31.051	82.5	13.106	51.181		
Q_{-s}	91.9	11.358	21.256	91.6	11.374	22.902	92.6	11.513	21.665	88.2	12.027	24.800	79.9	13.523	42.647		
Q_{-M}	95.5	11.012	14.821	94.4	11.033	15.952	95.0	11.142	15.104	92.6	11.566	17.241	84.1	13.068	32.951		
Q_{-M}	97.6	10.852	19.210	97.4	10.782	19.994	97.4	11.054	19.503	95.2	11.546	23.873	90.2	12.939	33.853		
Q_{-M}	93.0	10.852	19.479	93.3	10.856	20.707	93.4	11.061	19.782	89.5	11.564	23.589	82.7	13.006	37.203		



الجدول (8) يُمثل النسبة المئوية للقوة التحريكية والوسط أو التباين التحويلي لبعض إحصاءات Portmanteau ضمنياً الإحصاءات المعجلة والمقترحة ليو افى بيانات مولدة وفق نموذج MA(2) عند حجم عينة (100) وقيم معاملات مختلفة من الجانب المائل المظلل الذي يوضح المدى المسموح به لمعاملات هذا النموذج.

test	0.2			0.6			1.0			1.4			1.8			θ_2
	power	mean	var.	power	mean	var.	power	mean	var.	power	mean	var.	power	mean	var.	
Q ₂₅	91.3	23.694	63.680	91.0	23.344	64.493	91.4	23.776	67.109	91.4	24.464	85.800	91.6	25.017	150.821	0.7
Q _{25M}	93.8	23.359	46.157	94.1	23.015	46.706	94.5	23.399	48.621	94.7	24.072	65.052	94.8	24.707	147.633	
Q _{50M}	94.0	23.596	63.728	94.4	23.453	64.153	94.7	23.642	65.948	94.9	24.457	83.841	95.0	24.858	58.854	0.3
Q ₇₅	91.7	23.430	63.520	91.6	23.084	64.107	92.0	23.494	66.352	92.3	24.246	84.562	92.4	24.885	63.342	
Q ₉₀	94.8	23.636	45.257	94.7	23.452	46.079	94.9	24.087	49.976	95.0	24.119	49.139	95.1	24.119	49.139	-0.5
Q ₉₅	96.4	23.328	32.646	96.5	23.133	33.659	96.8	23.508	46.179	97.0	24.058	58.854	97.1	24.058	58.854	
Q _{95M}	97.0	23.110	44.097	96.8	22.939	44.953	97.1	23.583	47.583	97.1	23.583	47.583	97.1	23.583	47.583	-0.9
Q ₉₉	95.6	23.158	44.244	95.1	22.980	45.016	95.4	22.094	56.205	95.4	22.094	56.205	95.4	22.094	56.205	
Q _{99B}	94.1	22.435	53.013	94.6	22.094	56.205	94.5	23.399	48.621	94.5	23.399	48.621	94.5	23.399	48.621	
Q _{99M}	95.9	22.174	37.826	96.7	21.879	39.976	96.7	21.879	39.976	96.7	21.879	39.976	96.7	21.879	39.976	
Q _{99M}	96.0	22.454	52.187	96.6	22.076	55.950	96.6	22.076	55.950	96.6	22.076	55.950	96.6	22.076	55.950	
Q ₉₉	94.3	22.230	52.263	94.9	21.870	55.759	94.9	21.870	55.759	94.9	21.870	55.759	94.9	21.870	55.759	
Q _{99L}	95.2	22.988	43.486	95.2	21.728	47.292	95.2	21.728	47.292	95.2	21.728	47.292	95.2	21.728	47.292	
Q _{99L}	97.2	22.643	31.243	96.8	22.178	44.305	96.8	22.178	44.305	96.8	22.178	44.305	96.8	22.178	44.305	
Q _{99L}	97.9	22.561	41.129	96.8	22.939	44.953	97.1	23.583	47.583	97.1	23.583	47.583	97.1	23.583	47.583	
Q _{99L}	95.9	22.560	41.696	95.1	22.980	45.016	95.4	22.094	56.205	95.4	22.094	56.205	95.4	22.094	56.205	
Q _{99B}	95.0	21.888	48.902	94.6	22.094	56.205	94.5	23.399	48.621	94.5	23.399	48.621	94.5	23.399	48.621	
Q _{99M}	97.4	21.688	34.730	96.7	21.879	39.976	96.7	21.879	39.976	96.7	21.879	39.976	96.7	21.879	39.976	
Q _{99M}	97.2	21.905	49.256	96.6	22.076	55.950	96.6	22.076	55.950	96.6	22.076	55.950	96.6	22.076	55.950	
Q _{99M}	95.3	21.682	48.724	94.9	21.870	55.759	94.9	21.870	55.759	94.9	21.870	55.759	94.9	21.870	55.759	
Q _{99L}	95.5	21.716	41.358	95.2	21.728	47.292	95.2	21.728	47.292	95.2	21.728	47.292	95.2	21.728	47.292	
Q _{99L}	97.5	22.395	29.608	97.6	22.429	33.983	97.6	22.429	33.983	97.6	22.429	33.983	97.6	22.429	33.983	
Q _{99L}	98.2	22.201	39.979	98.6	22.178	44.305	98.6	22.178	44.305	98.6	22.178	44.305	98.6	22.178	44.305	
Q _{99L}	96.1	22.244	40.022	96.2	22.239	45.117	96.1	23.583	47.583	96.1	23.583	47.583	96.1	23.583	47.583	
Q _{99B}	94.2	22.155	51.135	95.4	22.472	51.395	97.6	22.699	60.567	98.2	24.464	85.800	98.2	24.464	85.800	
Q _{99M}	96.7	21.957	36.791	96.7	22.228	36.839	95.4	22.395	43.472	91.4	24.072	65.052	91.4	24.072	65.052	
Q _{99M}	96.7	22.193	50.720	97.2	22.369	51.761	95.0	22.735	59.855	91.9	24.457	83.841	91.9	24.457	83.841	
Q ₉₉	94.8	21.959	50.523	95.6	21.705	51.170	97.9	22.502	59.846	88.7	24.246	84.562	88.7	24.246	84.562	
Q ₉₉	95.6	23.050	43.923	95.8	23.295	43.682	94.1	23.446	47.162	90.3	24.485	63.342	90.3	24.485	63.342	
Q _{99L}	97.6	22.715	31.665	97.7	22.942	31.601	96.4	23.033	34.138	95.6	24.119	49.139	95.6	24.119	49.139	
Q _{99L}	98.6	22.479	41.347	98.5	22.567	41.977	97.3	22.899	44.243	94.9	24.058	58.854	94.9	24.058	58.854	
Q _{99L}	96.7	22.550	41.905	96.1	22.716	42.045	94.9	22.959	44.996	97.1	24.057	60.476	97.1	24.057	60.476	
Q _{99L}	91.2	23.773	70.261	91.8	23.751	62.336	92.5	23.449	57.414	91.2	23.810	64.306	91.2	23.810	64.306	
Q _{99M}	93.8	23.438	50.816	94.0	23.451	45.444	95.2	23.175	41.737	94.5	23.462	46.725	94.5	23.462	46.725	
Q _{99M}	94.1	23.759	71.355	94.5	23.751	61.535	95.3	23.363	56.089	94.8	23.792	64.379	94.8	23.792	64.379	
Q ₉₉	91.6	23.551	70.440	92.1	23.536	61.972	93.6	23.191	56.366	92.0	23.586	63.908	92.0	23.586	63.908	
Q _{99L}	93.9	23.886	47.116	94.4	23.814	44.098	94.6	23.603	42.759	93.7	23.945	48.961	93.7	23.945	48.961	
Q _{99L}	96.0	23.571	34.604	96.6	23.528	32.333	97.0	23.327	31.309	96.0	23.592	35.741	96.0	23.592	35.741	
Q _{99L}	97.0	23.204	45.130	97.5	23.178	42.169	98.5	23.873	38.726	97.3	23.319	46.276	97.3	23.319	46.276	
Q _{99L}	94.3	23.330	45.373	95.5	23.581	42.397	95.7	23.023	39.982	94.6	23.417	46.858	94.6	23.417	46.858	
Q _{99L}																θ_1
test																



" (1992) -1

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" (2009) -2

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